

# Are Kenyans biting the hand that feeds them?

When we destroy the Mau and other water towers, we endanger livelihoods and curtail economic growth

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An undisturbed natural forest. (Photo: KFS)



Finlays' plantations in Kericho, at the boundary of the Mau Forest Complex. The photo shows an intricate mix of tea plantations with eucalyptus and indigenous forest. (Photo: Finlays)

The Mau Forest Complex, which measures approximately 400,000 hectares, is the largest among the five water catchments in Kenya. The catchment stretches across eight counties, namely, Narok, Kericho, Bomet, Nakuru, Baringo, Keiyo Marakwet, Uasin Gishu and Nandi. This montane indigenous forest is among the few such forests remaining in East Africa.

The Mau catchment comprises 22 forest blocks (see table 1) that are managed by 33 forest stations under the Kenya Forest Service (KFS). However, the Maasai Mau block, covering 46,278 hectares, is Trust Land Forest and as such is managed by the Narok County Government. The originally gazetted forest area covered 452,007 hectares but a large part of the area was excised in 2001, reducing the forest land area to 416,542 hectares.

Table 1: Forest Blocks of Mau Catchment

No.	Forests block	No.	Forest block
1	Transmara	12	Nabkoi
2	Oi Pusimoru	13	Metkei
3	Maasai Mau	14	NorthernTinderet
4	East Mau	15	Timboroa
5	South West Mau	16	Kilombe Hill
6	Western Mau	17	Maji Mazuri
7	Forest	18	Chemorogok
8	Mau Narok	19	Lembus Forests
9	Mt Londiani	20	Likia
10	Molo	21	Kiptunga
11	Tinderet	22	Mariashoni

The Mau catchment is a source of 12 important rivers that traverse long distances within and outside the country, providing water for domestic, industrial and agricultural use and for power generation. The rivers draining from the Mau Forest Complex include Mara, Sondu, Nyando, Yala, Nzoia, Ewaso Ngiro, Njoro Naishi, Nderit, Makalia, Molo and Kerio. They drain into various lakes including Lake Victoria, Lake

Nakuru, Lake Natron, Lake Baringo and Lake Turkana.

## The importance of the Mau Forest Complex in Kenya

### Ecological goods and services

The Mau Forest catchment provides invaluable ecological goods and services, including river flow regulation, flood mitigation, water storage, recharge of groundwater, reduced soil erosion and siltation, water purification, promoting biodiversity, micro climate regulation, and nutrient cycling and soil formation. Through these services, the Mau Forest Complex sustains many natural habitats in the lower areas of the catchments.

### Water resources

The water from Mau Forest Complex serves more than 4 million people inhabiting 578 locations in Kenya and several locations in northern Tanzania. The drainage system is today a source of numerous rivers that supply water to communities and urban centres in the region, thus supporting livelihoods and economic development. The forest canopy helps reduce the force of rainfall, enabling percolation of water into the ground, thus mitigating soil erosion and siltation of water bodies.

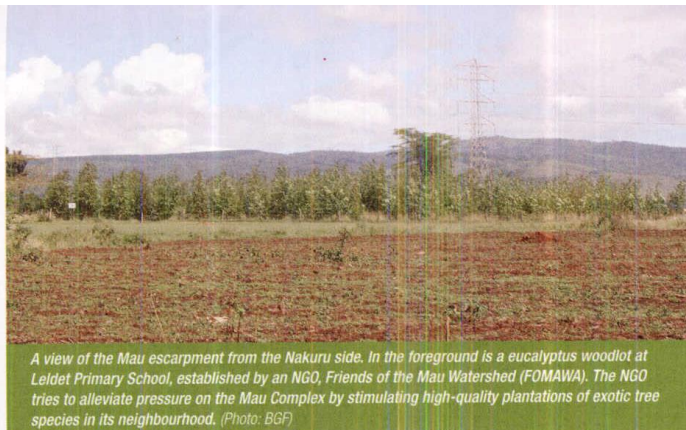
### Carbon sink

The Mau Forest Complex has a continuous forest canopy that serves as a carbon sink absorbing carbon dioxide from the atmosphere. This enables carbon to be stored in wood biomass as a reservoir, a process described as carbon sequestration. The forest releases oxygen, thus purifying the air and supporting the survival of humankind. Further, the ecosystem influences the micro-climate of an area, making it extremely favourable for agricultural production.

