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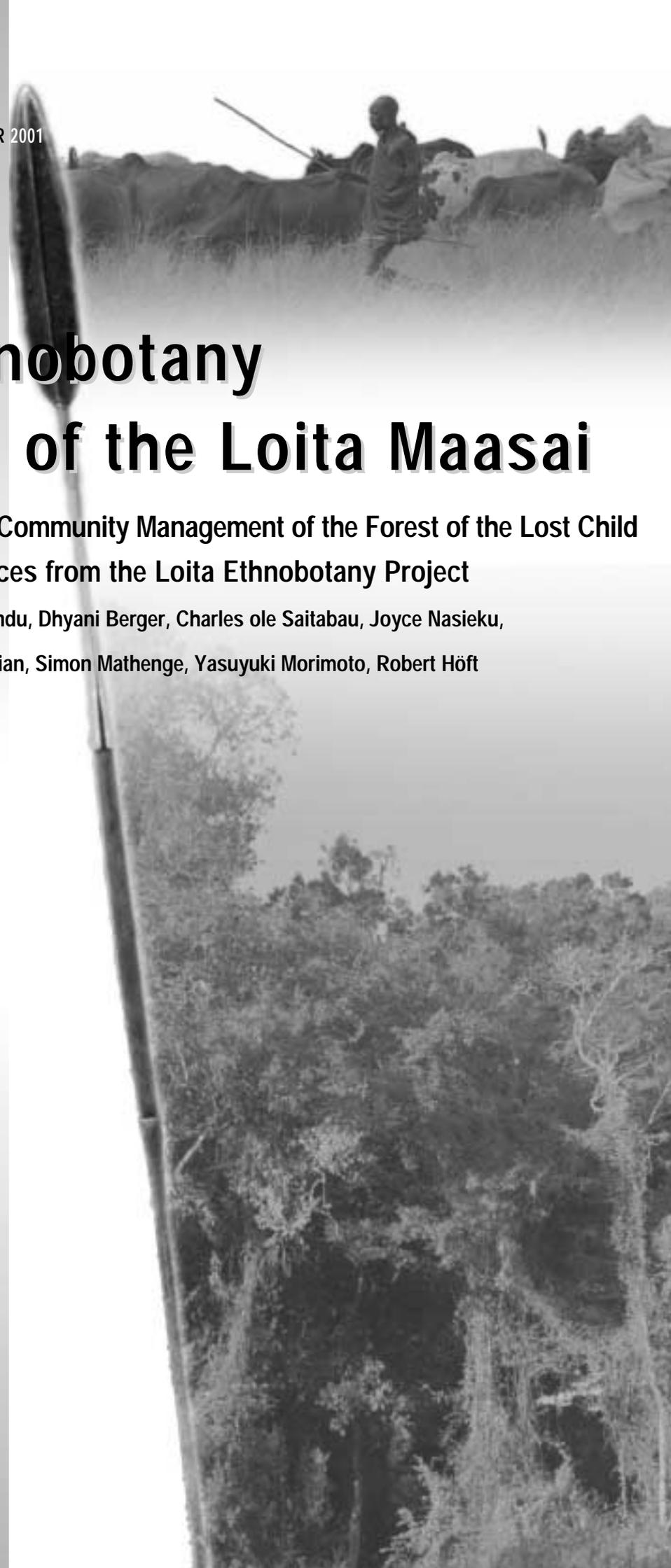
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Ethnobotany of the Loita Maasai

**Towards Community Management of the Forest of the Lost Child
Experiences from the Loita Ethnobotany Project**

**Patrick Maundu, Dhyani Berger, Charles ole Saitabau, Joyce Nasieku,
Moses Kipelian, Simon Mathenge, Yasuyuki Morimoto, Robert Höft**



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Photos: all photos by Robert Höft

Cover: Young Maasai herding cattle near Olasur in Loita Forest (top), fringe of Loita Forest overgrown by lianas (bottom), Maasai spear

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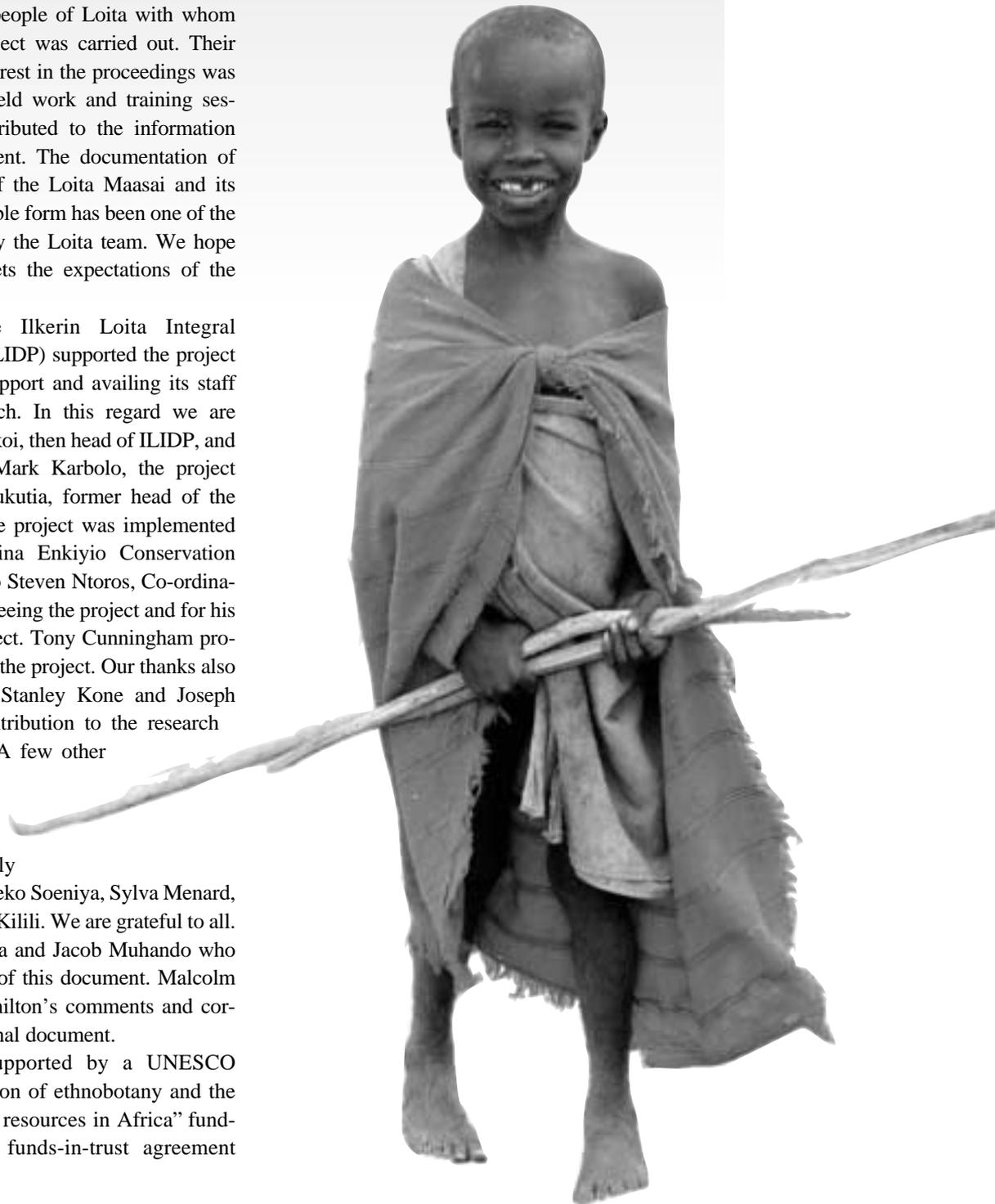
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The staff of the Ilkerin Loita Integral Development Project (ILIDP) supported the project by providing logistic support and availing its staff for training and research. In this regard we are indebted to Charles Sonkoi, then head of ILIDP, and his team, particularly Mark Karbolo, the project manager, and Philip Kukutia, former head of the training department. The project was implemented under the Loita Naimina Enkiyo Conservation Trust. We are grateful to Steven Ntoros, Co-ordinator of the Trust for overseeing the project and for his keen interest in the project. Tony Cunningham provided initial guidance to the project. Our thanks also go to Moses Kukutia, Stanley Kone and Joseph Lempoyio for their contribution to the research that led to this report. A few other people joined the team on various occasions and worked with it with dedication, particularly Kiping'ot ole Moijoi, Rieko Soeniya, Sylva Menard, L. Mbithe and Geoffrey Kili. We are grateful to all. We thank Phylis Karanja and Jacob Muhando who typed the original draft of this document. Malcolm Hadley's and Alan Hamilton's comments and corrections improved the final document.

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Introduction

As Maasai legend has it, a child looking after her father's calves took them to the edge of the forest. While following and herding them she entered the forest itself. In the evening the calves returned home without the child. Young Maasai warriors, or Morans, were sent to look for her. They wandered deep into the forest, calling her name, but eventually they too, like the calves, returned home alone. To this day, the forest has never returned her, but her memory lives on in its name - *Entim e Naimina Enkiyio* or the Forest of the Lost Child.

From a brochure published by the Loita Naimina Enkiyio Conservation Trust Company 1994

The Loita Ethnobotany Project was initiated in 1995 to enable the Loita community develop a locally directed management plan for Loita Forest. The project followed the registration in 1994 of the Loita Naimina Enkiyio Conservation Trust whose objective was to protect and manage the forest heritage held as trust land by the Narok County Council.

The project was developed with guidance from ECODET (an environment and development NGO) and supported by the National Museums of Kenya and the 'People and Plants' initiative. The Ilkerin-Loita Integral Development Project, a key player in local community matters, provided staff and logistic backing. Charles ole Saitabau, responsible for conservation education in this project, was appointed co-ordinator of the Loita Ethnobotany Project. Work began through a series of orientation workshops with leaders and community members, collaborative resource mapping and surveys followed by training in participatory and ethnobotanical methods and quantitative resource assessments. The project was to lay the groundwork for a community-based ethnobotany programme as a step towards a locally developed forest management plan. Specific objectives included:

1. to raise awareness in the community for the need for, and benefits of, sustainable management of plants, especially trees;
2. to empower, mobilize and develop community capacity to sustainably manage forest resources;
3. to collect and use ethnobotanical information with people who live near and depend on the forest;
4. to identify plant species that are vulnerable to over-exploitation as a priority for management interventions;
5. to work out a management system for sustainable harvesting, monitoring and regulation;
6. to take first steps towards the establishment of a Loita Ethnobotany Centre.

The project was an initiative of the local people and was prompted by:

- increasing threats on the Loita Forest, locally known as Naimina Enkiyio;
- diminishing plant resources of specific species and increasing threats to biodiversity;
- loss of traditional values and social structures that sustained biodiversity;
- lack of formalized and accessible information on Loita Forest plant resources and their use by the Loita Maasai.

The Ethnobotany Project drew participation and expertise from local specialists and national and international research and conservation institutions. The ethnobotanical research aspects of the project reported in this paper therefore sought to undertake the following:

1. to study how members of the Loita Maasai community use their plants, particularly those of the Naimina Enkiyio (Loita) Forest;
2. by qualitative and quantitative means, study the level of utilization of some locally important species to establish their past and current status and use trends;



Joyce Nasieku, Charles ole Saitabau and two volunteers from Ilkerin practising plant collection and herbarium techniques.

The **Ilkerin Loita Integral Development Project (ILIDP)** has spearheaded rural development in Entasekera, Ilkerin, Morijo, Olorte Olmesutye and Oling'arua locations for at least fifteen years. The project was established in 1972 by the Catholic Diocese of Ngong and handed over ten years later to local Maasai managers. The project is located on land donated by the community. It constitutes of a farm, training centre, school, health centre and technical workshops with a multi-dimensional rural development programme reaching out to communities through its six sub-centres.

3. to contribute to the formulation of a community management plan for Loita Forest and the plant resources found in Loita in general.

Research methods included group and household interviews, questionnaires, use ranking, community resource mapping, transect walks with local experts and market visits. For individual over-exploited species, quantitative data of the affected species were collected to assess the status of the resource and trends. Parameters measured included tree height, diameter at breast height, density, spatial distribution, density of dead trees or stumps and species cover. To assess the level of use, quantitative measurements of fuelwood and wood for construction were carried out. Such measurements included weight of selected loads of fuelwood, frequency of harvesting, impact on living trees and amount of wood used in construction.

Plants were collected in the field, identified and deposited at the University of Nairobi Herbarium, East African Herbarium and at a local herbarium in Loita which was established by the project. Data were also incorporated into a databank held by the Kenya Resource Centre for Indigenous Knowledge (KENRIK).

Within approximately 30 months of activities, the Project

- trained about 15 young local participants on research and resource monitoring techniques,
- raised awareness among the local population on the dangers faced by the forest and some plant resources;
- collected and identified the most common plants of Loita;
- established a local herbarium;
- documented the uses of over 250 species of plants;
- identified species locally endangered by over-exploitation; and
- contributed to the development of a proposal to prepare a management plan for Loita Forest.

IUCN, with support from Bilance (a Dutch development initiative), has built on the Loita Ethnobotany Project, initially through a set of studies on land tenure, the socio-economic settings, biodiversity and ecotourism potential. IUCN intends to continue providing technical support and to facilitate conflict resolution and participation of all stakeholders in the forest management planning process.



Moses Kipelian, one of the local experts knowledgeable about wildlife, plants and their uses and general ecology, measuring the diameter of a cedar (*Juniperus procera*) tree.

