

Mau Complex and Marmanet forests

Environmental and economic contributions

Current state and trends

Briefings notes compiled by the team that participated in the reconnaissance flight on 7 May 2008, in consultation with relevant government departments.

20 May 2008

Executive summary

1. Overview

The Mau Complex forms the largest closed-canopy forest ecosystem of Kenya, as large as the forests of Mt. Kenya and the Aberdare combined. It is the single most important water catchment in Rift Valley and western Kenya. Through the ecological services provided by its forests, the Mau Complex is a natural asset of national importance that supports key economic sectors in Rift Valley and western Kenya, including energy, tourism, agriculture (cash crops such as tea and rice; subsistence crops; and livestock) and water supply. The Mau Complex is particularly important for two of the three largest foreign currency earners: tea and tourism.

2. Economic contributions

The market value of goods and services generated annually in the tea, tourism and energy sectors alone to which the forest of the Mau Complex and Marmanet have contributed, is in excess of Kshs 20 billion. This does not reflect provisional services such as water supply to urban areas (Bomet, Egerton University, Elburgon, Eldama Ravine, Kericho, Molo, Nakuru, Narok, and Njoro) or support to rural livelihoods, in particular in the Lake Victoria basin outside the tea growing areas. This figure also does not reflect potential economic development in the catchments of the Mau Complex and Marmanet, in particular in the energy sector. The estimated potential hydropower generation in the Mau Complex catchments is approx. 535 megawatts, representing 57% of the current total electricity generation capacity in Kenya.

3. Environment and economic stability

Looking forward, environmental stability and secured provision of ecological goods and services will remain essential to attain sustainable development in Kenya. They are cross-cutting, underlying requirements to achieve Vision 2030 - Kenya's development blueprint aiming at making the country a newly industrializing middle income nation, providing high quality of life for all the citizens.

4. Environmental and economic threats

Despite its critical importance for sustaining current and future economic development, the Mau Complex has been impacted by extensive illegal, irregular and ill-planned settlements, as well as illegal forest resources extraction.

Degazettement of forest reserves (excisions) and continuous widespread encroachments have led to the destruction of some 104,000 hectares representing over 24% of the Mau Complex area over the last 10 years. In 2001, 61,023 hectares of forest in the Mau Complex were excised. In addition, some 43,700 hectares have been encroached in the remaining protected forests of the Mau Complex. In the forests of Marmanet, some 11,000 to 12,000 hectares have been lost to illegal and irregular settlements. Such an extensive and on-going destruction of key natural assets for the country is a matter of national interest. It presents significant environmental and economic threats and underlines a breakdown of law and order, with ramification to internal security and conflicts.

I. Introduction

Unlike Mt. Kenya or the Aberdare, the Mau Complex is not well known to many Kenyans. It does not feature high peaks that are landmarks in the Kenyan landscape. It does not include any national park or national reserve. Its tourism potential is yet to be developed. Its name does not refer to one protected area. Indeed, the Mau Complex comprises 16 contiguous forest blocks, gazetted as forest reserves or trust land forest, each of them having its own name, many of them making no reference to “Mau”. It also includes six satellite forest blocks that are not contiguous to the main blocks but are part of the same ecosystem.

The Mau Complex, however, forms the largest closed-canopy forest ecosystem of Kenya, as large as Mt. Kenya and the Aberdare combined. It is the single most important water catchment in Rift Valley and western Kenya. Through the ecological services provided by its forests, the Mau Complex is a natural asset of national importance that supports key economic sectors in Rift Valley and western Kenya, including energy, tourism, agriculture (cash crops such as tea, rice, wheat, barley, pyrethrum; subsistence crops; and livestock) and water supply.

Despite its critical importance for sustaining current and future economic development, the Mau Complex has been impacted negatively by extensive illegal, irregular and ill-planned settlements, as well as illegal forest resources extraction.

Alerted by key partners, in particular the United Nations Environment Programme (UNEP), the Ministry for Environment and Mineral Resources participated on 7 May 2008 in an aerial reconnaissance of forest destruction in the Mau Complex and in Marmanet. The findings of the aerial reconnaissance are alarming.

This report highlights the environmental and economic importance of the forests of the Mau Complex and Marmanet to provide a better understanding of the issues at stake. It summarizes the findings of the aerial reconnaissance of 7 May 2008, supported by information and data received from various government departments, and provides recommendations to re-establish law and order in the protected forests and restore critical catchments to address current environmental and economic threats. The report confines itself to technical issues (statement of facts), but does not attempt to address the deep-seated, underlying political issues.

II. Environmental and economic importance of the Mau Complex and Marmanet forests

1. Location and extent

The Mau Complex forests are located on the western side of the Rift Valley. They span north-south from Eldama Ravine to Narok and east-west from Nakuru to Kericho (see Map 1). They form the largest closed-canopy forest ecosystem of Kenya. Before the disputed 2001 excisions, the Mau Complex forests covered some 420,851 hectares, an area as large as the forests of Mt. Kenya and the Aberdares combined (see Annex 1).

The Marmanet forests are located on the eastern escarpment of the Rift Valley, north of Nyahururu. They comprise five forests reserves: Lariak, Marmanet, Ol Arabel, Rumuruti and Uaso Narok (see Map 2). Before the disputed 2001 excisions, the Marmanet forests covered some 43,524 hectares (see Annex 2).

2. Key water catchments

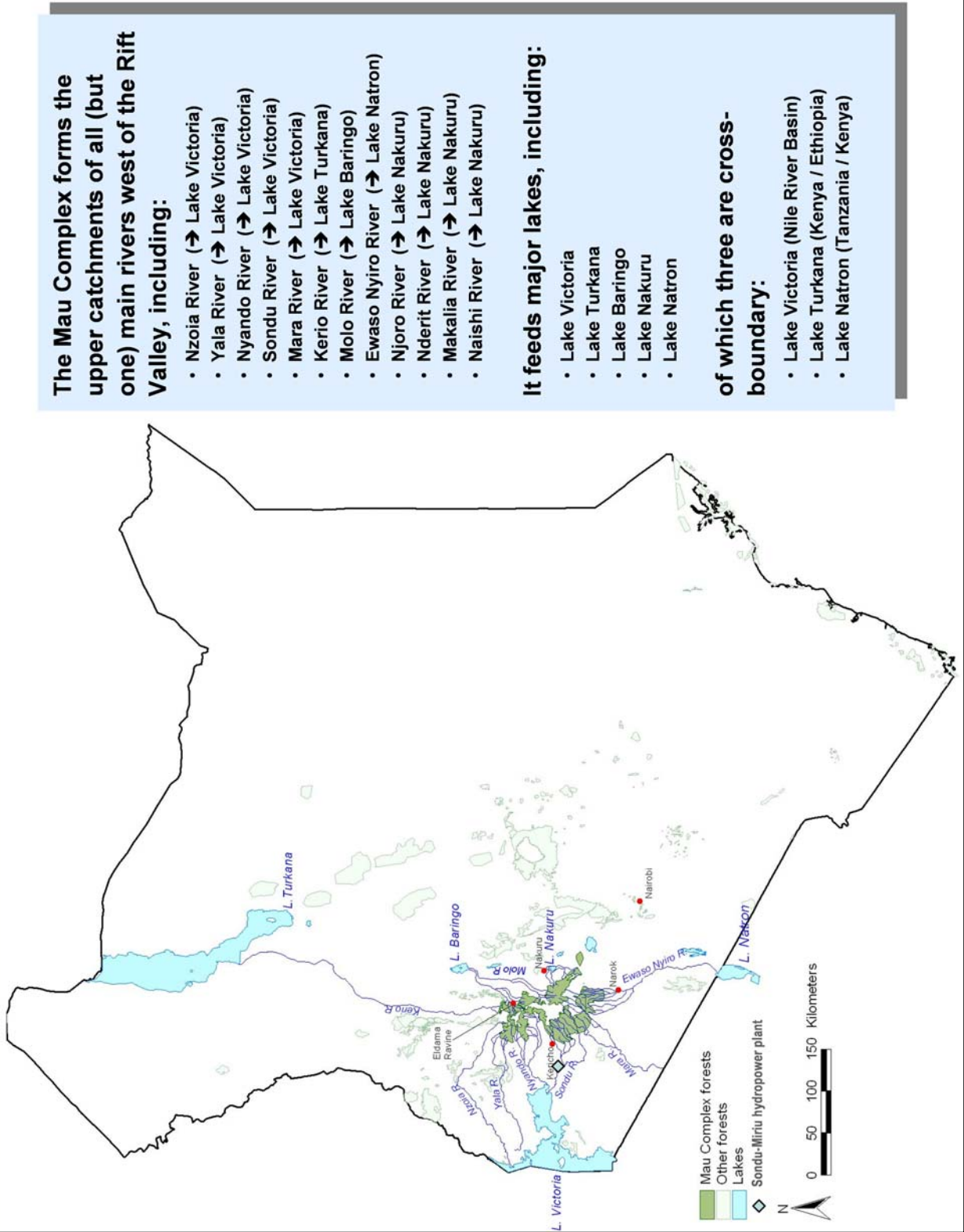
The Mau complex is the largest of the five “water towers” of Kenya, the others being Mt. Kenya, Aberdares, Cherangani Hills and Mt. Elgon. The Mau Complex forms part of the upper catchments of all (but one) main rivers on the west side of the Rift Valley, including Nzoia, Yala, Nyando, Sondu, Mara, Ewaso Ngiro (south), Naishi, Makalia, Nderit, Njoro, Molo and Kerio. Through these rivers, the Mau Complex feeds major lakes, including Victoria, Turkana, Baringo, Nakuru and Natron, of which three are cross-boundary lakes (see Map 1).