### Biodiversity resources

The Mau Forest catchment is rich in both flora and fauna. Vegetation patterns are complex, but there is a broad altitudinal zonation from west to east. There is lower montane forest below 2,300 metres above sea level, giving way to thickets of bamboo *Arundinaria alpina* mixed with forest and grassland, and finally to montane sclerophyllous forest near the escarpment crest. The lower montane forest is in best condition in the south-western Mau Nature Reserve, where characteristic trees include *Aningeria adolfi-friedericii* (muna) and *Strombosia scheffleri* (strombosia).

However, illegal logging has taken place, leading to loss of biodiversity with *Polyscias kikuyuensis* (mutati) the most affected. Other indigenous species such as *Tabernaemontana*



A view of the Mau escarpment from the Nakuru side. In the foreground is a eucalyptus woodlot at Leidet Primary School, established by an NGO, Friends of the Mau Watershed (FOMAWA). The NGO tries to alleviate pressure on the Mau Complex by stimulating high-quality plantations of exotic tree species in its neighbourhood. (Photo: BGF)

*stapfiana* (mwelele), *Syzygium guineense* (mshwi) and *Neoboutonia macrocalyx* (kibatwa, mwege, mutundu) are found here, while pockets of less-disturbed forest hold *Olea capensis* (Elgon olive), *Prunus africana* (red stinkwood), *Albizia gummifera* (omulera, mcani mba) and *Podocarpus latifolius* (podo, East African yellowwood). Substantial parts of the high *Juniperus-Podocarpus-Olea* forest have been encroached and cleared, although some sections remain in good condition.

### Bird watching

The Mau Forest catchment is home to a wide variety of birds, thus attracting bird watching. Several areas within the catchment have been declared *Important Bird Areas (IBAs)*. These hold significant numbers of one or more globally threatened bird species. Some birds migrate/congregate in exceptionally large numbers. These sites are coordinated by Nature Kenya, an NGO, in collaboration with Birdlife International.

These areas are supported by swamps and rivers flowing from the Mau Forest. The swamps include Koguta (Sondu River); Kusa (Nyando River); Mara Bay and Musoma.

### Firewood

The Mau Forest is a major source of firewood derived from dried wood. The firewood is collected mainly by vendors and sold to the urban centres in the region.

### Non-timber forest products

The catchment is a source of non-timber forest products which provide livelihoods to local communities. These products include herbal medicines, honey and wild fruits. The products earn the communities livelihoods without destroying the forests and are thus an incentive to conservation. In addition, local communities graze extensively on the Mau forest; more so during the dry season.

## Contribution to economic growth of various sectors

The Mau Forest Complex supports the economic growth of key sectors including energy, tourism, agriculture (cash crops, subsistence crops and livestock) as well as water supply to urban centres and industries.

The market value of goods and services generated annually in the tea, tourism and energy sectors to which the Mau Forest Complex has contributed, is in excess of Ksh 20 billion. This does not reflect provisional services such as water supply to urban areas or support to rural livelihoods, in particular in the Lake Victoria basin outside the tea growing areas. This figure also does not reflect any potential economic development in the catchment of the Mau Forest Complex, in particular in the energy sector.

The estimated potential hydropower generation in the Mau Complex catchments is approximately 508 megawatts, representing 41 per cent of the current total electricity generation capacity in Kenya.

### Agriculture sector

Approximately 5.5 million people depend on agriculture for their livelihoods for both subsistence and cash crop. Some of the cash crops in the region include tea, wheat, sugarcane, barley, rice and pyrethrum.

The major tea growing area covers Kericho, Kisii and Nandi, providing jobs to 50,000 people and a livelihood to 75,000 small farmers supporting 645,000 dependants. The 2009 sale value of the tea from western Kenya was estimated at Ksh 15.2 billion, comprising two thirds of agricultural production from the region. The tea benefits from the forest by Ksh 13.8 billion a year. The favourable micro climatic conditions of the Mau catchment, namely, regular rainfall, adequate soil moisture and moderate temperatures, provide suitable conditions for tea production (Ministry of Agriculture Report, 2011).

Rice is an equally important cash crop from this region. River water from the Mau catchment is used for irrigation in the production of 95 per cent of rice grown in paddy schemes in the region.

The deltas of Yala and Nyando rivers comprise a large area under rice production in the region. The estimated market value of rice in 2006 was Ksh 1 billion. It is important to note that rice contributes significantly to food security in the country.

#### Water sector

The Mau Forest Complex is the single most important source of water for key rivers in western Kenya and Central Rift Valley. The major urban centres that depend on the water flowing from the Mau Forest Complex include Bomet, Egerton University, Elburgon, Eldama Ravine, Kericho, Molo, Nakuru, Narok and Njoro.