The Maasai: An overview

Erisio Ilmaasai o Enkai — Equal are the Maasai and God

Maasai proverb cited from "Oral Literature of the Maasai" by Naomi Kipury 1983

The Maasai are predominantly nomadic pastoralists who occupy the southern part of Kenya and the northern districts of Tanzania. Maasai is essentially a linguistic term, referring to speakers of this Eastern Sudanic language (Maa) of the Chari-Nile branch of the Nilo-Saharan family.

The Maa language has two internal sub-divisions (dialects): North Maa includes the speech varieties of the Ilsampur (Samburu) and Ilcamus (Njemps). South Maa is said to include the varieties spoken by the Ilarusa, Ilmoitanik, Isiria, Ilwuasinkishu, Ilpurko, Ilkeekonyokie, Ildamat, Iloitai, Isikirari, Iloodokilani, Ildalalekutuk, Ildamat, Ilkaputiei, Ilmatapato, Ilkisonko, and perhaps others (Vossen 1988). Linguistically, some of these are extremely close. The sub-divisions effectively function as politically independent *iloshon* (sing. *olosho*) or sections.

The Maasai are further divided into clans whose members stem from the same male ancestor not far back in history. The clans are patrilineal and include the *Ilmakesen* (of baboon), *Ilaiser* (of rhinoceros), *Ilmolelian* (of elephants), *Iltaarroseero* (of hyena), and *Ilikumai* (of raven). Regardless of clan or family affiliations, all Maasai are also members of one of two moieties, one called *odomong'i* (the house of the red oxen) and the other *orok-kiteng'* (of black cattle).

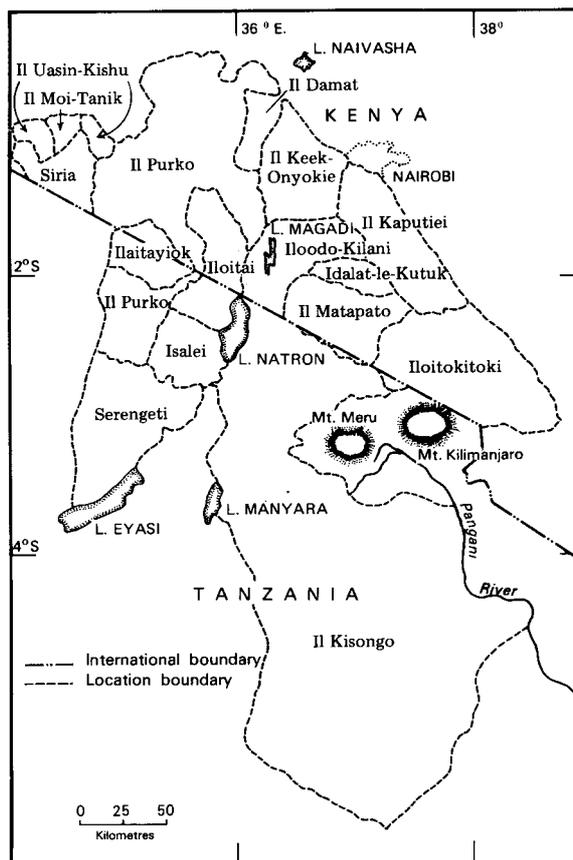
Several thousand years ago the ancestors of the Maasai migrated eastwards from their supposed original homeland in northern central Africa (Chad/CAR) looking for pastures. In today's Ethiopia they encountered Cushitic groups with whom they intermarried, thereby adopting some cultural and linguistic elements including circumcision, division in age groups and the drinking of cow blood. Most likely before the 16th century, Maa speaking peoples entered into northwestern Kenya. The growing number of cattle is likely to have been the reason for this southward expansion which led them across the Kerio Valley. Maasai elders see Kerio (Edikirr-e-Kerio) as their origin.

Social changes

Before the colonial era (around 1890), the Maasai had a grazing range which comprised more than two thirds of present-day Kenya. It spanned from Homabay and Trans-Nzoia in the

West to Taita-Taveta and Tana River Districts in the East and from Tanzania in the South to the shores of Lake Turkana. Most of the other communities were confined to forested mountainous areas which were of less interest to the Maasai as a livestock-keeping community.

Frequent engagement in fierce wars with other community groups as well as between their own sections, has influenced to a great extent the present day location and range of each of the sub-groups and the community as a whole, in relation to their neighbours. Much of their original land has further been lost to their neighbours who are mainly engaged in agriculture and who tend to concentrate in the cooler and wetter highland areas. Over the years this encroachment, which has come practically from all sides and all neighbouring communities, has not only disconnected the mainstream southern Maasai from the northern sub-groups such as the Njemps and Samburu, but has also pushed them into the drier plains. The majority of the Maasai population in Kenya



The distribution of Maa speaking pastoralists since ca. 1930 (Kipury 1983).

is therefore presently confined to the Kajiado, Narok and Samburu Districts. Today they number about 450,000 with a birth rate of about 3.5% and an infant mortality of 8%.

Although over the years the Maasai have undergone great changes in structure and organization, they are a unique ethnic group which has largely resisted change. Recently though, their social values and structures have started breaking down. A good number of Maasai now lead a largely sedentary lifestyle. While much of their land is still communally owned, the tendency in the recent past has been to subdivide land into large group ranches and further to single family units. The consequence of all these developments has been less access to grazing resources than before, less freedom of movement from one region to another, concentration of livestock in the more fragile dry ecosystems, degradation of natural vegetation and soil erosion, fewer animals per family, social and cultural erosion and increased poverty. The latter coupled with increasingly common alcoholism has led to families losing their land and eventually migrating to urban areas, where men search for cheap paid labour, especially as watchmen.

Despite these developments, the Maasai are recognized the world over for their lifestyle centred around their cattle, the tenacity to their culture and their traditional way of dressing.

Maasai and the environment

Until relatively recently the Maasai depended entirely on their surroundings for their survival. Even now, their life is still intricately interwoven with the environment. This is attested to by the intimate knowledge of the environment acquired since childhood. Childhood activities such as looking after animals and the years spent as war-

riors in the forest provide an essential training in environmental matters. Young women learn about plants during excursions to collect firewood, water and medicines as well as construction material.

Traditionally, social taboos prohibited the use of wildlife. Whoever hunted wildlife for food was equated to an Iltorobo (Ndorobo), hunter-gatherers who were looked down upon by the Maasai. The land of the Maasai therefore now boasts an exceptionally high density of wildlife. This has not been without a price, however, as protected areas, such as the Serengeti, Masai Mara and Ngorongoro conservation area proclaimed in their territory and the accompanying restrictions, have reduced access to these grazing fields. In addition, diseases brought by wildlife such as the gnu (wildebeest) and competition for fodder are problems confronted by the Maasai.

As livestock keepers, the Maasai herd cows, goats, sheep and occasionally donkeys. Poultry and pigs are becoming increasingly common. More recently, camels have been introduced. Traditionally, herding involved a well-organized seasonal movement of animals from the lowlands of the Rift Valley (*ilpurkeli*) during the wetter seasons to the well watered highlands (*isupuki*) east of the Rift Valley during dry periods.

Animals are kept both for economic reasons and as a source of food. Milk from cows, especially fermented, is the main traditional food of the Maasai. Herbal soup is an important part of the diet for most people, men and women alike, but especially for the warrior age group. It is taken as a health food by ordinary people and as a drug by warriors. Meat is usually eaten during ceremonies. Wild food, especially fruits, tubers, resins and roots, are still important, particularly to women and those taking care of animals in the field.

THE ILTOROBO (NDOROBO)

The Iltorobo (literally meaning: poor people without animals who earn their living by hunting and gathering) occupied most of the Rift Valley forests including Loita Forest. They were hunter gatherers, living on fruits, insects, honey and hunting. Astute hunters of buffalo, eland, zebra, forest hog and antelope they were experts using bow and poisoned arrows. Their language was influenced by that of the neighbouring communities: those in Loita Forest spoke Maasai. The core of this extensive group of people was however in Mau Forest and here they spoke Ogiek, which is more related to Kipsigis, but has words from the neighbouring Maasai and Kisii communities.

In Loita Forest, the Iltorobo hunted and collected honey. The fire they used has decimated the population of large cedar (*Juniperus procera*) trees which are a preferred habitat for bees. But because they were few in number, the impact on the population of cedar remained low until the modern Maasai began to use the species for fencing and building.

The Iltorobo no longer roam these vast forests. The ones in Loita have settled among the rest of the Maasai, intermarried and become integrated with Maasai culture although some still retain habits which are reminiscent of their wandering forest life. Many Iltorobo families bear Ogiek names.

The Loita Maasai (Iloitai)

We are still a pure Maasai community, known for our profound wariness of strangers. *Eiba Osikiria odoku* - we dislike a donkey that approaches fully loaded - is a phrase commonly used to describe the Loita Maasai's distaste for new arrivals, especially those that threaten our land.

From a brochure published by the Loita Naimina Enkiyio Conservation Trust Company 1994

One of the 15 or so sub-groups of Maasai, the Iloitai, leads a more traditional lifestyle than other Maasai groups in Kenya. The Loita Maasai number about 25,000 people. They occupy the south-eastern part of Narok district. They live on a 2,000 m high plateau, bound to the east by the Nguruman Escarpment, to the north by the Loita Hills and to the west by the Siana and Mara plains. Southwards, the Iloitai extend across the international border to the Loliondo district of northern Tanzania.

Due to geographical remoteness, difficult road access and poor communications, this group of Maasai has remained isolated from other Maasai and from many of the social ills afflicting those living near the big towns. Although only 150 km from Nairobi, a journey to Loita requires a 4-wheel drive vehicle and takes eight hours.

The Loitans have tenaciously clung to their culture and have always been aggressive towards outside domination. This is not to imply that they are against modernization. On the contrary they have a relatively high percentage of well educated individuals. But despite this, the value these elite attach to their community values is strong enough for them to pour scorn on other ways of life. The Loitans are thus a people with an independent way of thinking, faithful to their kinsmen and happy to retain their traditional way of life - traits they probably acquired in defence of their shrinking land and small population. Even the colonial Government had difficulty in governing Loita. The District Commissioner of the then Maasai District, Major Grant is said to have been killed at Morijo, an act which drew wrath from administrators. It thus seems reasonable to conclude that the Loitans, more than any other Maasai in Kenya, hold tenaciously to their cultural values.

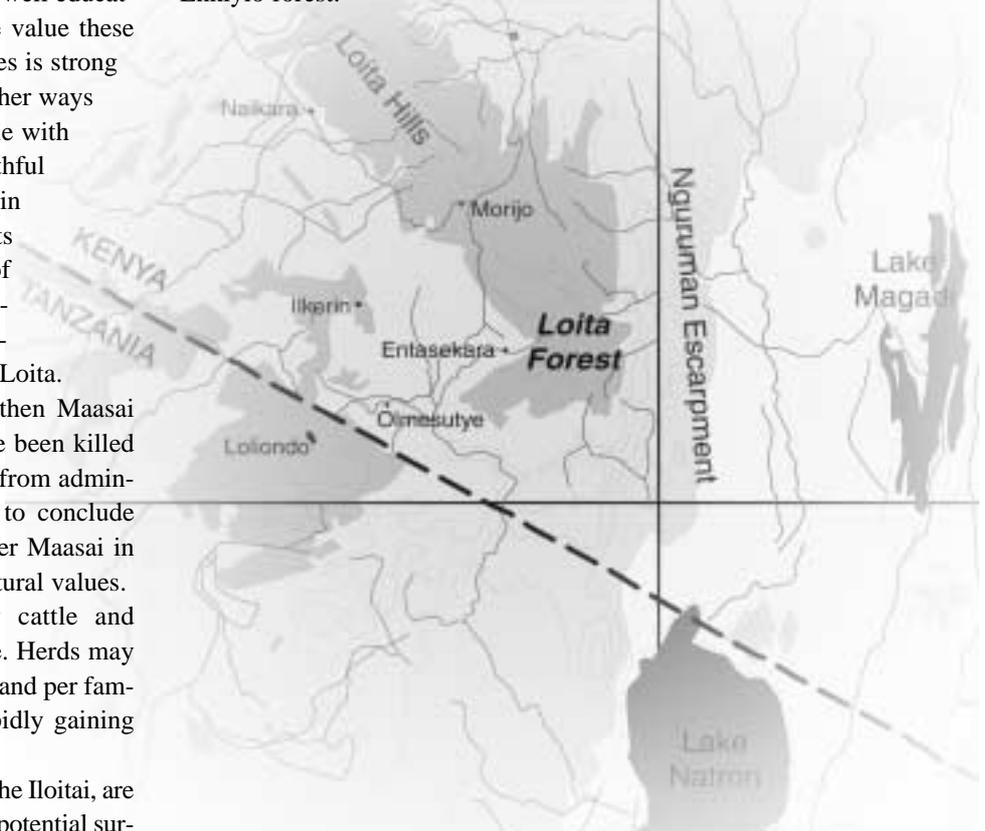
Livestock keeping, especially cattle and sheep, are their main economic base. Herds may vary from a few head to over a thousand per family, although crop cultivation is rapidly gaining prominence.

The Loita highlands, the land of the Iloitai, are endowed with great riches and much potential sur-

passed by few others in Kenya. Wildlife, forests, grasslands and fertile soil with high potential for agriculture are the Loitan heritage. The Loita Hills which rise over 2,600 m are covered by a dry forest with numerous forest glades. To the east they give way to the spectacular Nguruman escarpment which drops more than 2,000 m in some places to the low undulating *Acacia* and *Commiphora* dominated lowlands of Magadi.