The Marmanet forests are catchments for four rivers: Ewaso Nyiro (north); Mukutan, Ol Arabel and Sandai. Those rivers drain into two lakes, Baringo and Bogoria, and into one major swamp: Lorian Swamp (see Map 2).

3. Critical to main economic sectors and future growth

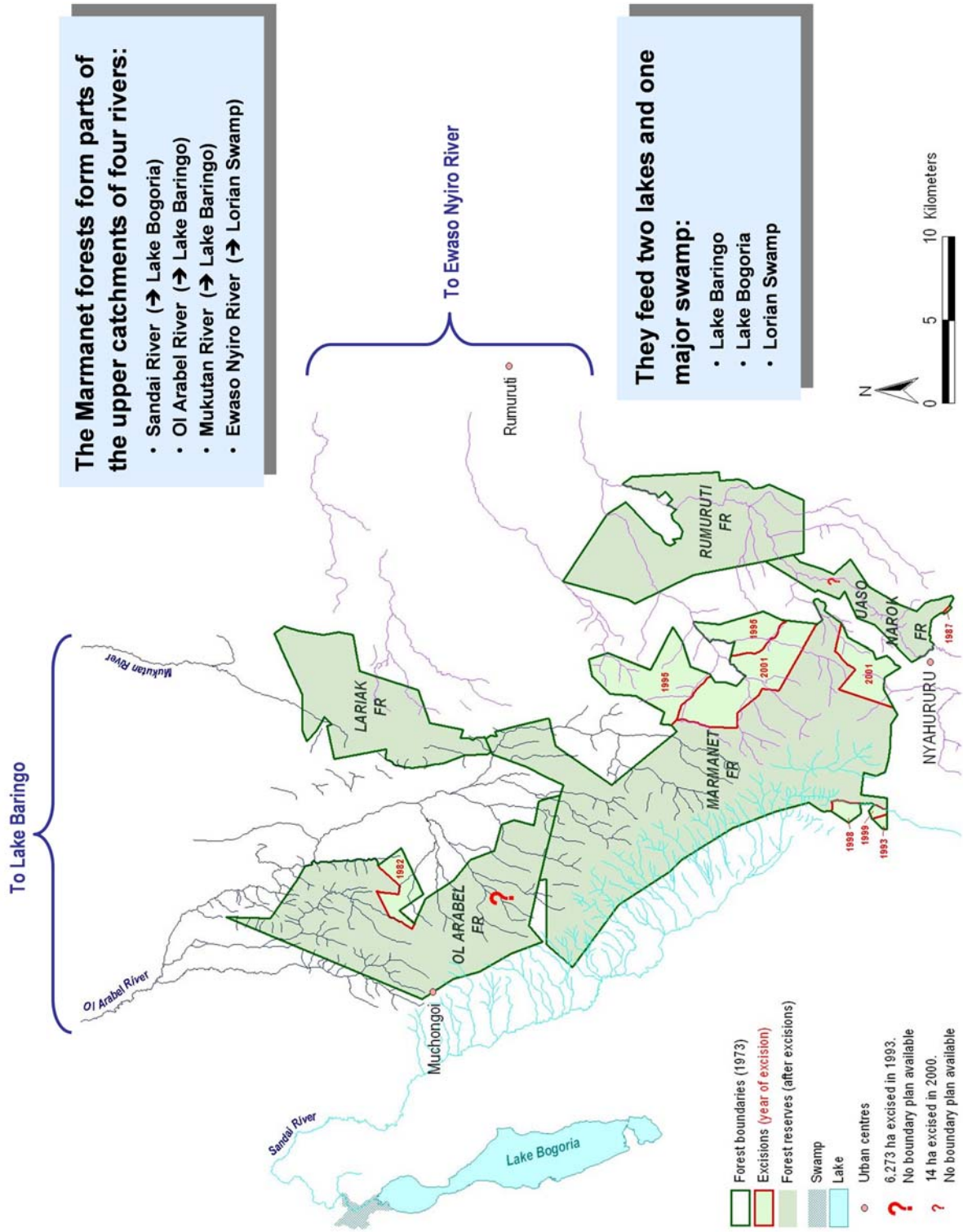
The forest ecosystems of the Mau Complex and of Marmanet provide invaluable ecological services, in terms of river flow regulation, flood mitigation, water storage, recharge of groundwater, reduced soil erosion and siltation, water purification, promoting biodiversity and micro-climate regulation.

Mau Complex: Critical water catchments



Map 1: Mau Complex forests: critical water catchments

Marmamet forests: Critical water catchments



Map 2: Marmamet forests: critical water catchments

These services support key economic sectors, including: energy, tourism, agriculture (cash crops, subsistence crops, and livestock) as well as water supply to urban centres and industries. The forests also provide other major environmental services, including nutrients cycling and soil formation.

At the global level, the forests play a key role in climate regulation. They are major reservoirs and sinks of CO₂ (carbon dioxide), the main greenhouse gas (GHG) behind global warming and climate change. Globally, deforestation is estimated to contribute 20 to 25 % of the total anthropogenic GHG emissions. Reducing emissions from deforestation is just becoming a potential source of funding through carbon trading in the voluntary market. Five projects on avoided deforestation currently exist in Africa with an additional five in planning stage. If deforestation is stopped in the Mau Complex, it could raise substantial funding.