#### Energy sector

Hydroelectric power contributes over 57 per cent of the national grid. The rivers from Mau catchment contribute an estimated 508 megawatts (MW), representing 41 per cent of the total current installed capacity in the country. The Sondu and Ewaso Ngiro rivers have the largest hydropower potential estimated at 209 and 220 MW respectively. The Sondu Miriu Hydropower Scheme, with an electricity generation capacity of 60 MW, depends on Sondu River originating from South West Mau Forest Reserve (Ministry of Energy Report, 2011).

The Sang'oro Hydropower Scheme, an extension of the Sondu Miriu Scheme, is currently under implementation with an estimated capacity of 21.4 MW. Downstream, the Magwagwa Multipurpose Dam Scheme, with an anticipated capacity of 94.6 MW, has also been proposed.

Large tea estates in Kericho have installed hydropower plants on the tributaries of the Sondu River, generating 4 MW. Additional potential sites for hydroelectric power generation have been identified within the Mau Forest Complex. A recent feasibility study has assessed the hydropower generation potential and economic viability of four sites in the Nandi Highlands with an estimated capacity of 9.5 MW (Ministry of Energy Report, 2011).

The hydropower plants either currently being developed or proposed in the Mau Complex catchments will have the potential to generate 189.4 MW per year, with an estimated value of Ksh 10 billion annually. The conservation of the Mau Forest catchment is imperative in order to attain the projected hydropower generation and guarantee an enhanced power generation in the country (Ministry of Energy Report, 2011).



The tree on the left, under which a person is standing, is *Polyscias fulva* (nyakom-ondiek, soyet), a close relative of *P. kikuyensis* (mutati), a fast-growing species that produces a white, relatively soft wood, used for making boxes, beehives, matches, etc. Both species are fast-growing, and are found in the forests that cover Kenya's water towers. (Photo: BGF)

#### Tourism sector

The forest ecosystem comprises an important site for ecotourism due to its rich plant and animal biodiversity and splendid scenery. The common wildlife species in this region include elephants, monkeys, antelopes and a wide range of birds. The ecosystem is home to Maasai Mara National Reserve and Lake Nakuru National Park, Kerio Valley National Reserve, South Turkana National Reserve, Lake Baringo and Lake Natron.

Other important tourism attraction sites include Loita Hills, Nguruman, Suswa caves and the Mau Escarpment. If developed, these sites have potential to diversify tourism in the region, increase overall visitor flow while relieving pressure on the Maasai Mara.

The rivers traversing through national parks and reserves in the Mau Forest Catchment are illustrated in Table 3 below.

Table 3: Rivers Traversing National and Game Reserves

River	National/Game Reserve
Mara River Basin	Maasai Mara Reserve (Kenya) Serengeti (Tanzania)
Kerio River Basin	Kerio Valley Kapnarok
Nzoia River Basin	Kakamega Forest
Njoro, Makalia, Nderit and Naishi	Lake Nakuru Park
Molo River	Lake Baringo

The water flow volumes in these rivers have reduced over time and sometimes the rivers dry up completely due to prolonged droughts and climate change. For example, the 2008/9 drought left the spectacular Makalia Falls dry. The volume of water in the Mara River reduces during the dry season, adversely affecting the magnificent wildebeest crossing.

Research by the United Nations Environment Programme (UNEP), KEFRI and UNREDD estimates the economic benefit of the Mau Forest to be more than Ksh 110 billion per year, including benefits to tea cultivation (Ksh 13.8 billion), the Sondu-Muriu hydro-electric power generation (Ksh 11.2 billion) and tourism at Lake Nakuru (Ksh 5.5 billion). Other services provided by the forest include an estimated Ksh 7.5 billion in storing carbon, Ksh 8.3 billion in controlling soil erosion and Ksh 1.8 billion in support of fisheries.

A recent study (Kipkoech et al, 2011) shows that three forest blocks of Eastern Mau (66,000 hectares), Trans Mara (34,400 hectares) and Maasai Mau (46,000 hectares) generate US\$ 265 million per year. Indirect uses (soil, hydrological and climate regulation) account for 87.6 per cent and direct uses (firewood, grazing, logging, etcetera) for 12.4 per cent. The study reveals that benefits to stakeholders far from the forest periphery were greater than those generated by forest adjacent communities.

## Rehabilitation of Mau Catchment ecosystems

Kenya's new constitution requires the country to increase its forest cover to 10 per cent. Yet between 2000 and 2010, deforestation in the water towers amounted to an estimated 28,427 hectares, leading to reduced water availability of approximately 62 million cubic metres per year.

Kenya's economy is highly sensitive to water availability and droughts. For example, inflation spiked above 10 per cent on three occasions between 2000 and 2010, each time driven by drought combined with increasing crude oil prices and weaker exchange rates. According to a joint KFS and UNEP report, deforestation deprived Kenya's economy of 5.8 billion shillings (\$US 68 million) in 2010 and 6.6 billion shillings in 2009, far outstripping the roughly 1.3 billion shillings injected from forestry and logging each year.