The larger part of the Loita population (average density around 10 persons/km²) lives in the open areas of the western edge of the forest, as it has good water supply from the hills and also gives access to grazing areas in the open grassland. Towards the forest the population declines as forest cover increases. The main forest area is only beginning to be occupied while its glades are important dry season grazing areas.

It is against this background that we will examine how the Loita Maasai are organized and what this implies for the use and conservation of plant resources, particularly those from Naimina Enkiyio forest.



SOCIAL ORGANIZATION

HOMESTEAD AND THE FAMILY UNIT

Loitans live in six subcentres, each consisting of several homesteads (sometimes 100 or more) scattered in one general area and with a central area that has facilities such as a clinic, school and shops. Between the villages is a more or less empty area - the grazing and firewood collecting area. In each village the homesteads are spaced rather randomly, each about 300 m to 1 km from the neighbouring one.

Each homestead may, or may not be surrounded by a fence and may consist of up to five closely related families and 10 to 20 or more individual houses. Houses belonging to these families are built around a single large animal enclosure mainly for the safety of the animals.

More often than not, the family is polygamous with the number of wives per household head averaging two to three. This number could be higher for an elderly man who may have as many as six wives, depending on his ability to maintain them. The man is the head of his set of family units, each of which consists of a woman and her children. His house may be separate from that of his wives. The number of children per woman averages five to six, but numbers as high as eleven, or as low as three are not uncommon.

Each woman lives in her house and is responsible for her family and property including livestock. She makes decisions related to her family unit, but decisions that affect the wider family are made by the man.

A house is built by the woman, often assisted by her colleagues. It consists of poles erected in a rectangular manner but with rounded corners. In between the poles, smaller poles and twigs are placed to fill the gaps. The roof is flat or nearly so and consists of strong horizontal branches supported by the peripheral poles and propped in the middle of the house by others placed at intervals. Specific species are preferred for the different parts of the building. The house is normally subdivided into compartments, consisting usually of a living room combining a fireplace and kitchen and a children's and visitors' sleeping place. Another compartment, opposite the children's sleeping place is the mother's compartment, which is only partially shielded. A separate compartment, normally located next to the door is the calf, goat and sheep pen. The house is finished off by plastering all over, including the roof, with fresh cow dung and soil.

More and more families, especially those living next to the forest, are changing the style of construction, and instead of a flat roofed house they are building houses with slanting roofs



Homestead near Ilerin with flat roof (above) and inside Loita Forest near Mpurputia with slanting roof (below):
construction styles vary with resource availability

thatched with grass, reminiscent of Bantu styles of construction. The houses are much bigger, often with a square base. The walls are plastered with mud instead of cow dung. These houses use split wood for the roofs. Only a few species are suitable for this because of the necessity for straightness and ease of working. The leading species is *Juniperus procera* followed by *Podocarpus falcatus* which provides straighter and longer wood.

Livestock and grazing

Livestock keeping is the single most important form of earning a livelihood among the Loitans. An ordinary family has about 10-20 head of cattle and 30-60 sheep and goats. Some families however may have over 1,000 head of cattle and 1,500 goats and sheep while some have as few as three head of cattle. This disparity in numbers is also reflected in the proportion of communal resources utilized by each individual. Within each homestead (which may consist of several related families), animals belonging to the different families may share one animal enclosure, or they may subdivide it so that each has their side, but all are enclosed in a common outer fence with different gates. In addition each homestead has a grazing area for calves (*olokeri*).

Responsibilities in the household

Early in the morning (06.00-07.00h) the women milk the cows with the help of girls. The animals are taken out of their enclosure to the field by 08.00h to return again around 18.00h in the evening. They are milked again before dusk.

Young boys, girls and occasionally the women look after cattle. Boys of between 8-13 years provide most hours of herding. Men normally supervise besides monitoring the condition of each animal. Boys and girls under the age of five look after smaller stock like calves, lambs and baby goats. Above that age, they may accompany others to look after livestock.

In recent years, more and more children have been attending school. Formal education is despised by many older Maasai as it prevents children from looking after livestock. In the traditional system, the responsibility of looking after animals is shed in the early teens in order to join the other teenagers as warriors and trainees in the wilderness.

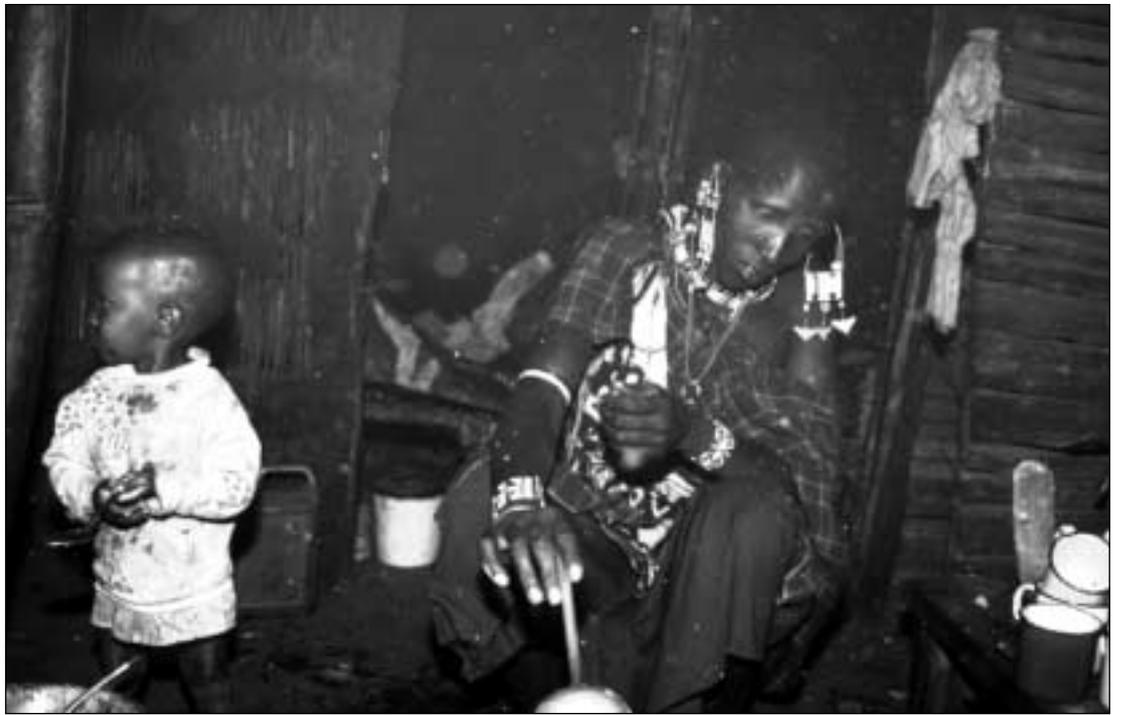
For varying periods, sometimes lasting up to seven years, the boys are trained in the forest in a variety of skills and knowledge, ranging from fighting techniques to the knowledge of medicinal plants and their uses. A selection of respected elders from the villages thereby act as tutors. A large initiation ceremony held in a specially constructed village of up to a hundred traditional huts in an isolated area (constructed by the mothers of trainees) marks the end of the warrior and training life. The young men are now allowed to marry. Traditionally the selection of spouse has been prearranged by the young man's parents. Sometimes the wedding takes place immediately after the initiation. A newly married man gets a share of the family livestock and other gifts from relatives which enable him to start a new phase in his life.

Girls in their early teens, on the other hand, help their mothers in home chores such as gathering firewood but get married earlier than the males, usually between the ages of 14 and 16.

The woman in the home builds her own house and looks after the children and the welfare of her family unit, including her husband. She is responsible for her portion of livestock from which she gets milk for the family. She is also responsible for gathering firewood which in Loita may be obtained from as far away as seven km and may be brought up to four times a week, in loads up of to 60 kg. The whole process of fetching, gathering and bringing firewood home may take up to two-thirds of the daylight time. The rest of the time is left for activities such as



Ceremonial manyatta constructed for an initiation rite near Naikara



Mother and child in their homestead near Ilkerin: smoke from the fire frequently leads to respiratory problems

fetching water, preparing meals for the children and the husband and milking the cattle in the morning and evening.

The man is the head of the family and takes important decisions, such as where to graze. He may undertake large projects such as fencing the homestead and animal enclosures. In all however, the man is far less busy than the woman and can spend long hours chatting with, and getting news from colleagues, which is also important for the family. The importance of news (espe-

cially from other Maasai lands) may be seen in Maasai greetings which incorporate a question on what is new in the area from which the other person has come.

LAND TENURE AND ACCESS TO RESOURCES

Land in Loita is owned communally by the Loita community and ideally one can live and have access to resources anywhere in the land of Loitans. However, each community has some con-



Community resource mapping in Entasekara

control over access to resources in the vicinity of their settlement. Permission to use specific resources has to be sought from the community elders.

Grazing during normal seasons is thus limited to specified places within the home range. Villages or clans therefore have access to certain grazing fields but limited or no rights of access to others. This restriction is more stringent towards the forest although even there people have built permanent dwellings and fenced off areas for themselves in recent years. The forest provides dry season grazing for the Loitans and is therefore an important source of security. The forest cushions the Loitans so well, that when the other areas of Maasailand report mass deaths due to drought, as happens every so often, in Loita this is rarely the case.

While grazing is subject to a lot of scrutiny from Loitan society, firewood collection is less so. Firewood is collected from the most convenient places, normally the nearest, and from areas where the specific species of interest, mainly *oloirien*, may be found in plenty and in the dry form. For each community or village, there are specific areas for firewood collection where most women go. These may be near (1-2 km) as is the case with those villages located near the forest, or up to 8 km, as is the case with those found in the more open areas.

For small-scale construction, wood can be obtained from any part of the forest without having to obtain permission. Extraction of large quantities, especially of specific species, is however under strict control by the elders. Some influential people, however, can bypass the limits

set by the elders. In addition to village elders the Chief Laibon plays a key role in decision making regarding the extraction of large quantities.

Other resources, such as medicinal and food plants, appear to be plentiful enough and can be obtained freely from anywhere with little objection.

SOCIO-POLITICAL SYSTEM AND GOVERNANCE

Each Maasai section (*olosh*) has its own political and ritual leaders. All political leaders are elected during the warriorhood (morahood) stage and retain their positions throughout their lives. At the end of the warriorhood stage the leaders cut their hair in the sequence of their rank to become *ilpayani* (elders).

The Chief Laibon oversees the rituals of all Maasai sections. He names age groups and, in collaboration with the elders, decides on the time to end a current age set and start a new one.

Age groups and age sets are important social structures among the Maasai. An age group is composed of men who were initiated during a given time span, usually about eight years. They represent men who have had similar experiences and so have much in common in life. Their age difference may be as high as ten years.

Each age group consists of two age sets (*ilk-it*), the right-hand set (*ilkiseyia*) and the left-hand set (*randai*). Initiation of members of an age group starts with the right-hand set whose morahood will take longer than that of the left-hand set. At the end of the age group both age sets join together in a ceremony initiating them as elders (*enkangooloriakan*).

Leadership categories

Olorip-Olasar is a young leader (*lajuni*) who is highly respected in the society. He is appointed by the *emurata etatene* (right hand age set). After circumcision his powers and respect are confirmed and he continues to help the other leaders in community matters. He attains the status of *olmurrani-loo-ntaasa*.

Olaigwanani is a young man selected on the basis of conduct and behaviour. He is the first to be circumcised of his age group and leads his age mates through all ceremonies and rituals until old age. He is head of his group of morans (warriors) and takes care of the moran *manyatta*. He is the commander during wars. After warriorhood his function is to settle family disputes among the moran community. He remains *olaigwanani* for life.

Olotuno is the chief leader of the morans and is considered a pure person. *Olotuno* is selected during the ritual of *eunoto* when warriors graduate to become elders. He is the first in his age group to cut his hair and to marry. An uncircumcised girl is selected and circumcised to become his wife. He is superior in rank to the *olaigwanani*.

Oloru-e-nkeene is a leader particularly concerned with age group matters. He does not fight and has less authority than *olotuno*. Elders (*ilpaiyani*) slaughter a black bull with a white chest (*orkiteng arus*). A fence (*olale*) is erected to separate mothers from morans who roast the meat. The elders would be drinking traditional beer. The skin (*nkeene*) of the slaughtered animal is most valuable. It is made into a cord (*enkeene*) which is presented to *oloboru-e-nkeene's* mother and later shared among women.

Olopising-Orkiteng is selected by morans and the elders when a new age group is initiated. He and his parents must be of good repute. During his selection, the morans kill a cow by suffocating it with a sheep skin. Elders dissect the animal which is roasted on a platform made from *oloirien* (olive) sticks (*ngeshereta*). The meat is then placed on *oloirien* leaves and *olopising-orkiteng* dressed in a sheep skin serves it to all morans before the elders eat.

The *oloiboni* (Laibon)

Laibonok (sing.: *oloiboni*, Laibons) are diviners who can predict calamities and prescribe remedies. There are several Laibons but only one Chief Laibon. Laibons are consulted for advice during major events and may prepare medicine for the treatment of ailments. They thus have social as well as spiritual control and command great respect in the community. The healing ceremony is usually solemn. The Laibon uses a gourd, herbs and a collection of paraphernalia for healing. In recent years, the power of the Laibon has waned due to the impact of Christianity and changes in the political system.