Looking years ahead, environmental stability and secured provision of ecological goods and services will remain essential to attain sustainable development in Kenya. They are cross-cutting, underlying requirements to achieve Vision 2030 - Kenya's development blueprint aiming at making the country a newly industrializing middle income nation, providing high quality of life for all the citizens.

a. Energy

Over 72 % of Kenya's total electricity output is generated by hydropower plants. Hydropower generated electricity is the cheapest and one of the most environment-friendly sources of energy.

The potential of hydropower generation on rivers that have predominantly their upper catchments in the Mau Complex has been estimated at 535 megawatts, a potential that represents 57 % of the total current installed capacity. Among the rivers flowing the Mau Complex, the Sondu River and the Ewaso Ngiro River have the largest hydropower potential estimated at 209 and 220 megawatts respectively.

A number of sites in the Mau Complex catchments have already been developed, are currently being developed or proposed. The Sondu-Miriu Hydropower Scheme with an electricity generation capacity of 60 megawatts (MW) has been recently completed on the Sondu River - the upper catchment of which is South West Mau Forest Reserve. The Sondu-Miriu Scheme was financed with support of the Japan Bank for International Cooperation and costed Kshs 15 billion (USD 238 million). The Sang'oro Hydropower Scheme, an extension of the Sondu-Miriu Scheme, is currently under

implementation. It will have a capacity of 21.4 megawatts. The estimated investment will be around Kshs 3.4 billion (USD 54 million). On the same river further downstream, the Magwagwa Multipurpose Dam Scheme with an anticipated capacity of 94.6 megawatts has also been proposed. In the large tea estates around Kericho, small hydropower plants have been installed on the tributaries of the Sondu River, generating 4 megawatts. In addition, a recent feasibility study has assessed the hydropower generation potential and economic viability of four sites in the Nandi Highlands. The potential capacity of those four sites is estimated at 9.5 megawatts. The rivers crossing those sites have their sources in the Mau Complex.

The total capacity of these developed, currently being developed and proposed hydropower plant sites in the Mau Complex catchments is estimated at 189.4 megawatts with an average annual energy production of 960 gigawatts-hour. The sale value of the average energy production on these sites will be in the range of Kshs 10 billion per year. In order to secure the installed hydropower capacity and the yet to be developed potential of the Mau Complex catchments, it is imperative to secure and conserve their forests.

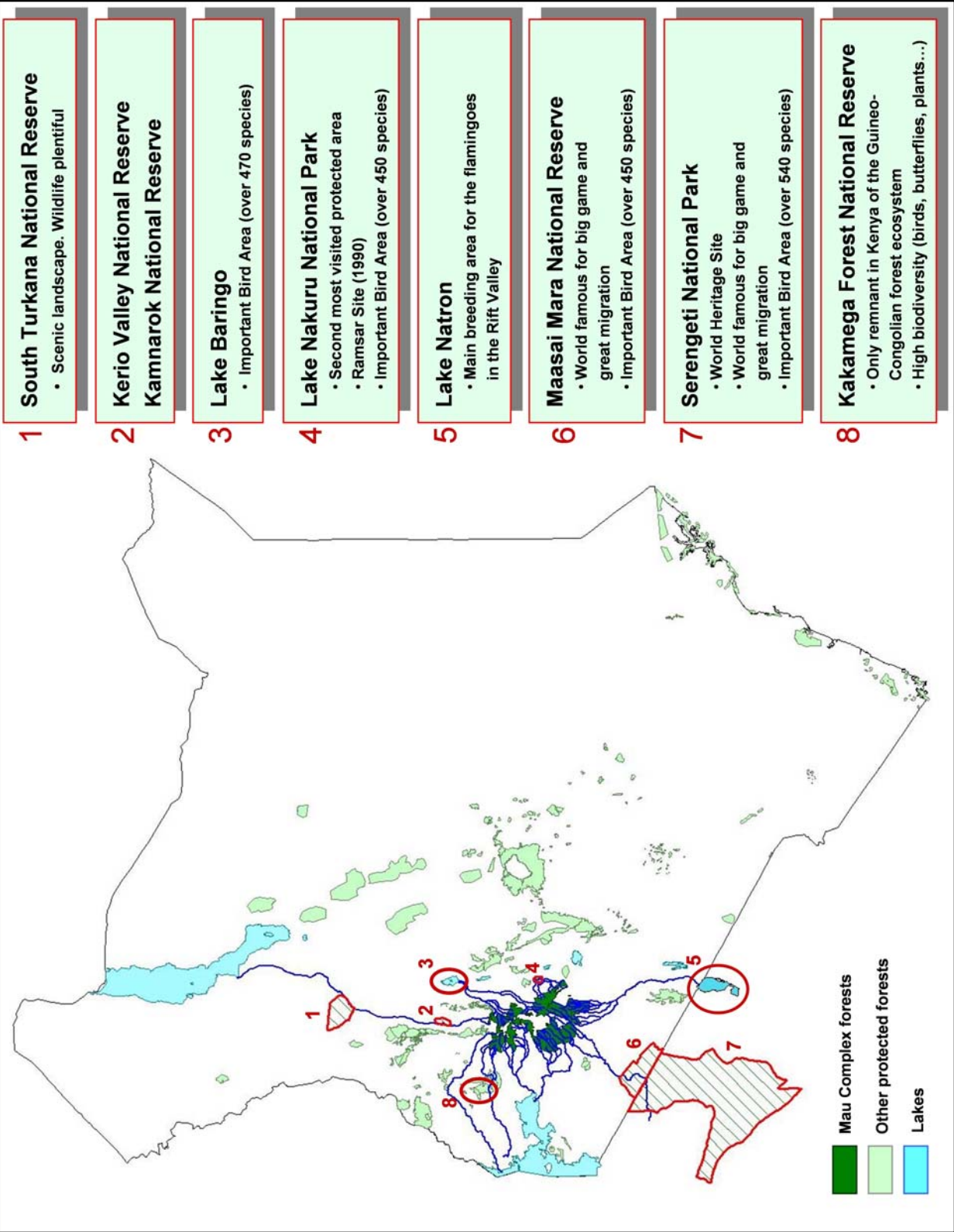
b. Tourism

Over the past years, the tourism industry has been one of the first three largest foreign currency earners for the country. In 2007, consolidated earnings from tourism amounted to Kshs 65.4 billion. It is also a major source of employment providing at least 400,000 jobs in the formal sector and over 600,000 in the informal sector.

The rivers flowing from the Mau Complex are the lifeline for major tourism destination areas including: Maasai Mara National Reserve and Lake Nakuru National Park. In 2007, the revenue from the entry fees alone amounted to Kshs 650 million and Kshs 513 million for the Maasai Mara and Lake Nakuru respectively. The annual indirect revenues from tourism in those two conservation areas are estimated to be in excess of Kshs 5 billion.

