



It's time to reclaim lost ground

Eldoret residents are ready to pay to conserve Moiben River, the source of water for the town

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Marakwet District is one of the most heavily forested districts in the country where forests and trees are estimated to occupy 40 per cent of the total land. Most forest blocks in the district are located within the Cherangany Hills and form one of the largest remaining natural forests in western Kenya.

It is an important water catchment area for rivers that flow to Lake Victoria and the drylands of north western Kenya. The rivers provide drinking water to millions of people and livestock, and for industrial and irrigation activities.

Chebara Dam is one of the largest projects that source water from Cherangany Hills for use in Eldoret town and its environs. The area is also an important source of roundwood for production of sawnwood and polewood, widely traded in western Kenya and other regions in the country. The value of the forestry sector output is only second to agriculture in income generation and employment opportunities in the region.

These forest blocks host several species of fauna and flora; a few may be endemic to the ecosystem. The forest consists of forest blocks owned by the state and managed by Kenya Forestry Service (KFS) and large private plantations estimated at over 120,000 hectares. However, like most public

Table 1: Information on forest stations in the area

Forest station	Forest block	Size in hectares	Remarks
Cheptongei	Sogotio	3561.2	Extensive encroachments in Chemurgoi and Sogotio and boundary encroachments visible
	Cheboyit	2486.8	
	Kipkunur	15175.7	
	Chemurkoi	3965.9	
Cherangany	Kiptaber	12,886.2	Extensive boundary encroachments and settlements in Toropket and Koisungur
	Koisungur	1086.8	
	Kerer	2160.2	
	Toropket	117.4	
Chesoi	Embobut	21933.9	60% of the forest under illegal settlements. An important water catchment that supplies all irrigation water in Tot Division.
Total		65,500.3	

forests, management is inadequate because of outdated plans and scarce resources for supervision.

Due to the shape and size of the forest blocks, the boundary in contact with farmers is very long, thus exposing the forests to rampant poaching of tree products, illegal settlements, overgrazing, cultivation and other illegal activities. The forest management blocks are shown in Table 1.

The major commercial trees found in the Cherangany forests include *Juniperus procera*, *Hagenia abyssinica*, *Podocarpus latifolius*, *Prunus africana*, *Croton macrostachyus* and *Arundinaria alpine*, among many other species. The animals found in the forests include hyenas, leopards, Colobus monkeys and bongos, among many other smaller animals.

The Moiben River structure

A GIS map developed for the Moiben River shows the different branches and tributaries. Except for the three tributaries from Tembu areas and Kapkochur forest and a few others at the middle and lower Moiben River, the rest of the streams in the catchment originate from farms (Figure 1). It is a widely held view that most river sources in key water towers originate from forests but the map shows that most tributaries of the Moiben River originate from private farms. This is a very interesting finding that confirms

Figure 1

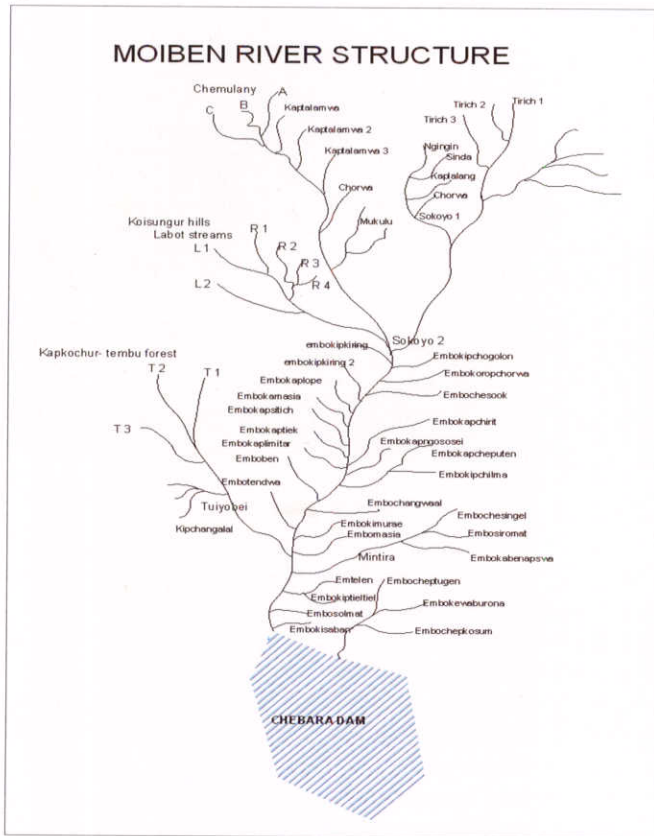
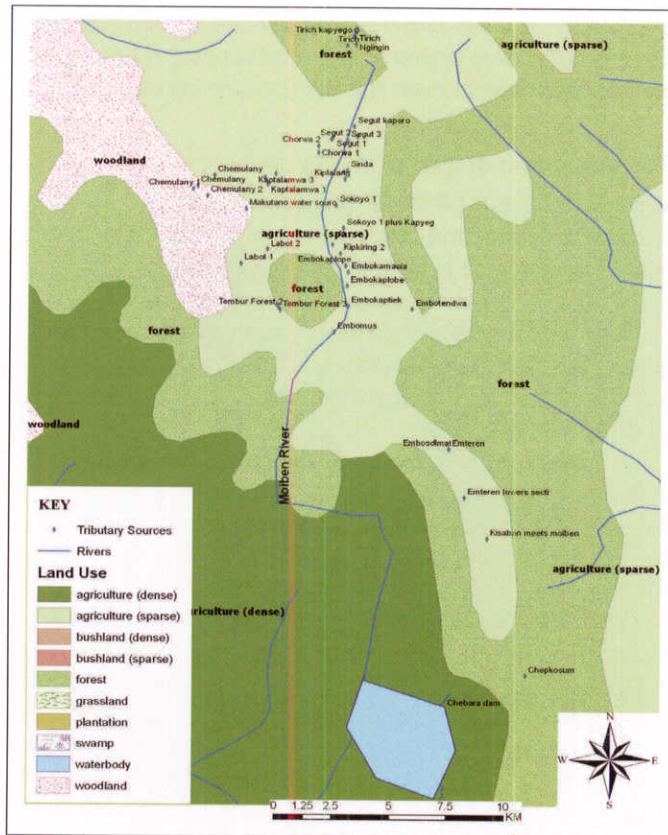