The Laibon system of leadership seems to have been acquired some 200-300 years ago. The culture of divining is originally non-Maasai. It is said that a young circumcised boy with a 'tail' named Kidong'oe (meaning the tailed one) was found wandering alone in the wilderness. The fact that he was already circumcised may be an indication that he strayed from a neighbouring Bantu or Cushitic speaking agricultural community. He was taken in by the clan of Ilmolelian which later cast him out after he was accepted into the home of *olmurani* (warriors, morans) of a rival clan, Ilaiser. Kidong'oe and his family later broke away and formed the Nkidong'i sub-clan, named after the gourd *enkidong'* (*Lagenaria siceraria*) used by Laibons for predictions. Kidong'oe was thus the first Laibon. Under the eighth Laibon in line, the Ilpurko leader Mbatiani, the aggressive Laikipiak Maasai were defeated around 1870-1875 (Were *et al.*, 1996). From then on the Ilpurko and the Iloitai who had hitherto been allies did not have a common enemy. Competition for pasture in the areas originally occupied by the Laikipiak created a division. The Ilpurko, being more numerous than the Iloitai, started to push the latter from the Loita plains into the highlands.

Resistance from the relatively weaker Iloitai was minimal. Another cause of division came in the late 1800s when a fight started in the Laibon family between Senteu and his brother Lenana, as to who would replace their father Mbatiani as Chief Laibon. The Iloitai supported Senteu while the Ilpurko supported Lenana. The division escalated, leading to warfare. The Iloitai were defeated and withdrew to the highlands where they live with the lineage of Senteu.

The prestigious position of Chief Laibon is inherited. The incumbent selects one of his sons as his successor. The current Chief Laibon, Mokombo ole Simel, an Iloitai, lives on the edge of Loita Forest. A tall, elderly figure clad in a coat from skins of Colobus and Blue monkeys, he is the spiritual leader of the entire Maasai community. The Chief Laibon presides over

social events and ceremonies such as the age set initiation and cleansing rituals. He oversees all major traditional events and blesses the paraphernalia required for rituals. By virtue of his position, he is the overall caretaker of Loita Forest who performs his ritual duties in specific sacred sites in the forest. He has the power to stop malpractices in the forest, such as over-exploitation of a specific species. The son, in his teens, is his day-to-day helper. Several other junior Laibons are scattered along the forest edge. The institution of the Laibon therefore is central to the conservation of Loita Forest. Indeed the Chief Laibon heads the Loita Naimina Enkiyio Conservation Trust.



Physical and natural environment

CLIMATE

Most of Loita lies above 1900 m. In spite of this altitude, the plateau receives only an average of about 600 mm of rainfall with peaks in April and in December. Rainfall reliability is low as totals may vary between 40 mm (in 1998) and over 1,000 mm (in 1997). Generally, rainfall increases towards the east and the north. The highlands of Entasekera receive higher rainfall than the adjacent lowlands. Relief rain and other forms of precipitation resulting from warm air rising up the Nguruman escarpment in the east maintains the highland humidity, such that lichens, mosses, epiphytic ferns and orchids are common on the trees in the forest.

Temperatures are lowest in June to August and highest in February, March and September. The mean maximum and minimum temperatures for the district are 24.5°C and 10°C respectively (Were *et al.* 1996). Night temperatures as low as 4°C have been recorded while day temperatures of 25°C are usual. Temperatures are highest in the plains and lowest in the highlands.

VEGETATION

The vegetation of the area can broadly be divided into the following categories:

Grassland consists mainly of grass species with a few annuals and short perennials and occasionally short spaced acacias, with grass as the main undergrowth. It is common in the open undulating plains of the western part of Loita. Open grassland is a consequence of fire and browsing which have led to the degradation of evergreen bushland. Soils are shallow and stony with rock outcrops and large areas of black clay (black cotton soil). This forms the main grazing ground for the Iloitai.

In **wooded grassland** the tree and shrub cover is between 10% and 40%. Grass is still dominant even under the shrubs and trees. The annuals and short perennials found in grassland are also found here, and may even be more common.

Evergreen bushland is the natural vegetation of the Loita plains but little undisturbed vegetation remains. In Loita, this vegetation type is characterized by clumps of shrubs and trees from just a few metres to some 50 m in diameter. Shrubs commonly reach 2.5-4 m height but occasionally trees up to 7 m are found. Most of the bushland species are commonly encountered around Ilkerin although this is degraded forest area. The area was, 30 years ago, a *Juniperus* -



Wooded grassland dominated by Whistling thorn, *Acacia drepanolobium* (Mimosaceae)

Olea forest, but due to over-extraction of the species by humans it has been transformed to bushland. In the drier and hotter southwestern part of Loita, *Encephalartos bubalinus* is a common species on rocky well-drained areas. Along streams, figs (*Ficus* spp.) and wild dates (*Phoenix reclinata*) may be seen.

In Loita, **thickets** result from the disturbance of forest habitats and so are common towards the forested areas. Good examples can be seen in the Olmesutye area.

Loita Forest is a generally dry upland forest of *Olea*, *Podocarpus* and *Juniperus*. The dominant species change with altitude, soil type, drainage and humidity. Wetter lower zones,



Secondary grassland near Ilkerin

Common plant species of different vegetation types

Grassland	Grass species <i>Bothriochloa insculpta</i> <i>Dichanthium insculptum</i> <i>Hyparrhenia cymbaria</i> , <i>H. filipendula</i> and <i>H. hirta</i> <i>Pennisetum mezianum</i> and <i>P. schimperi</i> <i>Themeda triandra</i>	Herbaceous plants <i>Bulbine abyssinica</i> <i>Heliotropium</i> spp. <i>Hibiscus</i> spp. <i>Hypoxis angustifolia</i> <i>Kalanchoe</i> spp. <i>Notonia</i> spp. <i>Thunbergia fischeri</i>	Shrub and tree species <i>Acacia drepanolobium</i> <i>Acacia hockii</i> <i>Acacia nilotica</i> <i>Acacia seyal</i> <i>Rhus natalensis</i>
Wooded grassland	as above	Herbs as above plus <i>Aspilia mossambicensis</i> <i>Aloe volkensii</i> <i>Aloe</i> spp.	Shrub and tree species <i>Acacia drepanolobium</i> <i>Acacia gerrardii</i> <i>Acacia kirkii</i> <i>Acacia nilotica</i> <i>Acacia seyal</i> <i>Rhus natalensis</i>
Bushland	as above	Shrubs or small trees <i>Acokanthera schimperi</i> <i>Carissa edulis</i> <i>Croton dichgamus</i> <i>Euclea divinorum</i> <i>Grewia similis</i> <i>Rhus natalensis</i> <i>Tarchonanthus camphoratus</i> <i>Zanthoxylum usambarense</i>	Tree species <i>Acacia nilotica</i> <i>Acacia hockii</i> <i>Acacia kirkii</i> <i>Cussonia holstii</i> <i>Euphorbia candelabrum</i> <i>Olea europaea</i> ssp. <i>africana</i> <i>Pappea capensis</i> <i>Schrebera alata</i> <i>Teclea simplicifolia</i>
Thickets	Herbs <i>Aspilia mossambicensis</i>		Shrubs or small trees <i>Carissa edulis</i> <i>Croton dichgamus</i> <i>Grewia similis</i> <i>Rhus natalensis</i> <i>Scutia myrtina</i>
Submontane forest	Herbs/small shrubs <i>Hibiscus fuscus</i> <i>Justicia</i> spp. <i>Lantana trifolia</i> <i>Ocimum gratissimum</i> <i>Pavonia urens</i> <i>Solanum aculeastrum</i> <i>Urtica massaica</i>	Small trees and shrubs <i>Acokanthera oppositifolia</i> <i>Apodytes dimidiata</i> <i>Carissa edulis</i> <i>Dovyalis abyssinica</i> <i>Myrsine africana</i> <i>Ochna ovata</i> <i>Pistacia aethiopica</i> <i>Rhamnus prinoides</i> <i>Rhamnus staddo</i> <i>Rhus natalensis</i> <i>Scutia myrtina</i> <i>Toddalia asiatica</i>	Trees <i>Cassipourea malosana</i> <i>Ekebergia capensis</i> <i>Fagaropsis angolensis</i> <i>Nuxia congesta</i> <i>Olea capensis</i> <i>Olea europaea</i> ssp. <i>africana</i> <i>Podocarpus latifolius</i> <i>Teclea simplicifolia</i> <i>Warburgia salutaris</i> and along drainage lines <i>Bersama abyssinica</i> <i>Ensete edule</i> <i>Mystroxydon aethiopicum</i>
Montane forest	as above		Trees/woody species as above plus <i>Yushania</i> (= <i>Arundinaria</i> = <i>Sinarundiaria</i>) <i>alpina</i> <i>Cassipourea malosana</i> <i>Ekebergia capensis</i> <i>Nuxia congesta</i> <i>Podocarpus falcatus</i>

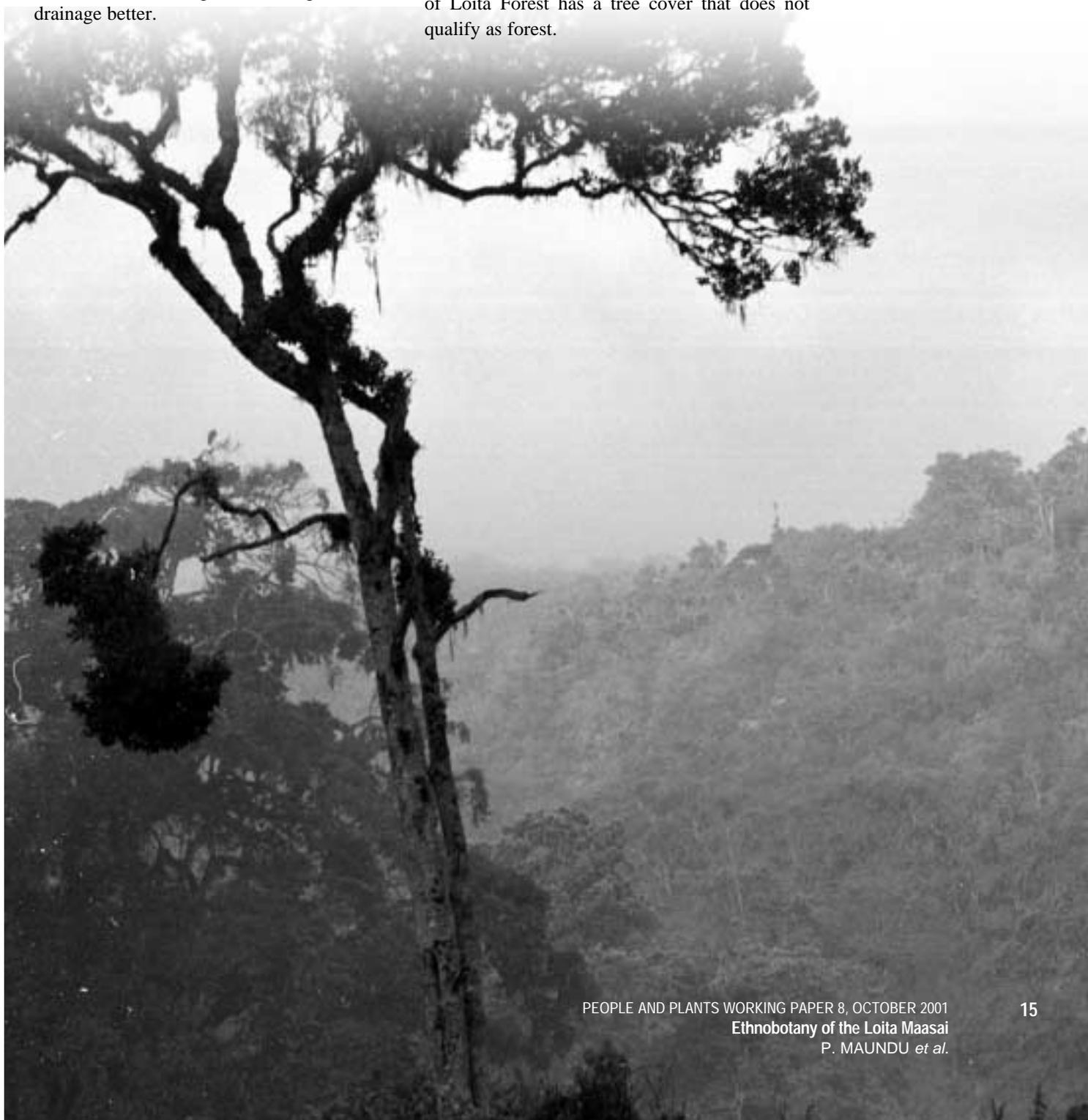
especially along rivers, may be dominated by species in the family Sapotaceae. *Bersama abyssinica* is common along the forest edges.

The following forest types can be distinguished:

- *Olea* forest is found at the base of the hills at the transition zone between grassland and forest. *Olea europaea* ssp. *africana* is the dominant species (see transect data), sometimes with a cover of 100%. It consists of trees commonly 10-16 m high. *Olea* forests are more common along stream valleys on dark brown, well-drained soils. This forest type is the major source of firewood for the local population.
- *Juniperus-Olea* forest is found at a higher altitude than the *Olea* forest. Here, the two species are co-dominant. *Juniperus* may dominate where the gradient is high and the drainage better.

- *Juniperus-Podocarpus* forest is found at a higher altitude than the *Olea* forest. *Juniperus* may be the dominant species in well-raised, well-drained inclined ground. Trees normally range from 15-25 m in height. In many cases, *Podocarpus falcatus* is co-dominant with *Juniperus*, or even be the dominant species at higher altitudes. This is however uncommon.
- Upper montane forest occurs on some hill-tops and is characterized by bamboo thickets.

Over the years patches of forest have been burnt resulting in open glades. Many of these are dominated by *Pennisetum hohenackeri*, a tussock grass which provides fodder when young. The glades are kept open by regular burning. In the local perception these glades are still part of the forest, although technically some 50% of the area of Loita Forest has a tree cover that does not qualify as forest.