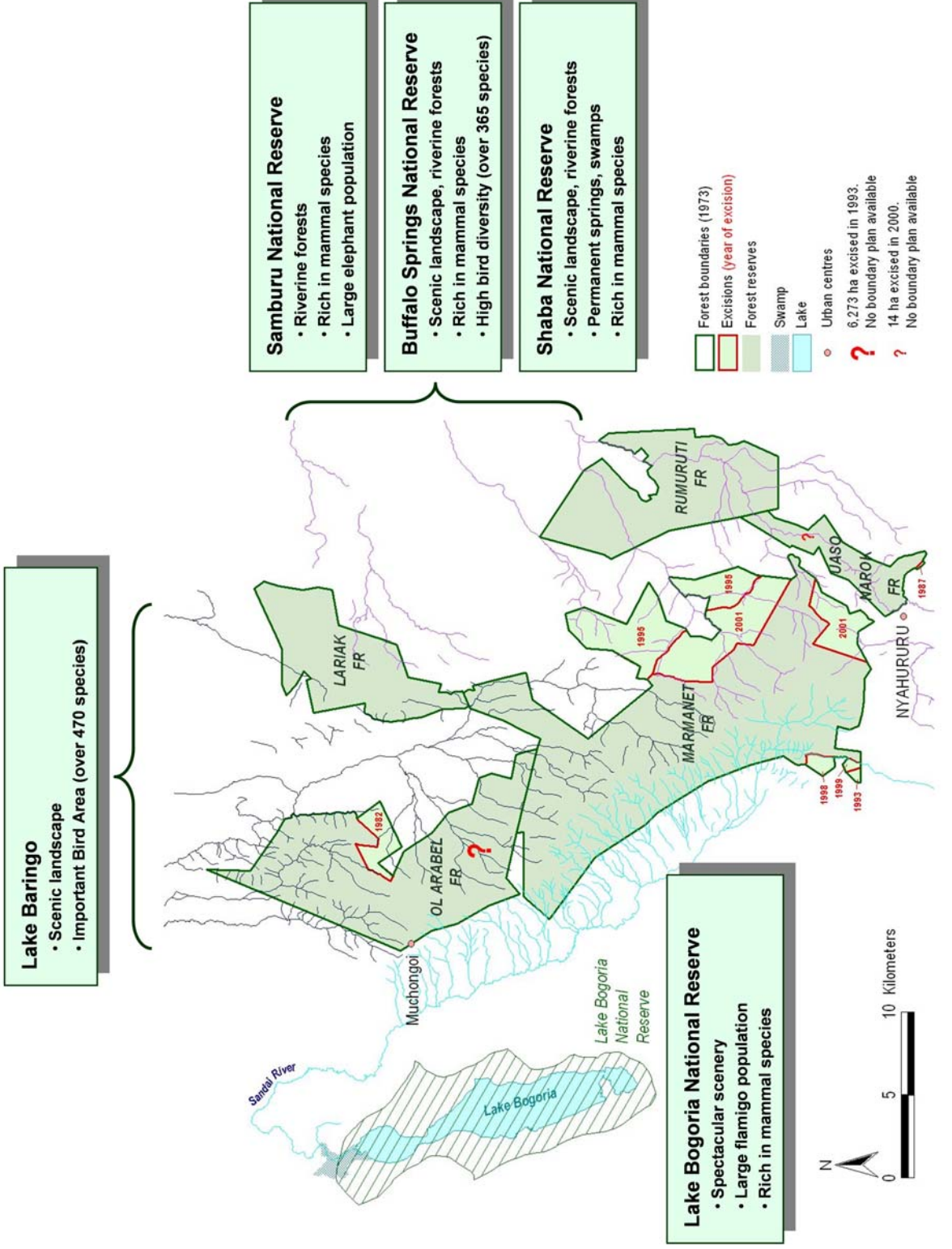
Those rivers are also the lifeline for a number of other conservation areas of which the tourism potential is not yet fully developed, including: Kakamega National Reserve; Kerio Valley National Reserve; South Turkana National Reserve; Lake Baringo; and Lake Natron (see Map 3). These conservation areas host a high diversity of fauna and flora. For example, three of them – Kakamega,

Mau Complex: Critical to major conservation areas



Map 3: Mau Complex forests: critical water catchments to major conservation areas

Marmamet forests: Critical to major conservation areas



Map 4: Marmamet forests: critical water catchments to major conservation areas

Baringo, and Natron - are classified as *Important Bird Areas*¹, Kakamega and Baringo hosting each over 450 bird species, while Natron is the main breeding area for the Lesser Flamingos in the Rift Valley. Other *Important Bird Areas* that depend on rivers flowing from the Mau Complex include: Koguta Swamp (Kenya – Sondu River); Kusa Swamp (Kenya – Nyando River); Serengeti National Park (Tanzania – Mara River), Mara Bay and Masirori Swamp (Tanzania – Mara River).

The rivers flowing from Marmanet forests provide waters to five major conservation areas: Lake Baringo, Lake Bogoria National Reserve, Samburu National Reserve, Buffalo Springs National Reserve and Shaba National Reserve (see Map 4). In 2007, the entry fees alone in those five conservation areas generated revenues in the range of Kshs 100-200 million.

c. Agriculture – Cash crops

One of the main cash crops grown in Kenya is tea. Across the country, tea growing areas are located near montane forests. Indeed, for optimum tea growth, three climatic conditions must be met: constant moisture, soil temperature between 16 and 25 °C and air temperature between 10 and 30 °C. These climatic conditions are found in areas adjacent to forests.

West to the Rift Valley, the tea growing areas are located in the Kericho Highlands, Kisii Highlands, Nandi Highlands, Cherangani Hills and Mt. Elgon. The 2007 sale value of the tea from western Kenya is estimated at Kshs 12.4 billion. In western Kenya, the tea sector provides jobs to 50,000 persons and a livelihood to 75,000 small farmers, supporting both together some 645,000 dependents. It is estimated that 2/3 of the tea produced in western Kenya is growing in areas that benefit from the ecological functions of the Mau Complex, including the maintenance of favourable micro-climatic conditions (constant moisture, air temperature, soil temperature).

Rice is another important cash crop that depends of the Mau Complex ecological services. Indeed, about 95% of the rice in Kenya is grown under irrigation in paddy schemes. In 2006, 5,234 hectares of rice was cultivated in the deltas of the Yala and Nyando rivers of which the Mau Complex forms parts of their upper catchments. The estimated 2006 market value of the rice produced in those deltas is estimated at Kshs 1 billion. Being the third most important staple food in Kenya after maize and wheat, rice contributes significantly to food security in the country.

¹ *Important Bird Areas* are key sites for conservation that have been identified based on globally defined criteria: 1) hold significant numbers of one or more globally threatened bird species; and/or 2) are one of a set of sites that together hold a suite of restricted-range bird species or biome-restricted bird species; and/or 3) have exceptionally large numbers of migratory or congregatory bird species.

d. Agriculture – Subsistence livelihoods

The rivers flowing from the Mau Complex cross 478 sub-locations where the total population is estimated at over 5.5 million. Directly or indirectly, a significant proportion of that population depends on the water flowing in these rivers for their subsistence livelihoods.

People who live within five kilometres from the forests of the Mau Complex depend, partially or totally, on the forests of the Mau Complex for firewood, grazing and medicinal plants.

The Ewaso Nyiro River (north), for which Marmanet forests are catchments, is the main river crossing the semi-arid Laikipia Plateau and the Samburu plains. It is the lifeline for the pastoralist communities and their livestock residing in those areas. It is estimated that some 150,000 livestock units depend continuously on the water of the Ewaso Nyiro River (north), with a estimated Nairobi market value of Kshs 3 billion.

e. Water supply to urban areas

The Mau Complex is the single most important source of water for direct human consumption, urban areas and industrial activities in Rift Valley and Western Kenya. Major urban areas depending upon the water flowing from the Mau Complex include: Bomet, Egerton University, Elburgon, Eldama Ravine, Kericho, Molo, Nakuru, Narok and Njoro.

Some of the main urban centres or settlements depending upon the water flowing in the Ewaso Nyiro River (north) include Archer's Post, Ol Donyio and Kipsing Trading centre, including tourist facilities in the protected areas

f. Water and security

In the recent past, diminishing water supplies have led to conflicts over water involving various communities. Water-related conflicts have negative national security ramifications, such as the Mai Mahiu – Kijabe – Longonot conflicts between various water users that led to loss of lives and destruction of properties. Continuous degradation of the forests in the Mau Complex and Marmanet will exacerbate conflicts over natural resources.