Figure 2: Land use categories in Moiben River catchment



that farms are the main areas that need attention so as to restore their functions for better provision of water supply.

Land uses in the catchment

Moiben is one of the important river systems that originate from Cherangany Hills with catchments from both public and private farm forests comprising large and small-scale farmers. The existing land uses include the following, but the area also has swamps and private forests.

Table 2: Land uses in the Moiben River catchment

Category	Area (ha)	Percentage
Public or government forests	5,605	4.6
Intensive agriculture	29,280	24.4
Sparse agriculture	84,225	70.2
Open woodland	890	0.7
Total catchment	120,000	100

According to the survey, 40 years ago there were 29 main tributaries of the Moiben River originating from the forests but 11 have since disappeared, while the remaining have experienced reduced volumes of water. Farm sizes range from 4 to 120 hectares in the upper catchment areas. The elevations of the Moiben River catchment area range between 2350 and 3122 masl.

Historical perspectives

According to the local residents, the Chemulany area was once dominated by indigenous tree species, mainly *Juniperus procera*, indigenous bamboo and glades dominated by wire-grass. The area was wet throughout the year and animals like buffaloes roamed the impenetrable wetlands. Reeds and *Hagenia abyssinica* grew in the marshy areas.

Food crops like maize took long to mature. The area was inhabited by a few pastoralists as the harsh cold weather scared away most people. In the late 1920s, the colonial administration wanted to encourage farmers to settle in the area and introduced modern livestock and crop farming.

The colonial agricultural office introduced Merino sheep and settlers were brought in from many places within the Keiyo-Marakwet area. To encourage the settlers to move into the area, they were given free Merino sheep and land with titles. However, due to the hostile climatic conditions at the time, few settlers were willing to settle in the area and the few who did were allocated larger pieces of land. To diversify agricultural produce from livestock (mainly sheep keeping) the colonial agriculture office in the 1940s introduced growing of potatoes, peas, cabbages and pyrethrum.

The cutting down of forests in the Cherangany Hills began with the introduction of cultivation agriculture and peaked in early 2004 when the banning of timber harvesting in public forests created a shortage of timber countrywide. The forested farmlands of Cherangany Hills were some of the areas targeted for timber harvesting from indigenous tree species in the country. The intensified logging fuelled by a high demand for timber and high prices on offer led to a drastic loss of forest on farms. The most affected were forests along rivers and wetlands within the catchment areas, compounded by the fact that most of the forests were located on private farmlands.

The Nginging-Kaplang catchment site

The Nginging East tributary is the permanent head source of the Moiben River. It originates from farmlands and later enters the forest many kilometres downstream. The catchment was formerly a scantily forested area intertwined by grasslands typical of high altitude areas above forest zones. However, expanding agricultural activities have accelerated the clearing of the farmlands. The high demand for horticultural produce from the area and good prices for potatoes in Eldoret and Kitale, and sometimes Nairobi and Mombasa, has seen expansion of potato farming within the catchment area.

The key tributaries to Nginging and Kaplang have started to show decreased water levels and the likelihood of them becoming seasonal is high. The volume of water is reported to have considerably decreased in many streams including Sinda East because of forest clearance and cultivation on the stream banks.