PLANT NAMING

Maasai plant names are rather complicated. To a newcomer, there seems to be no standard way of naming. This impression is caused by the fact that a single name can refer to as many as 20 species. The name *enchani-pos* has been recorded for species in 11 genera in nine families. *Olosida* is applied to over 20 species of related plants in Acanthaceae, mainly in the genera *Hypoestes*, *Justicia*, *Barleria* and *Asystasia*. The name *empalaka* has been recorded for 22 grass and sedge species. The above phenomenon is common in the Maasai naming of plants.

The difference in naming emanates from the Maasai perspective of classification which is based on a combination of general morphological features, the habitat of the plant and its perceived character and use.

The factor that most influences the specificity of a name is its use. Plants with distinct uses have distinct names. The names are more consistent for plants that are commonly used: for example, *Pappea capensis*, a most useful plant among the Maasai, is known by the names *orkisikong'o* and *oltimigomi*. This is consistent throughout Maasailand. A less common and less useful species such as *Bersama abyssinica* (Melianthaceae) often shares the same name with *Ekebergia capensis* (Meliaceae).

Plants that have similar general characteristics, morphological or otherwise, may bear one general name. Most *Aloe* species are referred to as *osuguroi* while sour tasting plants (*Oxalis*, *Rumex*, *Oxygonum*) tend to be known as *enkaisijoi*. To differentiate such plants with similar characteristics, the Maasai add a distinguishing epithet, often referring to the following:

- habitat, eg. *-endim* (of the forest); *-rongai* (of the narrow plain); *-engare* (of water).
- colour, eg. *oibor*, *-naibor* (light colour or white); *-orok*, *-narok* (dark colour or black); *-nanyokie*, *-onyokie* (red)
- people, eg. *-olaiyoni* (of boys), *-otatua* (people who live in the area called Iltatua)
- animal, eg. *-ngatuny* (of lion), *-entarei* (of goat), *-oloogishu* (of cow), *-loo sirikon* (of donkey).
- Other common epithets include: *-pos*, *-ekop*, *-enkop*, *-olmwateni*, *-keri*, *-kewon*, *-kedong'o*, *-lokonya* and *-oloiyiok*.

Further complication is brought about by the variety in pronunciation and hence the variation in spelling for a single name. A simple name such as the name for *Rubia cordifolia* (Rubiaceae) can correctly be written as *olng'eriandus*, *ornng'eriandus*, *eng'eriandus*, *olng'eriantus* and *ornng'eriantus*. All these names are encountered in speech. Searching this in a database can be time consuming. Certain generalities can however be made in the Maasai naming system:

Or- and Ol- at the beginning of a name are interchangeable. They are masculine and are often applied to larger plants. E- can occasionally replace Or-, Ol- and O-. Normally diminutive or feminine in nature, it is usually applied to small plants. Sometimes the two can be used perfectly interchangeably, eg. *esupukiai ekop* and *osupukiai ekop*. Some plants may have only the e-version while others have only the ol-, or- or o-versions.

While some spellings are clear and without debate, the natural pronunciation of some of the following leads to more than one way of spelling and therefore one has to confirm if both are correct or if it is only one:

- -d- and -t- (as in *oltiani*, *oldiani* and *oldiasimbol* and *oltiasimbol*)
- -g- and -k- (as in *oloisugi* and *oloisuki*)
- -nk- and -ng- (as in *engoriambiti* and *enkoriambiti*)
- -nt- and -nd- (as in *entemelua* and *endemelwa*)
- -o- and -u- (as in *olmakutukut*, *olmakotokut*)
- -p- and -b- (as in *olopito* and *olobito*)
- -ua and -wa (as in *oltarakwai* and *oltarakuai*)
- -yia and -ya (as in *enkoiyiapasei* and *enkoiyapasei*)
- -yioi and -yoi (as in *olmisigiyoioi* and *olmisigiyoioi*)

During a computer search either all the possible epithets have to be considered, or avoided altogether, by using the main body of the word e.g; -misi- for *olmisigiyoioi*.

Plant names can easily be converted to the plural form by replacing ol- and or- with il- and ir- respectively (eg. *ilgum* for *olgum*). The plural form may however also refer to the fruits. Therefore the most natural way of pronunciation is the singular form.

Plant inventory and uses

This survey concentrated its work in Ilkerin, Entasekera and the forest area. The drier zone of Loita is under-represented. About 250 species are represented: the common, most conspicuous and most utilized species of Loita. This number probably represents only about 50-60% of all species in Loita with known uses. Some specific types of use were not addressed adequately, in particular ethnoveterinary information including fodder species and species used in animal health.

Although some species without reported uses are included in this report, the majority of plants with no known use (as far as the resource persons were concerned) have been left out of this ethnobotanical survey. It is estimated that the floral diversity of Loita could be six to eight times greater than shown here (between 1,500 and 2,000 species). This survey therefore is by no means complete.

Plants used in ceremonies and rituals

Ceremonies are an important part of Maasai life and take place for significant life cycle events such as naming and circumcision, as well as being used to fight disease, to combat infertility, for blessings and to settle disputes. The ceremonies can be short or long, sometimes lasting several weeks.

In this category are plants associated with all forms of traditional ceremonies and rituals. The importance of using plants in the ceremonies of the Loita Maasai is demonstrated by the large number of species (24) found in this category. The *oloiboni*, the spiritual leader uses a variety of plants to make charms for cursing, bewitching or treating people. The main ceremonial plants include:

- *Olea europaea* ssp. *africana*: the most commonly used ceremonial tree; it is used in all ceremonies as it is believed to bring good luck; it is the plant used for blessings;
- *Ficus thonningii* and *Ficus cordata*: the ceremony for blessing women is conducted under fig trees;
- *Olea capensis*: a sacred tree used during the ceremony of initiating the *olorip-olasar*;
- *Cordia monoica*: used to settle disputes;
- *Lantana trifolia* is used in many rituals involving livestock.

PRE-CIRCUMCISION CEREMONIES

When an animal is slaughtered as part of the pre-circumcision process, the ceremonies of *orkine loo benek* (the slaughtering of a goat) and *orkiteng loo baa* (the slaughtering of an ox or a sheep) take place. On both occasions the African olive (*oloirien*) is significant: the animals are slaughtered under an *oloirien* tree; the fire used for cooking is made from *oloirien* wood and a mesh of *oloirien* sticks is used to form a platform to roast the meat. Whilst this is happening the people pray for rain, health, many animals and children.

Selection of *olorip olasar*

In the night after his selection, the young *olorip olasar* has to stand leaning against one of the trees regarded as 'peaceful' or 'harmless' without flinching. These include *Olea europaea* ssp. *africana* (*oloirien*), *Podocarpus*, *Olea capensis* (*ololiondoi*) and figs, particularly *Ficus thonningii*.

Circumcision ceremony

Latimi (stacks of *Olea africana* ssp. *europaea*) are attached to the entrance of the house of the boy to be circumcised. The male circumcision ceremony starts by brewing large quantities of beer in gourds made from *Lagenaria siceraria*. Roots of *Aloe* spp. (mostly *A. volkensii*) accelerate the fermenting of the honey and provide a slightly bitter taste. A day before the start of the ceremony, a pair each of women, men, boys and girls go out to bring branches of *oloirien* which are erected on either side of the door of the house after circumcision.

During circumcision elders make a 'new' fire in a carefully selected and cleaned place. Fire is made by friction using a piece of *oltarakwai* wood (*entoole* or female part) and *oreteti* (*orpiron* or male part). Bark fragments of *oltarakwai* are light and burn easily. *Oloirien* firewood is then used. Leaves of *oloirien* brought by women and children the previous day are placed on the fire to emit smoke. This is called *Olasar* and is meant to bless the village and those being circumcised.

Naming ceremony

During *orkipoket*, the naming ceremony for an initiate or a young child, a sheep is slaughtered on *olmisigiyoio* (*Rhus natalensis*) or

oloirien leaves. Women bring four fresh *oloirien* sticks, each half a metre long, on which meat is roasted. This meat called *enaikwiti* is eaten only by women. Two women and two elders drink beer, bless the child and give it a new name. On their necks, they put a ring of *osinandei* (*Periploca linearifolia*).

Fertility Ceremony

During *olamal loo ngituak*, hundreds of women pass through an arc formed by the stem of a sacred *oreteti* (*Ficus thonningii*) deep inside the forest. When they come back to the village two elders, one with a milk gourd and the other with beer, use the leaves of *oltukai* (*Phoenix reclinata*) to sprinkle these liquids on the women as they enter. At the end of the ceremony the women feast on meat roasted by elders on *oloirien* sticks (*ngesh-ereta*) and placed on *oloirien* leaves.

BLESSING CEREMONIES (OLASAR)

When the Laibon directs that a homestead requires blessing, women bring *oloirien* leaves and firewood whilst people gather in the cattle enclosure. A new fire is started using *oltarakwai* and *oreteti* and people including children, elders and women sing around the fire.

When animals return from far-distant grazing lands, where they have been due to a long drought, an *oloirien* fire is made on either side of the entrance to the animal enclosure. Fresh *olmagirigiriani* (*Lantana trifolia*) is put on the fire to give an aromatic smell. Animals pass through the smoke and into the enclosure. The intention is to cleanse the animals and to bless them.

In case there is an outbreak of foot-and-mouth disease in one area, other villages may perform *aen ngishu orkirobi* to keep their animals clear of the disease. Two long branches of *olmisigiyo* (*Rhus natalensis*) are fixed on either side of the entrance to an animal enclosure. An elder smears honey on *oloirien* branches as well as the houses.

USE OF CEREMONIAL SPECIES IN THE CONSTRUCTION OF A WARRIOR MANYATTA

There are three types of *manyatta* including *manyatta oor murran*, *manyatta ngeene* and *emanyatta oolorikan*. The *manyatta oor murran* is constructed for the graduation from moranhood (*eunoto*) which may involve the construction of over 100 huts by the mothers of the warriors. *Enaunir* is a stick of *oloirien* put on every door of a house in a *manyatta* of initiates. During *eunoto*, animals are slaughtered under an *oreteti* (*Ficus thonningii*). The *olasar* (burning of fresh *oloirien* leaves) is performed as in other cere-

monies. At the end of the ceremony the *manyatta* is disbanded and burned.

Plants used for building

The use of plants as a source of timber is only recent. Hand saws which are required for splitting logs to timber are increasingly being introduced by non-Maasai timber poachers who are also co-operating with the locals. The most valuable timber species is *Juniperus procera* (*oltarakwai*) followed by *Podocarpus falcatus* (*olpiripiri*). Timber is mainly used in the construction of roofs for modern houses.

CONSTRUCTION

A wide variety of species are used for building houses and other structures. Most important are poles of plants which are strong and resist termite attack and decay. In Loita, there are three common types of houses:

- Roof built with poles and sticks and plastered all round with a mixture of cow dung and soil: this is the house common around Ilkerin.
- A modification of the first type, where an additional pyramidal grass-thatched roof is built above the ordinary flat roof to facilitate the flow of rain water from the roof: this type is more common near the forest.
- Modern rectangular houses: the roof is pyramidal, with or without a ceiling. It may be grass thatched or roofed with iron sheets. Walls are of stone or *Juniperus* poles but plastered with mud only. The ceiling is made of *Juniperus* timber. Such houses are most common near the forest.



Animal enclosure of cedar (*Juniperus procera*, *oltarakwai*)

The amount of timber consumed increases from the first type to the third and therefore the third option can only be afforded by those living near the forest, or having the means of transporting timber. Modern construction therefore puts a lot of strain on *Juniperus* resources in the forest and as more families opt for this type, the species will diminish in the near future.

Strong poles are used to support the main structure of the house. In order of preference, these are:

- *Juniperus procera* (*oltarakwai*)
- *Olea europaea* ssp. *africana* (*oloirien*)
- *Acacia nilotica* (*olkiloriti*)
- *Olea capensis* (*ololiondoi*)

Plants with thinner stems but with similar characteristics are used to fill in the gaps between poles. The most preferred species are:

- *Tarchonanthus camphoratus* (*oleleshua*)
- *Croton dichogamus* (*oloibor benek*)
- *Ochna ovata* (*orjartuyan*)
- *Mystroxydon aethiopicum* (*olodonganayioi*)

FENCING

Fencing is done around animal enclosures, homesteads and to protect cropland. Three types of fences are common in Loita: poles, dead branches and a living fence.

The traditional way of fencing is by piling up branches of thorny acacias and *oleleshua* (*Tarchonanthus camphoratus*) or, where thorny material is limited as in Ilkerin, by sticking *ole-*



Split cedar (*Juniperus procera*, *oltarakwai*) poles stacked up for collection at the edge of Loita Forest

leshua and *olmisigiyoioi* (*Rhus natalensis*) into the ground. Other species used for dead fences include *Maytenus heterophylla* (*olaimurunyai*) and *Mystroxydon aethiopicum* (*olodonganayioi*).

Fencing with poles involves erecting a continuous wall of 3-4.5 m height in holes or in a trench dug round the

area to be fenced. Fencing poles are almost always of either *Juniperus procera* (*oltarakwai*) or *Olea europaea* ssp. *africana*. This type of fencing is most common near the forest where the species used are available. *Oltarakwai* has been favoured because the poles are extremely durable. Being termite resistant, they can last for over 100 years. They also look good with their dark-red shiny colour. The poles can easily be split and



at a homestead in the vicinity of Loita Forest

leave sharp edges and pointed tips which are a deterrent to intruders including wild animals such as lions. Fencing with these poles however is labour intensive and extremely wasteful. It involves cutting a tree with a diameter of up to one and half metres, chopping it into pieces, splitting it, transporting the poles and erecting them in a trench or holes. This is the sort of fencing many families, especially the wealthy, have adopted.