4. Regional / international dimensions

The rivers flowing from the Mau Complex drain into five lakes, three of them are international water bodies: Lake Victoria (Kenya, Tanzania, and Uganda), Lake Natron (Kenya, and Tanzania), and Lake Turkana (Kenya, and Ethiopia). Five rivers – Nzoia, Yala, Nyando, Sondu, and Mara – that have upper catchments in the Mau Complex drain into Lake Victoria. They are part of the Nile River Basin.

The sedimentation rate in Lake Victoria is accelerating due to deforestation coupled with poor agricultural practices. Increased sediment influx is mainly from these five (Kenyan) rivers and from the Kagera River. At least 3 million tons of top soil is deposited into the Lake each year from runoff in the Nyando River Basin alone. The estimated value of the soil lost to Kenyan farmers is thought to exceed USD40 million annually, a figure that does not take into account extensive losses to the Lake's multi-million dollar fishing industry. The sediment load in the rivers is particularly high during flash flows. Flash flows can be mitigated through the maintenance of a healthy forest cover in the upper catchments. High sediment/nutrient load into the lake is a major contributor to the development and expansion of the water hyacinth on the lake with negative impact on the lake's fisheries and the associated economic activities.

Kenya, as a signatory to multilateral environmental agreements, has also a number of obligations under international law that pertain to the conservation and sustainable management of the Mau Complex and Marmanet forests and catchments:

- *1971 Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat.* Lake Nakuru National Park has been recognized as a wetland of global importance and listed as a Ramsar Site in 1990. Under the Ramsar Convention, Kenya has an obligation to “formulate and implement its planning so as to promote the conservation of the wetlands included in the List”.
- *1992 Convention on Biological Diversity.* Under the Convention, Kenya has the obligation to, among others, “establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity”; “promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings”; “promote environmentally sound and sustainable development in areas adjacent to

protected areas with a view to furthering protection of these areas”; and “rehabilitate and restore degraded ecosystems”.

- *1992 United Nations Framework Convention on Climate Change*. Under the Convention, Kenya is committed to “promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases [...], including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems”.
- *1999 East African Treaty*. Under the Treaty, the Parties, including Kenya, are committed to “take necessary measures to conserve their natural resources”.

III. Aerial reconnaissance and current level of forest destruction

1. Background

Since 2001, UNEP with key partners, in particular Kenya Wildlife Service, Ewaso Ngiro South Development Authority, Kenya Forests Working Group and the Department of Resources Survey and Remote Sensing, has regularly monitored forest cover changes using remote sensing techniques with a view to alert the Government on the location and extent of forest destruction and on the associated negative impacts on environmental stability and economic development in the affected catchments.

In view of the critical importance of the Mau Complex for Kenya and the accelerated rate of forest destruction - raising from 2,010 hectares per year between 2000 and 2003 to 4,670 hectares per year between 2003 and 2005 - the Executive Director of UNEP raised his concern with the Minister of Environment and Mineral Resources regarding the unabated and increased forest cover loss in the Mau Complex and in Marmanet and invited the Minister to participate in a reconnaissance flight to appraise himself of the current situation.

2. Aerial reconnaissance: team, programme and flight route

The aerial reconnaissance flight took place on 7 May 2008. The team comprised:

- Hon. John Michuki – Minister for Environment and Mineral Resources
- Prof. James ole Kiyiapi – PS/ Ministry of Environment and Mineral Resources
- Mr. Francis ole Nkako – MD/ Ewaso Ngiro South Development Authority
- Mr. Hassan Noor – PC/ Rift Valley Province
- Dr. Muusya Mwinzi – DG/ NEMA
- Dr. Julius Kipngetich – Director/ KWS
- Representatives of the Media
- Capt. Antony Kiroken (pilot) – Chief Pilot, KWS
- Mr. Christian Lambrechts (navigator) – UNEP

The Minister for Forests and Wildlife, the Permanent Secretary, Ministry for Forests and Wildlife, and the Director, Kenya Forest Service, were invited to be part of the aerial reconnaissance team but did not participate.

The programme of the aerial reconnaissance is appended at Annex 3. The flight was preceded by a briefing session which was attended by the aerial reconnaissance team and the Executive Director of UNEP, as well as UNEP's Coordinator for Kenya, the Permanent Secretary for Special Programme, the Executive Director of the East Africa Wildlife Society and the Outreach Officer of the Kenya Forests Working Group. The television and press media also attended the briefing.

During the flight, the following forests were flown over: Maasai Mau, Ol Pusimoru, Transmara, South West Mau, Eastern Mau, Ol Arabel, Marmanet and Bahati (see Map 5)

The flight was followed by two press meetings at Naishi, Lake Nakuru National Park, and at Wilson Airport, Nairobi.