The reasons for deforestation are multiple and complex. They range from unregulated charcoal production, harvesting of fuel wood, logging of indigenous trees, cultivation in the indigenous forest, shamba-system practices, livestock grazing, quarry landslides and human settlements.

### Rehabilitation efforts

The Kenyan government has recognised the value of its forests, and is working on the rehabilitation of the Mau Forest Complex. Over the last one-and-a-half years, more than 21,000 hectares of forestland have been repossessed, and 10,000 hectares have been rehabilitated by the government and partners.

A number of programmes and activities have been started to improve the livelihoods of communities living adjacent to the forest and address the situation of the forest-dwelling communities, in particular the Ogiek.

In addition, the government gazetted the Kenya Water Towers Agency (KWTA) on 13 April 2012, to take over the responsibilities of coordinating and supervising the rehabilitation, conservation and management of Kenyan water towers.

KFS, the main government agency responsible for management of the Mau Forest Complex, has signed agreements with the African Wildlife Foundation and Malaika Ecotourism & Coral Cay Conservation (UK) to rehabilitate 5,400 and 150 hectares respectively, of Mau Forest Complex. Other organisations with interest include James Finlay (K) Ltd, to rehabilitate 100 hectares, and Save the Mau Trust Fund, expected to rehabilitate 8,600 hectares.

In addition, Kenya Commercial Bank, Barclays Bank of Kenya, Equity Bank, East African Breweries Limited and Nation Media Group have pledged to support rehabilitation efforts of the Mau Forest. Civil society organisations and local

communities are also actively involved in the rehabilitation activities.

The Ministry of Environment and Mineral Resources has played a leading role in the provision of seedlings to support tree planting by various stakeholders. The Ministry of Energy, Ministry of Lands and Ministry of State for Defence have committed to rehabilitation of almost 50,000 acres, in partnership with KFS.

### Resource mobilisation

Through KFS, Kenya Wildlife Service (KWS), Kenya Forest Research Institute (KEFRI) and KWTA, Kenya has invested heavily in forest management, enforcement, research and rehabilitation of the Mau Forest Complex.

**USAID** is assisting the country to develop a robust blueprint for management and rehabilitation of waters through the use of Mau and Cherangany forests as model forest systems through a three-year project (2015-2018). The **French Development Agency** has developed a proposal focusing on resource assessment for the entire Mau Forest Complex and rehabilitation of Eastern Mau Forest Reserve.

The **European Union** has supported various projects to rehabilitate the Mau. A project proposal was developed with a proposed budget of 2.3 million euros.

### Challenges to Rehabilitation

- Lack of a clear policy on the relocation and compensation of settlers in key forest blocks.
- Uncertainty by local communities living inside the forest areas that has created social distress and hostility towards rehabilitation efforts.
- Inadequate use of technical guidelines on tree planting that has led to low survival rates and total failure in some cases.
- Lack of coordination between sectors in the rehabilitation efforts that has led to duplication of efforts, institutional conflicts and confusion among stakeholders and potential partners.
- Inadequate awareness of the value of forests ecosystems in the provision of ecological goods and services at national level.
- Inadequate awareness of appropriate land use and conservation methods.
- High poverty levels leading to direct dependence on forest resources.
- High population growth leading to encroachment into forest land.
- Slow implementation of the Forest Act 2005 aimed at facilitating establishment of community forest associations (CFAs) across the country. The CFAs are expected to formulate a specific forest management plan in their areas of jurisdiction.

- Inadequate, irregular and uncoordinated surveillance of the forest boundary to avoid further encroachment.

- WTA is still weak and invisible at the grass roots level, thus creating uncertainty and confusion.
- Lack of coordinated interventions by policy-makers.

- Poor infrastructure for forest management.

Recent studies propose the inclusion of the following activities:

- Investment in management and enforcement protection against settlements and overgrazing; and rehabilitation of degraded sites;
- Investment in the forestry sector to increase the efficiency in production, especially in sawn timber and charcoal;
- Address the growing trend of dependence on imports of forest products, which constituted more than 50 per cent of domestic output for the year 2009;
- Ensure adequate regeneration after harvest and an increased forest plantation growth in the long-term;
- Regularise incentives such as payment for ecosystem services, trading and insurance schemes;
- Mobilise funds from various sources such as REDD+, Climate Change Adaptation and carbon trading schemes;
- Encourage governments to implement policies that encourage sustainable use of natural resources.

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