Living fence

The living material is normally of plants that root easily from cuttings, such as *Commiphora* spp. All species must be resistant to both termite attack and decay. In all cases, the fence must be high and strong enough to keep away thieves and wild animals, especially hyenas and lions.

As a rule, the branch for closing the entrance to an animal enclosure is always of *Gardenia volkensii* (*oltakurukuriet*) and it is the women who open and close it. When it is pulled out of the entrance, it is placed directly in front of the gate. The direction it faces should not be altered when it is pulled out. This *Gardenia* branch may be reinforced with branches of other species.

Food plants

EDIBLE INNER BARK

Some plants, particularly *Acacia* spp., are chewed for their sweet taste, their water content, as an exercise for the jaws and to pass time. The bark is removed and the inner light-coloured thin layer is chewed.



The roots of *Aloe volkensii* (*olsuguroi*) are used for the fermentation of honey beer

INFUSIONS

The stem and root bark of a number of species is used to prepare a brown tea-like infusion. Sugar and milk may be added. From some plants, such as *Zanthoxylum usambarense*, the fruits and the leaves are used. In the majority of cases, these infusions serve the dual purpose of a drink and medicine, which may either be curative or preventive. Most of them are nice smelling.

GUMS AND RESINS FOR CHEWING

In this category are species that exude substances which are sucked. Many are almost tasteless but are sucked just to exercise the mouth and to pass time. Resins are mainly obtained from *Commiphora* spp. and gums from *Acacia* spp. The latex from *Acokanthera* spp. (otherwise known as the source of arrow poison) and *Carissa edulis* can be made into chewing gum for children.

FERMENTATION OF BEER

The roots of various *Aloe* species (*olsuguroi*) are dug up, cleaned, and used during fermentation of beer. This is in contrast with many Bantu communities who use the fruits of the sausage tree, *Kigelia africana* (Bignoniaceae), for fermentation. Once prepared, the roots are spongy and have characteristics similar to those of the sausage tree fruit. After every preparation, the roots are dried and kept for the next one. Preparation of beer is done in large containers made from the fruit of the gourd (*Lagenaria siceraria*) with its contents removed. The beer is served in smaller gourds, from which several people may drink.

EDIBLE FRUITS

Although consumed as snacks, fruits constitute a major part of the food ingested by children and women looking after cattle as well as morans in the wilderness. The five most preferred fruits are:

- *Carissa edulis* (*olamuriaki*)
- *Vangueria apiculata* (*olgum*)
- *Pappea capensis* (*oltimigomi*, *orkisikong'o*)
- *Syzygium cordatum* (*olairagai*)
- *Flacourtia indica* (*oldongururwo*)

Other commonly used fruits include:

- *Rhus natalensis* (*olmisigiyioi*)
- *Scutia myrtina* (*osanangurut*)
- *Cordia monoica* (*oseki*)
- *Grewia similis* (*olnyalugwai*)

EDIBLE GALLS

The galls of *Acacia drepanolobium* (*eluai*) are formed at the base of a pair of spines. The galls are fleshy, hollow, up to 4 cm in diameter, dark green to reddish purple when fresh, turning dark grey to black and usually inhabited by black or brown ants as they dry. The fresh soft galls are edible. They have a sweet and somewhat bitter taste. Very young galls are green to dark green, bitter and filled with fluid. As they mature they turn reddish purple and hollow but harden with age, becoming fibrous. This use is found in most other communities where the plant grows.

EDIBLE ROOTS AND TUBERS

A number of species especially in the genus *Ipomoea* (Convolvulaceae) and several genera in Asclepiadaceae have edible tubers. All are characterized by a slight sweet taste and a juicy consistency. As a result they are also preferred for their water. The black cotton plains of grassland are the home to the majority of these edible tubers, many of which are noticed only in the rainy season when they sprout new shoots from their underground tubers.

SOUPS

This is probably the most important use of plants for food in Maasailand. It is a custom to take soup with plant extracts. This is done to improve the taste, to keep diseases away and for curative purposes. The moran may however take

some species in soup as a drug or stimulant. In most cases the root bark is used. Other forms include the root, stem bark or pieces of stem.

The most commonly used soup species are:

- *Acacia nilotica* (*olkiloriti*)
- *Pappea capensis* (*oltimigomi*)
- *Carissa edulis* (*olamuriaki*)
- *Scutia myrtina* (*osananguruti*)

Acacia nilotica is the most frequently used soup plant. The root or stem bark is boiled in water and the decoction drunk alone or added to soup. The moran are fond of taking this as a drug before going on raids. It makes them energetic, aggressive and fearless.

EDIBLE STEMS

The soft stems of some species are chewed mainly for their taste, usually sour. In many cases only the juice is swallowed and the remains discarded. Common species include *Rhus* spp. (Anacardiaceae) and *Rhoicissus tridentata* (Vitaceae). Some of the species may be used as a toothbrush at the same time (see below).

Plants used as firewood

A great number of species can be used as firewood. In Loita, however, tradition requires a woman to use wild olive, *Olea africana* ssp. *europaea* (*oloirien*). A woman who uses olive for firewood endears herself to the husband and gains respect from him and the society. *Olea* is

Pairwise ranking of firewood species

Firewood tree species were identified and ranked for frequency of use, preference and availability at two different locations. Eight Maasai names of tree species used for fuel were written on separate pieces of paper. The first ranking exercise concerned the most frequently used species identified through pairwise ranking. For example: "Of *olorien* and *olmisigioi*, which do you use more frequently?" Answer: "*Olorien*". Comparison of each possible combination resulted in the ranking presented in Table 1. Similarly, preference and availability in two locations were analysed.

Table 1. Outcome of fuelwood ranking exercise (1=highest; 8=lowest).

Species	Most used	Preference	Availability in Ilkerin	Availability in Entasekera
<i>oloirien</i>	1	1	7	1
<i>oleleshua</i>	2	2	3	3
<i>oloisuki</i>	3	3	4	5
<i>oliala</i>	4	4	5	7
<i>olgilai</i>	5	5	8	4
<i>oldardar</i>	6	6	6	8
<i>olerai</i>	7	7	1	6
<i>olmisigiyioi</i>	8	8	2	2

preferred for its characteristics: the wood burns brightly, thus providing lighting for the usually dark Maasai houses; it imparts a characteristic good scent to the house, masking or obliterating the smell of dung which is used for plastering the houses; unlike many other firewood species, *Olea* burns with relatively little smoke, a necessary quality for such houses which are completely enclosed and therefore poorly ventilated; *Olea* burns readily even when fresh as though it contains oil.

This tradition of using *Olea* remains steadfast even in villages where it has to be obtained up to eight kilometres away due to its extermination in closer areas. The other species are used only sparingly. A random sample in ten homesteads located away from the forest (*Ilkerin*) and another ten near the forest (*Entasekera*) found all the women using only *Olea* for firewood. This is collected on average three to four times in a week in 45-60 kg loads depending on one's ability to carry. Women usually go in groups of up to ten. In the collecting area, dry firewood is collected and split into narrow (5-10 cm by 0.5-1.5 m long) sticks, bound in a bundle with a long cord made from cow hide. As the fuel resources in the area start to diminish, the women turn to the living trees themselves until they are finished. They then turn to the stumps and finally the roots. In the area around Ilkerin, the women are at the stage of stumps and roots. This is in spite of the presence of other reasonably good fuelwood species in the vicinity.

The most important firewood species in the order of preference are:

- *Olea europaea* (*oloirien*)
- *Tarchonanthus camphoratus* (*oleleshua*)
- *Zanthoxylum usambarensis* (*oloisuki*)
- *Schrebera alata* (*oliala*)

Some plants however are not used as firewood. This may be due to their significance in ceremonies or because of the quality of their wood. *Olea capensis* (*ololiondoi*) is probably the most sacred plant in Loita and cannot be used for firewood. *Warburgia salutaris* (*osokono*), the most important medicinal plant, is also not used. Charcoal burning was not recorded in Loita.

Medicinal plants

This survey lists about 90 species used for medicinal purposes in humans. This probably represents only half of the species used for medicine in Loita. The vast number is an indication of the important role played by plants in the health of the Loita Maasai. The importance of medicinal

plants among the Maasai can be seen in the name, *olchani*, which is used both as a general name for all plants as well as for medicine.

The common diseases in Loita are 'malaria' fever, brucellosis, gastro-intestinal problems and infections of the urinary tract. This is confirmed by the large number of species used in each of these categories (Table 2). Some species are used for the treatment of more than one disease (Table 3, page 23).

Table 2. Number of plant species used for different categories of ailments.

Class of ailment	No. of species to treat
Digestive system disorders	31
Fevers (brucellosis, malaria)	19
Urinary tract infections	14
Aches	11
General body health and strength	11
Respiratory system diseases	8
Infant (new born care)	7
Wounds, sores and cuts	6
Gynecological and child birth	5
Eye diseases	4
Infectious diseases	4
Circulatory system disorders	2
Skin care	1
Snakebite	1

ACHES AND PAINS

This category includes backache, painful joints, general body and rheumatic pain and headache. Backache includes all types of pains emanating from the back, including pains due to kidney problems, backbone and even some types of venereal diseases. Many plants with fleshy leaves, particularly *Kalanchoe* spp. (Crassulaceae) are used to treat body pain. The leaves are warmed repeatedly and each time placed gently on the painful part.

CIRCULATORY SYSTEM DISORDERS

Anaemia is not a serious problem among the Maasai who use soup with plant material quite frequently. Some plants are taken to 'clean' the blood and its 'filters', the kidneys.

Table 3. Plants with several medicinal uses.

Maasai name	Botanical name	Number of diseases reportedly treated
<i>osokonoi</i>	<i>Warburgia salutaris</i>	9
<i>oloisuki</i>	<i>Zanthoxylum usambarense</i>	8
<i>oloirien</i>	<i>Olea europaea ssp. africana</i>	5
<i>olesayiet</i>	<i>Withania somnifera</i>	5
<i>olmakutukut</i>	<i>Clerodendrum myricoides</i>	4
<i>olkinyei</i>	<i>Euclea divinorum</i>	4
<i>olmagirigiriyani</i>	<i>Lantana trifolia</i>	4
<i>olkiloriti</i>	<i>Acacia nilotica</i>	3
<i>olekidongo</i>	<i>Achyranthes aspera</i>	3
<i>olamuriaki</i>	<i>Carissa edulis</i>	3
<i>oltakurukuriet</i>	<i>Gardenia volkensii</i>	3
<i>olaimurumyai</i>	<i>Maytenus heterophylla</i>	3
<i>oloile</i>	<i>Sarcostemma viminale</i>	3

DIGESTIVE SYSTEM DISORDERS

In this category plants are used for gums and teeth, mouth infections, intestinal worms, diarrhoea and dysentery, aiding digestion, aiding faecal disposal, emetics and purgatives, to stop vomiting and stomach-ache.

Most emetics and purgatives are used in the treatment of malaria-like fevers common in Maasailand.

EYE DISEASES

Eye infections are a common disease in Loita among children. This is attributed to the high prevalence of domestic flies which are particularly associated with milk and cow dung. The milky latex of some plants is used to clean specks from eyes. Specks in the eye is a common phenomenon in the local houses because of the loose nature of the roof. Other plants with latex are used to correct waning eyesight.

FEVERS

The most common causes of fever are brucellosis, malaria and flue (perceived as similar to malaria). Brucellosis is a common disease in Loita. It is caused by a bacterium, *Brucella abortus*, that can be transmitted from animal to humans mainly through contact with the animals and through milk.

Throughout interviews, local people referred to all malaria-like fevers as malaria. It is therefore difficult to know which fever is actually due to malaria parasites. Loita is generally cold and incidence of actual malaria is probably low. The fever could be due to food poisoning or even brucellosis. Many of these 'malaria' fevers are countered by taking emetics, purgatives and herbs that directly attack the disease.

INFECTIOUS AND RESPIRATORY SYSTEM DISEASES

In this category are sore throat, tuberculosis, colds, coughs and pneumonia. Many aromatic plants are used for coughs and colds. The bark of *Warburgia salutaris* is most commonly used to treat respiratory problems.

URINARY TRACT INFECTIONS

Urinary tract infections are another common disease in Loita but the Maasai have evolved effective treatments for these. The prevalence is attributed partly to polygamy as the disease becomes hard to treat effectively once it gets into the family. The two common diseases are gonorrhoea and syphilis.



Debarked *Warburgia salutaris* near Entasekara

WOUNDS, SORES AND CUTS

Specific types of wounds and sores are treated with specific plants. For example, *Solanum incanum* is applied on an open boil while *Maytenus heterophylla* is used after a circumcision operation.

Wood products

A variety of personal and household items are carved from various plant species. Arrow shafts are made from plants with straight, narrow and durable stems. The most commonly used are *oleleshua* (*Tarchonanthus camphoratus*), *enchaniembae* (*Allophylus* sp.) and *endulele-endim* (*Erythrococca bongensis*)

Trees with soft trunks are carved into beehives, mortars, stools and troughs for salt and giving water to animals. Beehives, mortars and troughs which need hollowing out are preferably made from trunks that are partially hollow. Most honey is however collected from trees in the forest or under rocks.

Thinner stems of soft wood species are made into knife and sword handles, utensils, sword sheaths and quivers for arrows. On the other hand, clubs, tools for branding animals, and sticks for walking, are made from tough wood. Wood such as that of *Teclea* and *Olea* is made into clubs. The tough, narrow, straight stems of some species such as *Erythrococca bongensis*, *Diospyros abyssinica* and *Grewia similis* are made into sticks.