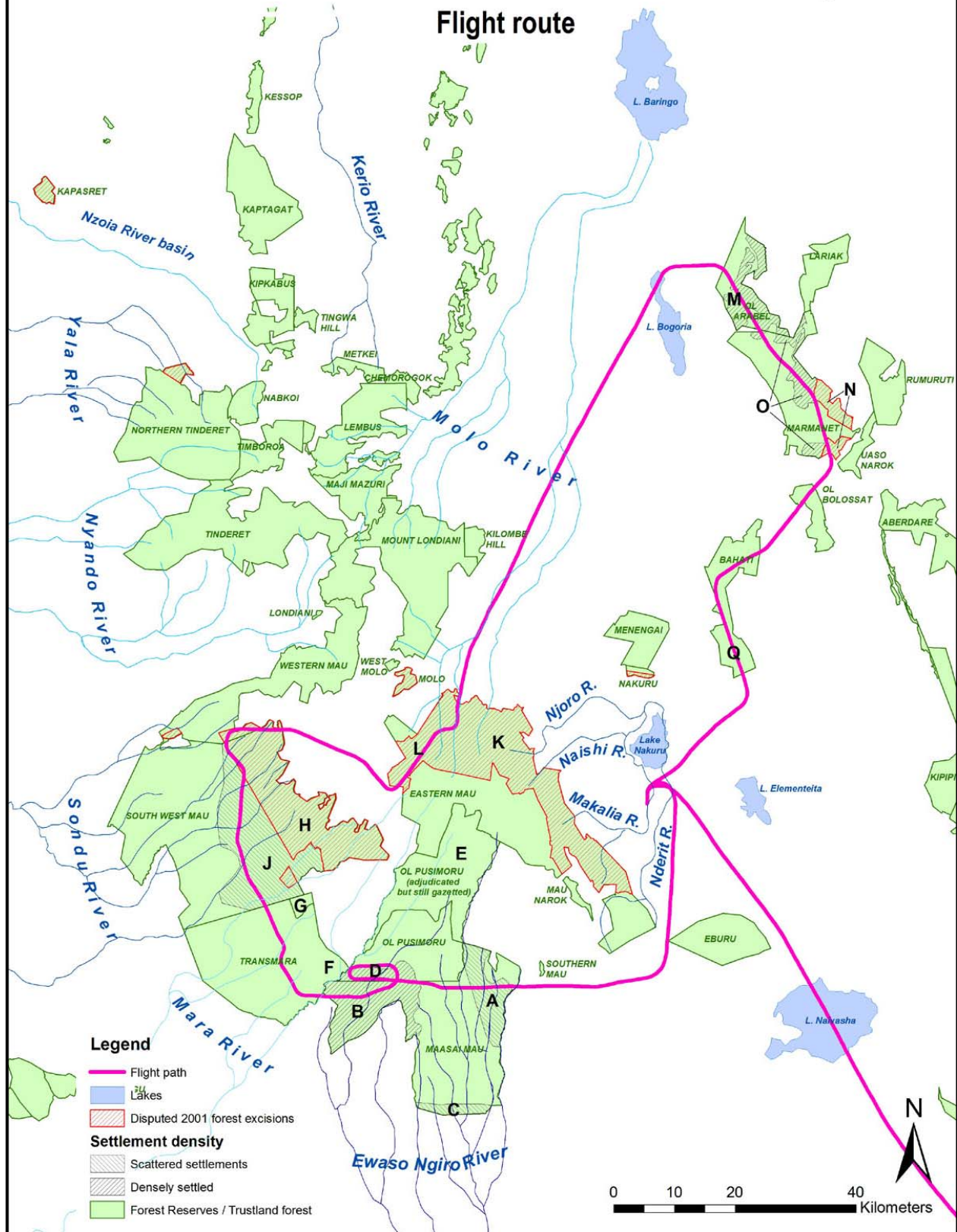
3. Main findings

The main findings of the aerial reconnaissance are given below. The general findings provide an overview of the situation in the forests flown over. They are followed by forest-specific findings for Maasai Mau trust land forest as well as for Transmara, South West Mau, Eastern Mau, Ol Arabel and Marmanet forest reserves.

a. General findings

- i. Of the 420,851 hectares of protected forests in the Mau Complex, over 61,000 hectares were excised in 2001, in particular in Eastern Mau Forest Reserve, South West Mau Forest Reserve and Molo Forest Reserve where 35,301, 22,797 and 902 hectares respectively were excised representing 54.3%, 27.3% and 100% of these forests.
- ii. The excised areas are critical upper catchment areas for Sondu River, Mara River, Molo River and Lake Baringo, as well as rivers Naishi, Makalia, Nderit and Njoro and Lake Nakuru. The excised areas included bamboo forests with high catchment values as well as parts of the summit of the Mau Escarpment.
- iii. The excisions impact negatively on major natural assets and development investments due to diminishing water levels. They include Lake Nakuru National Park, Maasai Mara National Reserve, Sondu-Miriu Hydropower Scheme (60MW), small hydropower plants in the Kericho

Aerial reconnaissance of forest destruction - 7 May 2008



Map 5: Flight path of the aerial reconnaissance

tea estates (4MW), and the tea growing areas in Kericho Highlands. The full potential impacts of the excisions have not been assessed since no environmental impact assessment (EIA) was carried out despite the requirements for such EIA in accordance with the 1999 Environment Management Coordination Act. Some impacts are already felt, including significant water level drop in Egerton University boreholes, making some of them useless, and a drastic change in the water regime of River Njoro, a key river for Lake Nakuru, which was perennial and is now seasonal.

- iv. In addition to the loss of over 61,000 hectares due to ill-advised excisions, some 40,000 to 50,000 hectares have been encroached by settlements in the Mau Complex, in particular in Maasai Mau forest, OI Pusimoru Forest Reserve and South West Mau Forest Reserve. Illegal logging activities are rampant in and around the encroached areas. In OI Arabel and Marmanet forest reserves, some 11,000 to 12,000 hectares have been lost to illegal and irregular encroachments.
- v. The situation in the forests flown over is characterized by a breakdown of law and order with ramifications on internal security and conflicts over natural resources. It presents major environmental and economic threats.

b. Maasai Mau forest

The Maasai Mau forest is a Trust Land forest. It is located in Narok South and North districts and managed by the Narok County Council (NCC). The forest which comprises only indigenous vegetation covers 46,241 hectares. The Maasai Mau forest, together with OI Pusimoru Forest Reserve, form the main forested upper catchments of the Ewaso Ngiro River. The most western part of the Maasai Mau forest is part of the upper catchments of the Mara River.

Key findings:

- i. Approx. 6,500 hectares are affected by illegal logging activities, scattered illegal settlement and fires in the north-eastern part of the forest (Olokurto area) (see “A” on Map 5);
- ii. Approx. 11,000 hectares are intensively impacted / destroyed by illegal settlements in the western part of the forest (Sierra Leone area – Narok South Constituency) (see area “B” on Map 5);

- iii. Approx. 1,800 hectares are affected by illegal logging activities, scattered illegal settlements and fires in the south-eastern part of the forest (Nkareta area) (see “C” on Map 5).

Additional notes:

- i. Following documented reports on forest destruction, the Cabinet decided in 2005 to restore the forest. Following the decision, the squatters were removed by a combined force of the Administration Police and NCC rangers in May-June 2005. Due to lack of monitoring and enforcement by the NCC, the squatters returned to the forest later in the year. An investigation conducted by the Ministry of Lands revealed that 1962 squatters have *bone fide* purchased the land, although the process was irregular. The Government, therefore, decided to compensate these 1962 persons. The compensation process never materializes on the ground.
- ii. From October 2005 to January 2006, the Ministry of Lands carried out a survey of the boundaries of Maasai Mau. Major discrepancies between the surveyed boundaries and the boundaries drawn by the Forest Department based on the Ole Ntutu Presidential Commission appear along Nkareta Adjudication Area. The 2005-2006 surveyed boundary hives approx. 3,017 hectares out of the forest.

c. Ol Pusimoru Forest Reserve

Ol Pusimoru Forest Reserve is located in Narok North District and managed by the Kenya Forest Service. It covers 37,593 hectares of indigenous forest. Ol Pusimoru Forest Reserve, together with the Maasai Mau forest, form the main forested upper catchments of the Ewaso Ngiro River (south). The most western part of Ol Pusimoru Forest Reserve is part of the upper catchments of the Mara River.

Key findings:

- i. Approx. 3,000 hectares of indigenous forests are intensively impacted / destroyed by illegal settlements in the south-western part of the forest (see “D” on Map 5);
- ii. 20,399 hectares have been adjudicated, although still gazetted as forest reserve (see “E” on Map 5).

Additional notes:

- i. In 1975 and 1979, 20,399 hectares were adjudicated and partially settled (the northern part neighbouring Eastern Mau Forest Reserve), although the area is still gazetted as forest reserve. The adjudication took place as part of a forest exchange between Narok County Council and the former Forest Department by which the Maasai Mau forest was to be gazetted as forest reserve and the northern part of OI Pusimoru excised for settlement. The exchange was never concluded as the Narok County Council did not surrender the Maasai Mau forest. The former Forest Department, therefore, did not excise the northern part of OI Pusimoru.
- ii. Encroachments in the non-adjudicated part of OI Pusimoru Forest Reserve emanate from the illegal settlements in the Maasai Mau and extent east-west over 12 kilometres along the boundary between the two forests. This boundary is a virtual line crossing the forest ecosystem and is not demarcated on the ground. It has been reported that these illegal settlements had critically intensified over the last year. If not addressed promptly, they could lead to a total clear felling of the forest in that area which, combined with the increased settlement in the Sierra Leone area of Maasai Mau forest, could lead to a total destruction of the forest connecting the Maasai Mau/OI Pusimoru block with the South West Mau/Transmara block.
- iii. In February/March 2008, the Kenya Forest Service carried out an eviction in the area removing illegal squatters over 1,500 hectares in February/March 2008. Short of financial resources, the Service could not complete the eviction in OI Pusimoru, but intends to resume the eviction shortly.



Photo 1: Forest destruction and illegal establishment of a small trading centre in Maasai Mau forest.