The four tributaries that join at Sogoiyo have been greatly affected by recent agricultural development in the Kaptalamwa area where intensive agricultural activities began in earnest in 2004. The agricultural activities

concentrate mostly on cultivation of potatoes, cabbages, peas and green onions. Rearing of Merino sheep for wool production has increased in the area due to recent increased demand for wool in emerging textile industries.

The perception of the residents on water catchment protection

The people sampled indicated that farmers incur losses when they conserve forest on farms in order to maintain stable river banks and minimise soil erosion. This is because farmers forego income-generating farming activities. This was confirmed by earlier socioeconomic studies done in farms within the Labot tributary catchment area of Lelan location that showed that farming enterprises were more profitable than forest conservation (Langat and Cheboiwo, 2005).

The residents were of the opinion that conservation efforts of water catchments for provision of better quality and quantity of water did not bring them any direct benefits. They felt that to motivate them to conserve forests and hence water courses, they should be compensated for perceived losses based on the area of conserved forests and units of river banks.

Thus, the government and other agencies should make the development of clear criteria for assessment of environmental services a priority before implementation of payment for environmental services schemes. Landowners proposed that restoration of degraded water catchments should involve planting of indigenous tree species known to stabilise banks and provide clean water such as *Hagenia abyssinica* (sewerwa), *Prunus africana* (tenduet) and *Arundinaria alpina* (mountain bamboo).

Some key findings

The landowners felt that since there are many players in the forest and water conservation sectors that have overlapping interests in the conservation of water catchments, there is likely to be conflict, duplication of efforts and wastage of resources. There is thus a need for harmonisation of public and private efforts for maximum impacts. The landowners felt that mapping of the extent of the critical catchments and specific areas of the catchments needs to be done, so as to quantify and qualify the efforts needed from them. There was a general observation that the fast decreasing tree and vegetation cover in the catchments and along the river courses, and the increasing impurities in local drinking water, need urgent attention.

Potential avenues for forest conservation

There were several proposals that the local communities felt could restore the water catchments areas. These included the following:

- Provision of tree seedlings for restorative plantings in the degraded areas.
- Support of local communities in tree nursery establishment.
- Development of project proposals for intensification of on-farm tree planting to ease pressure on tree resources in public forests.
- Water projects for local households in order to ease pressure on streams within the catchment area.
- Land compensation commensurate with opportunity costs of alternative land uses.
- Depopulation of the water catchment through compensation for alternative land and possibly monetary compensation to land owners within key water tributaries.
- Levy based on use of water resources from the Moiben River with some of the funds going towards community development through local authorities or relevant appropriate institutions.
- Employment of local people in environmental conservation activities.
- Creating awareness on the statutory requirements for river bank management such as non-cultivation of specified distances classified as protection belts by the Agricultural and Water Acts.
- Enhancing adoption of good agricultural practices such as construction and maintenance of terraces, planting of trees or fodder grass along the contours and river banks.



Challenges on private farms

- Higher rates of harvesting of trees on farms, mostly due to high demand and prices for timber because of the ban on logging in public forests and increased farming activities.
- The enforcement of legislation on farming along river courses has been weak and awareness on its existence has been inadequate.
- Increased population in the catchments and faster subdivision of land that has resulted in enhanced agricultural activities and cutting of trees along the water courses.
- Increased livestock population and reintroduction of Merino sheep-rearing for wool has increased grazing pressure in the water catchments on farm forests.

Challenges on Government forests

The local people have unlimited access to grazing in public forests. This custom has been overstretched over the years with large numbers of animals, and has suppressed regeneration. The forest blocks at the head and midstream are heavily encroached and many illegal settlements are located in the water catchment areas. Highly valuable timber species such as podo, cedar and *Hagenia abyssinica* have been heavily harvested by poachers, leaving some places bare of vegetation.

These developments have degraded the water catchments and in some cases led to the disappearance of streams. In Tirich catchment areas, the local people report that there were 29 tributaries originating from public forests but now only 11 remain, though with reduced volumes of water. The disappearance of streams is attributed to forest degradation, but our studies could not confirm the real cause of such hydrological changes. However, we observed the dried stream courses.

Conclusions

The Moiben River system is key to the provision of quality water to residents of Eldoret and surrounding areas. The ecosystem within the Moiben River is threatened by human activities upstream. A number of stakeholders are involved in conservation and development projects in the area. Two socio-economic surveys undertaken in both the catchment area and in Eldoret itself show that upstream communities are aware of the threats to the ecosystem and of the measures to be undertaken, and residents of Eldoret were willing to pay to support conservation. The study identified a range of incentives to upstream communities to support conservation of water sources that drain into Moiben River up to Chebara Dam.

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