FIRE STICKS

Fire is made by friction between two pieces of sticks of specific characteristics. The one for drilling, referred to as *orpiron*, is made from *oreteti* (*Ficus thonningii*). The piece which is drilled, *entoole*, is normally of soft wood and the species most commonly used is *Juniperus procera* (*oltarakwai*). These may be carried around as one would carry a match box. Shredded bark of *oltarakwai* burns easily and is used to set the fire burning.

SNUFF CONTAINERS

Snuff taking is part of Maasai culture. Snuff containers are mainly tiny gourds (*Lagenaria siceraria*) or bamboo stems (*Arundinaria alpina*). These are carried around in pockets, on the neck or wrists, or even in holes in earlobes.

TOOTH-BRUSHES

Tooth-brushes are made by chewing the tips of twigs of certain species until they are soft. The

most important species are *Warburgia salutaris* (*osokonoi*) and *Zanthoxylum usambarense* (*oloisugi*). Tooth-brushes from these trees are known to have a medicinal value as well.

DYE SPECIES

The use of dye is restricted to only a few applications, the majority being children dyeing their lips or toys. *Acacia nilotica* (*olkiloriti*) is however used to dye leather. Other items that are dyed include knife sheaths and handles, quivers and shields.

ARROW POISON

Arrow poison is made from *Acokanthera schimperi*. All parts of the plant can be used. Stems, roots, or even leaves, are put in a large container, filled with water and boiled for up to 10 hours in a secluded area. Additional water is added in case the water evaporates before this time period is attained. Once all the water has evaporated, a thick sticky black substance is left in the container. The plant parts are discarded. This substance is then cut into pieces, put into containers or wrapped and stored away from people. Arrow poison is applied on arrow tips. The arrows are used for hunting and for self defence. Once introduced into the blood system the poison can kill in 20 minutes. The hunter gatherers who lived in Loita Forest were known for their expertise in poison-making and hunting, using poisoned arrows.

Fodder plants and veterinary uses

This constitutes the largest category among all human and veterinary related uses. The research however did not concentrate on ethnoveterinary aspects: first, because the use of livestock medicine is unlikely to pose any serious dangers to species diversity in Loita; and second, because this is a vast field of study in itself, given that the entire livelihood of Maasai is livestock dependent.

Miscellaneous uses

There are many other minor plant uses in Loita. Among the more common ones are: cleaning gourds, containers, detergent, glue, insecticide, mattress, ornament and decorations, perfume and deodorant, sandpaper, sieve, smoking gourds, string and rope, tanning leather, thatching, tobacco substitute, toilet tissue, towel, toys, stinging nettles. Other forms that we know of include: bee-food, bee-habitat and poisonous plants.

Conservation needs and attitudes

Loita is located between the Mara and Serengeti plains and the forests of the western escarpment of the Rift Valley. The vegetation types of the area reflect this large gradient ranging from open or wooded grasslands to closed-canopy forest. Diversity of habitats is increased by small-scale differences in topography and soils and different degrees of human disturbance. This results in a pleasant mosaic of vegetation types which in turn provide a range of habitats for wildlife. Although the Loita ecosystem is by no means undisturbed and although the level of endemism is probably very low, the abundance of different habitats leads to a generally high diversity of plants and animals. Its bird diversity, for example, is rated among the highest in the country.

Much of Loita's mammal population is concentrated in the grasslands and in the open areas of the transition zone (the area between the forest and the grassland with forest patches and large open areas with grass). The plains, in particular, are densely populated with gnu, giraffe, zebra and gazelles (Thomson's, Grant's and impala). Seasonality seems to affect most of the plains animals which continue migrating from one zone to the other depending on the condition of pasture and browse. So it is not rare to see the plains devoid of animals in one season, only to find them teeming with animals in another.

The forested highlands have their own range of species. Here elephants roam the forests and venture little into the plains. Buffalo, baboons and colobus monkeys are largely restricted to the forest areas. In the marshy reeds of the river Olkeju lo Rasur, hippos are abundant. Although rather rare to spot during the day, their foot prints and pathways are good testimony to their presence. These marshy areas are also inhabited by waterbuck. In addition the marshes provide good wallowing grounds for elephants.

The Maasai in general have co-existed with wildlife for millennia. This is unlike most agricultural communities, who have hunted their wildlife to near extinction. But why have the Maasai managed to conserve their wildlife so effectively? The answer lies in the fact that the Maasai have developed conservation measures within their traditions, in the form of taboos and social norms, to be observed by all.

Hunting is considered a degrading activity

left to the poor hunters and gatherers. The killing of animals is regarded as sinful and an act punishable by God. Male lions were hunted for fame but lionesses and cubs were spared to proliferate. Those who ate game meat were denied milk: if they drank milk, it was believed, the cow's udders would dry up or block. In this way,

the Maasai have lived with wild animals and their livestock have grazed alongside them for many, many years.

Loita forest, to the daylight visitor, may appear quiet and with little animal life. However spending the night camping in the forest may lead one to appreciate what is hidden beneath these forests: the cracking branches of trees as they snap under the force of a passing elephant; the howls of the colobus monkey perched high up on tree tops and of baboons as they warn each other of the presence of a marauding leopard; howls of hyenas as they traverse the forest towards the villages in search of stray goats or meat and bone leftovers, eerie cries of several owl species and of course the melodious early morning songs of hundreds of bird species in search of food and mates.

Threats to Loita Forest

LEGAL ISSUES

While the plains to the south and west of the Loita forest are communally owned, the forest legally is trustland under the care of the Narok County Council. The potential of the forest as a tourist site and a conservation area, as well as its natural resources and its potential for farming, have been the source of conflict among the Loitans, and between the Loitans and the Narok County Council. The County Council intended to gazette the forest as a reserve. Local residents were concerned that this would lead to a loss of their rights over the forest and its resources and that loggers might invade the forest. The Loita Naimina Enkiyio Forest Conservation Trust was formed to prevent the County Council from

gazetting the forest and a court case was launched. The Trust argued that the people of Loita are capable of managing and conserving their forest. Almost ten years later the case has still not been settled. However, Loitan interests are now well represented in the Council and it appears that the plans to gazette Loita Forest have been shelved.

DIMINISHING RESOURCES

Until the recent past, most of the pressure was on plant resources located in the open and wooded grassland areas and pockets of dry forest of the western part of Loita where the majority of the population lives. Over-exploitation of key species in these areas led to the extermination of *Juniperus procera* and *Olea europaea* ssp. *africana* around Ilkerin. In recent years, more and more families have moved and settled at the edge and even inside the forest in order to be closer to the resources they need for their livelihood. This pressure is a result of diminishing resources, mainly firewood and construction material in the grassland areas, and of increasing competition for good grazing land.

Loita now has more livestock than ever before. Grass and browse are increasingly becoming diminished earlier in the year, meaning more and more dependence on forest grazing areas which are usually reserves for extreme drought conditions. In addition bush encroachment has been responsible for diminishing grass resource. Large areas of what used to be grassland just a few years ago have now turned to bushland and woodland. This has been attrib-

uted to too much grazing pressure and changes in burning patterns.

The trend of moving to the forest was started by influential individuals who got approval from the Chief Laibon. Nowadays, manyattas are found in most parts of Loita Forest and large areas are burnt to create grazing land.

AGRICULTURAL EXPANSION

Until a few years ago, the Loita Maasai did not engage in crop cultivation. A few people, mainly under the influence of the neighbouring agricultural Sonjo living across the border in Tanzania, started irrigated farming at Olmesutye. They grew vegetables and maize. Agricultural extension campaigns took this up and agriculture slowly started to spread to areas far from the rivers and streams. The Ilkerin-Loita Integral Development Project has played a key role in promoting agriculture and in supplying seeds and implements.

Harvests turned out to be usually good due to the high water holding capacity of the heavy soils and the unlimited supply of animal manure. In spite of the high labour input for fencing (protection from livestock and wild animals), the interest in cultivating maize and beans spread quickly amongst the population. Now about three out of four homesteads have a garden. Their size is usually between 0.25 to 2 ha. The positive returns from the farming, especially in the last few seasons, is further encouraging farmers to clear more land for crops and for others to become engaged in agriculture.

There are currently no tractors or other agricultural machinery in the whole of the Loita. Our biggest piece of agri-equipment is an ox-plough.
From a brochure published by the Loita Naimina Enkiyo Conservation Trust Company 1994



Grounded tractor at Ilkerin

Narok District is well known for its agricultural potential. The northern part of the District with similar conditions to Loita, is an important zone for barley and wheat. Large-scale farming has even been considered by some individuals in Loita. However, this would certainly spell disaster for conservation efforts in the area.

The agricultural expansion is a consequence of population growth in Loita. An average mother may have six to eight children, who cannot be supported solely by animal products.

Many families do not have other sources of income and some families own only a few animals. It is therefore obvious that most households supplement their animal produce with other agricultural products. The harmful effects of crop cultivation in Loita can be summarized thus: Agriculture will lead to more permanent settlement, giving way to the quest for land ownership, which will lead to the sub-division of land. This, in turn, is likely to lead to:

- the displacement of wildlife and loss of corridors;
- greed and annexation of communal resources by a few individuals, precipitating unrest and hatred;
- the disintegration of social structures and traditional family support systems;
- degradation and loss of habitats for plants;
- reduction of soil fertility leading to farmers clearing new areas and leaving old places open to soil erosion and weed species;
- the fencing of farms using tree branches.

The large amount of material needed for fencing and the necessity for regular repair is already a major threat to *Tarchonanthus camphoratus*.

In Olmesutye for example, one farmer burnt the riverine forest to open the area for farming. This area has unique species, e.g. *Encephalartos bubalinus*. Thus although agriculture may be necessary, now or in the future, policies and guidelines are needed to limit agriculture to certain areas while setting aside others for dry season grazing, ecotourism and conservation.

OVER-EXPLOITED SPECIES

Qualitative studies and household surveys suggested that some species are facing particularly severe harvesting pressure. *Olorien* (*Olea europaea* ssp. *africana*) is found in almost every aspect of Maasai cultural life, from medicine and food to ceremonies. It is also the preferred species for firewood. As a result of local over-exploitation women have to travel up to eight

kilometres to get firewood from this tree. In addition, this species is the most commonly used pole for the construction of traditional houses.

Juniperus procera is the most preferred species for poles, fences and in construction. In addition the species is an ideal habitat for bees. Honey extractors use fire to drive away bees. This in some cases burns the whole tree and often the neighbouring ones, a costly method of honey harvesting. *Juniperus* is particularly vulnerable to these fires. The species has been wiped out in the areas which were settled early and only stumps remain as a proof that they actually existed.

Although modern clinical services are now available in Loita, traditional medicinal practice is still the most important method of treating diseases. About 90 species were recorded as being used for herbal medicine in Loita alone, but the actual number could be twice as high. *Warburgia salutaris*, *Rhamnus staddo* and *R. prinoides* are the most important medicinal plants. The bark of *Warburgia* is a common medicine to treat 'malaria' fever. The roots of *Rhamnus* spp. are used to treat diseases of the urinary tract which are common in the area. In recent years, inappropriate extraction techniques have put undue pressures on these species which are now only found deep in the forest. All these species are over-exploited and have disappeared in most of the populated areas.

Another species, *Podocarpus falcatus* was barely used in Loita until 1995 when people began exploiting it for timber to build schools. Currently the species is not in danger but it is the most likely candidate to join the list of over-exploited species.

Some of the species have multiple uses and so any effect on their availability as a result of one major use adversely affects other uses as well. For example, *Olea europaea* ssp. *africana* is the most important firewood species, the most important ceremonial tree and the most important for smoking milk gourds. *Juniperus* on the other hand is the most preferred wood in construction and pole fencing. It is also the most important source of sticks for making fire and an important bee-habitat. *Warburgia salutaris* is the leading medicinal plant and is also preferred for tooth-brushes.

Table 4. List of locally threatened tree species and their main uses.

Species	Maasai name	Type of use
<i>Juniperus procera</i>	<i>oltarakwai</i>	Fencing, building, timber
<i>Olea europaea</i> ssp. <i>africana</i>	<i>oloirien</i>	Firewood, poles
<i>Warburgia salutaris</i>	<i>osokonoi</i>	Medicine
<i>Rhamnus staddo</i>	<i>orkokola</i>	Medicine
<i>Rhamnus prinoides</i>	<i>olkonyil</i>	Medicine
<i>Podocarpus falcatus</i>	<i>olpiripiri</i>	Timber

To summarize, a few species take on most of the burden of supplying material for the livelihood of the Loita Maasai. These key species have either been exterminated in areas settled for a long time or are on their way out. Although the forest provides a good buffer, the resources are finite and now under real threat. More people are depending directly on the forest for the resources which previously could be obtained in nearby forest patches or riverine vegetation.

Quantification of threats to key species

It is difficult to visualize the slow degradation of forest habitats and the continuous but slow loss of key resources. Community mapping, transect walks and quantitative assessments have therefore been used. The six most vulnerable species as shown in Table 4 were chosen for a detailed study.

METHODOLOGY

Data were collected in five different sites (Table 5) characterized by different vegetation types and harvesting levels, using 50x50 m quadrats. Parameters examined included:

- average tree height;
- density of living trees;

- density of dead trees (burnt and stumps);
- diameter at breast height (DBH);
- basal diameter of stumps;
- species and age of stumps (approximate)
 - old stumps (more than 12 months old)
 - new stumps (less than 12 months old);
- tree/shrub damage (cut, burned, living, dead etc.);
- percentage tree or shrub cover;
- number consumed by fire;
- regenerating stumps (%);
- density of saplings.