Photo 2: Large scale destruction of forest in OI Pusimoru Forest Reserve.

d. Transmara Forest Reserve

Transmara Forest Reserve is located in Narok South District and managed by the Kenya Forest Service. It covers 35,343 hectares of indigenous forest. Transmara Forest Reserve is the main forested upper catchment for the Mara River.

Key findings:

- i. Illegal logging of indigenous trees is expanding along the north-eastern part of the forest (see “F” on Map 5), most likely emanating from the densely encroached areas in Maasi Mau forest and Ol Pusimoru Forest Reserve;
- ii. Approx 1,000 hectares illegally are encroached by a tea estate (see “G” on Map 5).

Additional notes:

- i. An area of 937.7 hectares was illegally allocated in 1988 where the Kiptagich Tea Estate is now established. The area has never been officially excised. Recognizing the illegality of the allocation, the Ndungu Commission recommended revoking it. In addition, the tea estate is further encroaching onto South West Mau and Transmara forest reserves beyond the boundaries of the illegal allocation.

e. South West Mau Forest Reserve

South West Mau Forest Reserve is located in Buret District and managed by the Kenya Forest Service. It was the largest forest blocks in the Mau Complex, covering 84,011 hectares, of which 22,797 were excised in 2001. It is the main upper catchment of Sondu River.

Key findings:

- i. 22,797 hectares representing 27.3% of forest area were excised in 2001 but contested before the High Court (see “H” on Map 5);
- ii. Approx. 21,300 hectares of indigenous forests, including bamboo forests, are intensively impacted by illegal settlements in the western part of the forest (see “J” on Map 5).

Additional notes:

An aerial point sampling conducted in December 2005 by UNEP, Department of Resources Survey and Remote Sensing (DRSRS) and the Kenya Forests Working Group (KFWG) revealed extensive encroachments into the remaining gazetted forest. The encroachments are emanating from the excised area along its entire boundary with the remaining gazetted forest, extending over some 30 kilometres. Following the aerial point sampling, two major evictions were carried out in 2005 and 2006 by a combined force of Kenya Forest Service, Administration Police and Kenya Wildlife Service. However, squatters have returned to the forest due to lack of monitoring and enforcement by Kenya Forest Service.



Photo 3: Large scale destruction of forests and bamboo forests in South West Mau Forest Reserve.

f. Eastern Mau Forest Reserve

Eastern Mau Forest Reserve is located in Nakuru District and managed by the Kenya Forest Service. It was one of the two largest forest blocks in the Mau Complex, covering 65,921 hectares, of which 35,301 were excised in 2001. It is the main upper catchment of the four rivers (Makalia, Naishi, Nderit, Njoro) flowing into Lake Nakuru.

Key findings:

- i. 35,301 hectares representing 54% of forest area were excised in 2001 but contested before the High Court (see “K” on Map 5);
- ii. The excised area is the main catchments for Lake Nakuru. It also covers main ridges and peaks along the top of the Mau Escarpment, including areas between 2,800 and 3,000 above sea level that were covered with bamboo forests, a vegetation cover with high catchment values.
- iii. In the excised area, there are still some indigenous forest areas with very low settlement density near and over the summit of the Mau Escarpment that should be recovered (see “L” on Map 5).

Additional notes:

- i. Based on satellite imagery, it has been assessed that over 50% of the dense vegetation cover, including forest, has been lost in the catchment of Lake Nakuru between 1973 and 2003 (see Annex 4). A large contributor to this loss has been the 2001 forest excision in Eastern Mau Forest Reserve, which covered the upper catchments of the four rivers flowing into Lake Nakuru.
- ii. Part of the excised area in 2001 covers upper ridges, summits, hilltops and steep slopes along the Mau Escarpment, which are not suitable for settlements. An aerial point sampling conducted in December 2005 by UNEP, DRSRS and KFWG revealed that there are still some intact indigenous forest areas with very low settlement density but threatened by settlement and logging in the excised area near and over the summit of the Mau

Escarpment. These areas are critical catchment areas with very high soil erodibility (high risk of soil erosion and siltation of rivers and lakes) and should be preserved.

- iii. The low settlement density and large parcels of land in some exercised areas, some being wheat farms as revealed by the aerial point sampling, suggest that people settled in those area may not be genuine land less people
- iv. Despite a High Court order preventing the Government to move further with the 2001 excision process, survey and settlement activities in the excised areas have continued.
- v. Through four projects totaling approx. Kshs 6 billion (USD 80 million) over the last 30 years, The World Bank has helped Kenya create a large forest plantation estate. The excision in Eastern Mau affected large plantation areas that were liquidated and their benefits being transferred to unintended beneficiaries.

g. Ol Arabel Forest Reserve

Ol Arabel Forest Reserve is located on the eastern escarpment of the Rift Valley in Baringo District. It is managed by the Kenya Forest Service and covered 9,629 hectares of which 6,273 were excised in 1993. It forms, with Marmanet Forest Reserve, the main upper catchments of Sandai River that drains into Lake Bogoria. It is also part of the upper catchments of Ol Arabel River that drains into Lake Baringo.

Key findings:

- i. 6,273 hectares representing 65% of forest area were excised in 1993, but no boundary plan available);
- ii. Approx. 80 % of the forest is settled (see “M” on Map 5).

Additional notes:

- i. In 1993, 6,273 hectares of land were excised from the forest, representing 65% of its area. No boundary plan of the excised area is available. As such, there were no limits to settlements and almost the entire forest has been settled.

- ii. The interpretation of satellite images for the year 1973, 1990, 1995, 2000 and 2003, revealed that the 1993 excision could not have been justified on the ground of legalizing a de facto occupation of the forest by people.

h. Marmanet Forest Reserve

Marmanet Forest Reserve is located on the eastern escarpment of the Rift Valley in Nyandarua North District. It is managed by the Kenya Forest Service and covered 20,446 hectares of which 2,837 were excised in 2001. It forms, with Ol Arabel Forest Reserve, the main upper catchment of Sandai River that drains into Lake Bogoria. It is also part of the upper catchments of Ewaso Nyiro (north) River and of Ol Arabel River that drains into Lake Baringo.

Key findings:

- i. 2,837 hectares representing 14% of forest area were excised in 2001 (see “N” on Map 5);
- ii. Approx 4,200 hectares are intensively impacted / destroyed by illegal settlements along the eastern and southern boundaries (see “O” on Map 5);
- iii. Two forest stations are illegally occupied: Gitundaga and North Marmanet.

i. Bahati Forest Reserve

Bahati Forest Reserve is located 25 kilometres to the north-east of Lake Nakuru. It is managed by Kenya Forest Service. The forest covers approx. 10,071 hectares. The forest forms the upper catchments of Bahari Springs located on the northern shore of Lake Nakuru and is

Key findings:

- i. Most of the forest cover is depleted. Forest plantations were harvested, but most of them have not been replanted;
- ii. On the south-eastern corner, at least 100 hectares of forest land has been encroached and settled (see “Q” on Map 5).

The forest blocks of the Mau Complex

Main blocks that are contiguous	Status (*)	Area in 2000	2001 Excisions			Recent illegal encroachments		Other forest losses (**)	Estimated remaining unsettled and unallocated area (***)
			Area affected	% of the area in 2000	Ndugu Commission's recommendation	Estimated affected area	% of the area in 2000		
		(hectare)	(hectare)			(hectare)	(hectare)	(hectare)	
Chemorogok	FR	1,335	-	-	Subject to court ruling, revoke the excisions and titles already issued and maintain the areas as forests / catchment areas but put into account the position of the Ogiek as recognized forest inhabitants and any party who may have finalized the exchange of their land with the Forest Department	-	-		1,335
Eastern Mau	FR	65,921	35,301	54%		-	-		30,620
Kilombe Hill	FR	1,531	-	-		-	-		1,531
Lembus	FR	13,118	-	-		-	-		13,118
Maasai Mau	TL	46,241	-	-		19,400	42%		26,841
Maji Mazuri	FR	7,794	-	-		-	-		7,794
Metkei	FR	1,954	-	-		-	-		1,954
Mount Londiani	FR	30,093	125	0%		-	-		29,968
Nabkoi	FR	3,028	74	2%		-	-		2,954
Northern Tinderet	FR	26,253	788	3%		-	-		25,465
OI Pusimoru	FR	37,593	-	-		3,000	8%	8,000	26,593
South West Mau	FR	84,011	22,797	27%		21,300	25%		39,914
Timboroa	FR	5,804	-	-		-	-		5,804
Tinderet	FR	28,128	-	-		-	-		28,128
Transmara (***)	FR	35,343	-	-		-	-	938	34,405
Western Mau	FR	22,712	1,036	5%		-	-		21,676
Satellite blocks that are part of the Mau Complex ecosystem									
Eburu	FR	8,712	-	-					8,712
Londiani	FR	105	-	-					105
Mau Narok	FR	808	-	-					808
Molo	FR	902	902	100%	See above				0
Southern Mau	FR	128	-	-					128
West Molo	FR	276	-	-					276
TOTAL		421,790	61,023	14%		43,700	10%	8,938	308,129

(*) FR: gazetted Forest Reserve, managed by Kenya Forest Service
TL: trust land forest, managed by Narok County Council

(**) This includes 937.7 hectares in Transmara Forest Reserve that have been illegally allocated to Kiptagich Tea Estate, are currently planted with tea and include a tea factory, as well as approx. 8,000 hectares in OI Pusimoru Forest Reserve within the 20,399 hectares of that forest that were adjudicated but are still gazetted as Forest Reserve.

(***) The estimates are based on remote sensing. They reflect the area, within the boundaries of the protected forests, that is not physically occupied by people, sparsely or densely. They include protected forest areas that are devoid of tree cover (such as grasslands, or clear-felled forest plantations) but not settled.

The forest blocks of Marmanet

Forest blocks	Status (*)	Area in 2000	2001 Excisions (**)		Recent illegal encroachments		Estimated remaining unsettled area (***)
			Area affected	% of the area in 2000	Estimated affected area	% of the area in 2000	
		(hectare)	(hectare)		(hectare)		(hectare)
Lariak	FR	4,957	-	-	-	-	4,957
Marmanet	FR	20,446	2,837	14%	4,215	21%	13,394
OI Arabel	FR	9,629	-	-	7,500	78%	2,129
Rumuruti	FR	6,519	-	-	-	-	6,519
Uaso Narok	FR	1,973	-	-	-	-	1,973
	TOTAL	43,524	2,837	7%	11,715	27%	28,972

(*) FR: gazetted Forest Reserve, managed by Kenya Forest Service

(**) The recommendation by the Ndugu Commission on the 2001 excisions, including the excision in Marmanet is: *“Subject to court ruling, revoke the excisions and titles already issued and maintain the areas as forests / catchment areas but put into account the position of the Ogiek as recognized forest inhabitants and any party who may have finalized the exchange of their land with the Forest Department”.*

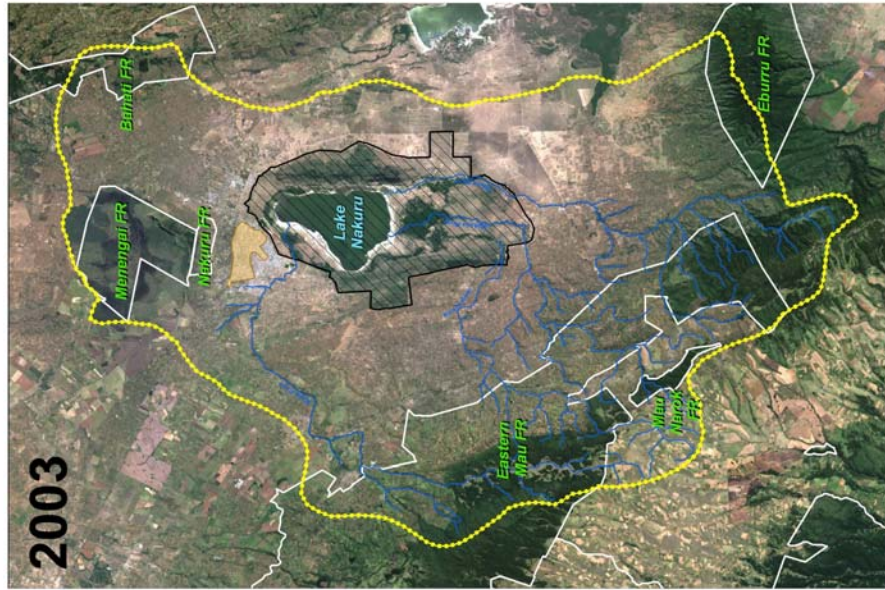
(***) The estimates are based on remote sensing. They reflect the area, within the boundaries of the protected forests, that is not physically occupied by people, sparsely or densely. They include protected forest areas that are devoid of tree cover (such as grasslands, or clear-felled forest plantations) but not settled.

Programme of the Aerial Reconnaissance of 7 May 2008

- 8:00-9:00** **Briefing on the flight route and the forest to be flown over**
(Venue: VIP Lounge, Police Airwing, Wilson Airport)
- *Welcoming remarks* by Prof. James Ole Kiyapi, Permanent Secretary, Ministry of Environment and Mineral Resources;
 - *Critical importance of forest conservation* by Achim Steiner, United Nations Under-Secretary-General and Executive Director, UNEP;
 - *Key values and status of the forest to be flown over* by Christian Lambrechts, Division of Early Warning and Assessment, UNEP.
- 9:15** **Departure from Wilson Airport**
- 9:45** **Landing in Naishi, Nakuru National Park**
- 10:15** **Departure from Naishi, Nakuru National Park**
- 10:30-12:00** **Flight over the Mau Complex forests**
- 12:00-12:20** **Transit flight Mau Complex-Marmanet**
- 12:20-12:40** **Flight over Marmanet forests**
- 13:00** **Landing in Naishi, Nakuru National Park**
- 13:00-14:00** **Lunch**
- 14:00-14:45** **De-briefing with the media in Naishi, Nakuru National Park**
- 15:00** **Departure from Naishi, Nakuru National Park**
15:30 **Landing Wilson Airport**
- 15:30** **De-briefing with the media in the VIP Lounge, Police Airwing, Wilson Airport**

Threats: 2001 excision in Eastern Mau impacts Lake Nakuru

The 2001 excision in Eastern Mau impacts tremendously on the catchment of Lake Nakuru. Between 1973 and 2003, 36,780 hectares of dense vegetation cover were lost in the catchment of Lake Nakuru, representing a loss of 49 % of its total dense vegetation cover. Boreholes are already drying (Egerton University) and rivers becoming seasonal (Njoro).



Legend

- Lake Nakuru catchment
- Nakuru town
- Forest Reserve boundaries
- Lake Nakuru National Park

Loss of dense vegetation cover between 1973 – 2003

Inside FR:	15,820 ha
Outside FR:	20,960 ha
Total:	36,780 ha

Sources
 - Landsat MSS and ETM images. False colour composition
 - Forest boundaries: KIFCON project, Forest Department

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