Two Maasai men participated in this study. The team relied on their long standing experience to identify stumps of the species of interest. Their degree of accuracy had been previously tested by the research team in areas where there still were a few standing trees as well as stumps. Their accuracy was determined by comparing the wood of the stumps positively identified as *Olea*, *Juniperus*, *Warburgia* etc. with confirmed pieces. The degree of accuracy for these guides was confirmed as 100% for all species. This was not the case for younger school boys whose accuracy ranged from 25% to 75%.

Table 5. Sampling locations for density of main tree species.

Site	Location	Distance from Ilkerin [km]	Vegetation type
A	Ilkerin	0	Secondary bushed grassland
B	Ilkerin	7	<i>Olea</i> bushland
C	Oloirien	15	Riverine <i>Olea</i> forest
D	Naimina Enkiyio Forest	20	<i>Juniperus</i> - <i>Olea</i> forest
E	Naimina Enkiyio Forest	20	<i>Juniperus</i> - <i>Olea</i> forest

Table 6. Density of key species along transect (*O.e.* = *Olea europaea* ssp. *africana* (*oloirien*), *J.p.* = *Juniperus procera* (*oltarakwai*), *W.s.* = *Warburgia salutaris* (*osokonoi*)).

Site	Density of individuals (both live and dead) [per ha]			Dead plants or stumps [in % of all trees]			% of plants killed in last approx. 12 months			Density of saplings (per ha)		
	<i>O.e.</i>	<i>J.p.</i>	<i>W.s.</i>	<i>O.e.</i>	<i>J.p.</i>	<i>W.s.</i>	<i>O.e.</i>	<i>J.p.</i>	<i>W.s.</i>	<i>O.e.</i>	<i>J.p.</i>	<i>W.s.</i>
A	108	20	-	100	100	-	0	0	-	0	0	-
B	135	1	-	17.8	100	-	9.7	0	-	5	0	-
C	179	-	-	46.6	-	-	33.5	-	-	0	-	-
D	104	20	4	42.3	80	0	6.3	50	0	0	0	0
E	40	80	8	30	50	50	0	44.4	50	0	0	0

When an *oloirien* tree is cut for firewood, the stump will normally coppice but under constant pressure the trees dry up. The women descend on the stumps (even when they are still alive) and hack them up using axes, leaving sharp rudiments near ground level which are too troublesome to further dig up. These are left as sharp conical stumps of hard heartwood which, due to their shape and the non-water absorbing nature of the wood, can last for a century or more without decomposing.

The five sites selected (Table 5) formed a more or less straight 20 km transect from Ilkerin (bushed grassland) to Naimina Enkiyio Forest. At each site, the selection of the quadrant or transect was next to a permanent mark that could help identify the site in future.

The following conclusions were drawn from the results shown in Table 6 as well as from additional observations and information:

- all six species are severely threatened;
- there has been increased destructive activity in the year prior to the study (1995);
- *Juniperus procera* is the most endangered;
- *Olea europaea* ssp. *africana* is the commonest plant. By

volume of material extracted, it outweighs all others;

- *Olea europaea* ssp. *africana* has been exterminated in site A while *Juniperus procera* has been exterminated in both A and B. (A further search in surrounding areas confirmed this).
- saplings are missing in most sites except for site B which had a relatively new colony of *Olea* after a fire;
- if no measures are taken these species will disappear in the area in the near future.

The findings and conclusions were presented and discussed in community meetings. Although the increased efforts required per unit of harvested product had been of concern to the participants the consequences of the lack of regeneration had not been noticed. Only a few people felt that it would be important to grow these species. The majority was of the opinion that Loita Forest

still provides an inexhaustible resource of all the requirements. The discrepancy between local perceptions and the scientific world view became apparent.

Our dark and dense forest is now intact in its natural, pristine and untouched state. It has suffered no encroachment or human disturbance. Its fauna and flora are rich and diverse. The floral community is exclusively indigenous, dominated by huge, tall trees such as Olpiripiri/Olchani le Nkai or the tree of God (Podcarpus), Oltarakuai (Juniperus), Oltiyani (Arundinaria alpina) and Oloirien (*Olea africana*).

From a brochure published by the Loita Naimina Enkiyio Conservation Trust Company 1994

Loita Forest is being increasingly fragmented through settlements and fires laid to create grazing areas

Conclusions and recommendations

The Loita Ethnobotany Project confirmed that measures to conserve Loita Forest need to be implemented urgently. The wish to develop a community-based management plan for Loita, as originally expressed by the Loita Naimina Enkiyio Conservation Trust, was probably driven more by political considerations than by the concern for the forest's future. The objective was to confirm ownership by the people of Loita of the entire forest ecosystem. During the course of the project it became apparent that Loita Forest is locally considered to be an inexhaustible resource of both land and natural resources. A management plan, it was expected, would therefore simply be a continuation of the free-access-for-all-Loitans policy, which currently governs the forest use.

The critical state of some resources as well as the problem of unplanned forest fragmentation and degradation took the project team and participants of community meetings and participatory exercises by surprise. Naturally, women had been aware of the distance to the nearest firewood. Of course the suppliers of cedar poles had known the effort it takes to harvest the amount required for a stockade. And of course this was reflected in the costs for construction. However, as a community this learning process had not taken place.

If, after this realization, the people of Loita are hopefully still in favour of the preparation of a management plan for Loita Forest, they have to be aware that this would entail some restrictions to the hitherto free access. It would also require efforts to actively raise and replant overharvested resources. Before starting the actual work on a management plan, the people of Loita would have to show their sincere commitment towards its implementation, whatever the management plan foresees in detail. They would also have to decide who is responsible for its implementation. It has been suggested that the Pastoral Association Development Committees, which have been formed in each subcentre, might best represent the people's interests, including their interests in the management of Loita Forest.

ELEMENTS OF A MANAGEMENT PLAN

Apart from defining overall responsibility for the management plan the, roles, rights and responsibilities of community groups and other interested parties will have to be clearly defined. Areas the management plan must address include:

- Strategies to reduce pressure on critical species (including through resource substitution and plantation efforts as well as control of commercial harvesting activities).
- Development of a cheap and robust monitoring system on the status of a few key species, in order to give early warning signals. Ideally the monitoring team would be drawn from a wide variety of user groups.
- Discussions between local user groups and experienced ecologists on the sustainability of traditional harvesting and management practices. These may result in different regulations for local subsistence and commercial exploitation.
- Assessment of the role of traditional institutions, e.g. the spiritual leaders (*laibonok*) as well as other customary leadership, in the management of Loita Forest.
- Assessment of the usefulness of traditional types of punishment to discourage illegal (i.e. in contradiction to the management plan) resource exploitation and poaching and to limit the burning of forest land to particular seasons and areas. This could help to build on and adapt traditional authority to develop a functional community-owned management system.
- Establishment of policies and practices which encourage existing and new entrepreneurial efforts by individuals, while taking into account the need to share benefits community-wide.
- Education and awareness creation programmes for the protection of the forest should be associated with practical actions for sustainable management in which individuals and groups take responsibility for their actions. At these occasions, alternative management practices should be proposed and tested.

PROBLEMS ANTICIPATED

Several problems will have to be addressed before or during the preparation of a management plan for Loita Forest.

- The conflict between the Narok County Council and the Loita community has not been resolved. Both claim rights to the decision making processes regarding Loita Naimina Enkiyio Forest. Furthermore, it has to be recognized that the Naimina Enkiyio Forest is of national importance, and that the legitimacy of outside involvement in the management process is acknowledged.
- The process of surveying the forest and establishing its boundaries will be a sensitive issue which will require consultation with elders and those living along the forest boundary. Professional assistance with modern mediation techniques combined with traditional methods of conflict resolution may be necessary.
- Efforts need to be made to promote the existing communal ownership of land and preventing further encroachment into the forest by agriculturalists
- Special strategies are urgently needed to address the social and environmental problems caused by the fencing off and claiming land for agriculture and livestock rearing. This is particularly sensitive as this practice is common among the elite who will be in key leadership positions.
- In some cases it may be necessary to remove existing fences which will require a strong management authority.

Prerequisites for a community-owned management plan include:

- use of the local, traditional and government leaders, while ensuring that planning and decision making goes beyond the elite and involves key user groups who depend on resource harvesting;
- appropriate opportunities for women's involvement and leadership in management;
- close involvement of teachers and school children in conservation activities;
- institution of a process to ensure fair play among the communities regarding land and access to resources.

ECOTOURISM POTENTIAL

Currently about 500 visitors a year come to Loita forest in organized groups or as individuals. Several tour operators organize walking safaris in Loita. The forest has attractive sites such as marshes with hippos, and the Olasur waterfall with a 94 m drop of water of Olkeju lo Rasur river. The establishment of tented campsites is under consideration. However, despite offers by some tour operators to contribute financially to the conservation of the forest by paying a fee for a forest sanctuary, no institution in Loita is currently in a position to enter into such agreements. For this reason even tour operators with

Proposed management structure

Each of the six subcentres in Loita has its Pastoral Association Development Committee. It decides on, plans and implements all development activities within the subcentre. It consists of twelve members who are elected for three years. They include the government chief, the councillor a representative of the Ilkerin-Loita integral Development Project, a representative of the Loita Council of Elders (which consists of five age group leaders and 5 traditional clan *laiguanak*) as well as women and youth representatives.

It has been proposed that the members of the Pastoral Association Development Committees of the subcentres should form a board which oversees the management of Loita forest. The board appoints and controls a manager who must be conversant with conservation work.

strong ethical principles, respect for the local culture and a willingness to contribute to well designed appropriate development projects are unable to contribute beyond the fees for local guides and donkey drivers. The Loita Naimina Enkiyio Conservation Trust has been used for political goals and continues to exist only on paper. It is up to the people of Loita to establish mechanisms to manage tourism and to endorse local institutions, which take responsibility for this process. Otherwise, it is difficult to see how benefits should accrue from the conservation of parts of the forest of particular interest for visitors.

RESEARCH NEEDS

About 250 plant species are represented in this survey. Most plants are among the most common, conspicuous and most utilized species of Loita. This number represents only a portion of all taxa in Loita with known uses. Some specific areas of research were not addressed adequately, in particular, ethnoveterinary information including fodder species and species used in animal treatment.

Although some species without reported uses are included in this report, the majority of plants with no known use (as far as the resource

persons were concerned) have been left out of this ethnobotanical survey. As mentioned earlier the floral diversity of Loita may be six to eight times greater than documented in this survey.

Furthermore the drier zone of Loita is under-represented in this survey. Both tasks (botanical and ethnobotanical surveys) could be carried out in separate projects by the Loita Ethnobotany Centre. This would make use of the small local herbarium.

The wildlife of the area, particularly of the forest, is a critical resource for the development of wildlife-based tourism. The bird diversity is particularly high. Although some surveys have been carried out, the results are not easily accessible. It would be important to gather existing information to decide on research needs in this field.

Support should be provided to further develop the Loita Ethnobotany Centre as a community information centre which is capable of supporting education, planning and research towards sustainable management of the forest.

Additional applied research is required for the restoration of degraded areas and the propagation of over-exploited species. This would include the identification of areas suitable for the

reintroduction of lost species in the settled areas. It would also involve the planting and tending of *Olea*, *Juniperus* and other species in areas where they used to grow. This programme should involve schools, villages and development agencies such as Ilkerin-Loita Integratal Development Project. Planting should focus on homesteads, school grounds, forest edges and the Ilkerin centre.

An important area requiring research is the development of a zonation system for Loita Forest. This would entail the designation of parts of the forest as sanctuary while setting aside other parts as dry season grazing areas. Currently, settlements, burning of forest land, grazing throughout the year, and the harvesting of large quantities of resources (e.g. cedar poles) take place without limitation or control. It is only due to the relatively small population in Loita, the limited commercialization of products and the difficult access that parts of Loita Forest still remain intact. A clear delineation of wilderness areas, as well as low-impact multiple-use zones, and their recognition by the local people, will however be crucial to protect the forest from further degradation.



Elders in discussion with the Chief Laibon

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The People and Plants Initiative

was started in July 1992 by WWF, UNESCO and the Royal Botanic Gardens, Kew to promote the sustainable and equitable use of plant resources through providing support to ethnobotanists from developing countries.

The initiative stems from the recognition that people in rural communities often have detailed and profound knowledge of the properties and ecology of locally occurring plants, and rely on them for many of their foods, medicines, fuel, building materials and other products. However, much of this knowledge is being lost with the transformation of local ecosystems and local cultures. Over-harvesting of non cultivated plants is increasingly common, caused by loss of habitat, increase in local use and the growing demands of trade. Long-term conservation of plant resources and the knowledge associated with them is needed for the benefit of the local people and for their potential use to local communities in other places.

The diversity of traditional plant-resource management practices runs through a spectrum from "cultivation" through to gathering "wild" plants, all of which are included in the People and Plants approach.

Ethnobotanists can work together with local people to study and record the uses of plant resources, identify cases of over-harvesting of non-cultivated plants, find sustainable harvesting methods and investigate alternatives such as cultivation.

The People and Plants initiative is building support for ethnobotanists from developing countries who work with local people on issues related to the conservation of both plant resources and traditional ecological knowledge. Key participants organize participatory workshops, undertake discussion and advisory visits to field projects and provide literature on ethnobotany, traditional ecological knowledge and sustainable plant resource use. It is hoped that a network of ethnobotanists working on these issues in different countries and regions can be developed to exchange information, share experience and collaborate on field projects.

Please visit our website at:
<http://www.rbgekew.org.uk/peopleplants>

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