
Valuing the Subsistence Use of Forest Products in Oldonyo Orok Forest, Kenya

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Introduction

Although Oldonyo Orok forest has been a gazetted forest reserve for the last two decades, there has in practice been little or no active management system in place. In 1993, the Kenya Forest Department and Kenya Wildlife Service decided that there was a need to investigate possibilities for a more active management strategy for the forest.

The justification for this increased management role was the importance of the forest area as a water catchment, as a source of drought refuge for local Maasai households, and the increasing threats to the forest arising from urbanisation and land-use change around nearby Namanga Town. In order to carry out management planning for Oldonyo Orok, socio-economic surveys were carried out to investigate how local people relied on the forest, and how they valued forest resources. These are described below.

The Forest and Forest-adjacent Area

Oldonyo Orok forest covers an area of 11,783 ha and lies on the slopes of Oldonyo Orok ('the black mountain'), a hill rising to 2,548 m which straddles the central Kenya-Tanzania border. At lower levels, *Acacia* woodland merges into the dry bush and scrub of the forest-adjacent area, and it is only on the higher parts of the hill that thicker forest and larger tree species are found. The upper forest is dominated by *Drypetes gerrardii* and *Diospyros abyssinica*, with *Calodendrum spp.*, *Croton megalocarpus*, *Olea capensis*, *Cassipourea spp.* and *Nuxia congesta*.

The Socio-economy in the Oldonyo Orok Area

The forest lies in the semi-arid rangelands of southern Kenya, where population density averages only 10 persons/km². Although only about 100 households live within 1.5 km of the forest, over 1,000 households rely on the forest as a source of dry-season grazing, and many more enter the area in times of severe drought. Virtually all of the rural forest-adjacent population are members of the *limatapato* section of the Maasai, a Nilotic pastoralist people who live in the Rift Valley area of southern Kenya and northern Tanzania.

Pastoralism forms the basis of livelihoods in the Oldonyo Orok region. There is little or no settled agriculture. Few households have non-livestock income sources, and although labour outmigration is increasing among the male youth, only a small proportion of forest-adjacent households contain members engaged in employment. Forest use is almost entirely for subsistence purposes; to date there has been virtually no commercial exploitation of the forest, although in the last few years small quantities of charcoal and polewood have started to be extracted for sale in the area near Namanga town.

With the exception of Namanga Town and nearby settlements and trading centres, the forest-adjacent area is primarily a subsistence economy, where cash exchange and trade are poorly developed and the monetary economy plays little role in local production and consumption systems. Although small amounts of charcoal and polewood originating from the forest are sold in Namanga Town, the rural population make no use of these goods and do not participate in their extraction. None of the products obtained from the forest by local people have a local market or price, and there are no close market substitutes for forest resources available in the forest-adjacent area.

A Method for Valuing Local Forest Use

There have been few attempts to value subsistence forest use and, with a few exceptions (eg. Kramer *et al.* 1992, Lynam *et al.* 1991), these have been concerned almost entirely with products which are traded or are closely related to other traded products (eg. Godoy *et al.* 1993). However, in Oldonyo Orok, it was necessary to find a technique – based on locally meaningful economic categories – to calculate values for non-traded forest products. This involved using ‘participatory

environmental valuation' (PEV), which aims to find a bridge between local economic systems and cash values, and elicit information about forest use and values at the subsistence, non-market level.

PEV uses pictures to refer to different forest products, which are manipulated in order to arrive at a value for forest use. A 'numeraire', or yardstick for valuation, is selected, usually consisting of a commodity which forms part of the local socio-economy, has wide local significance as an item of value, and can easily be translated into a monetary amount. Both the range of forest activities depicted and the 'numeraire' selected vary between different forest using communities. In Oldonyo Orok, for example, the 'numeraire' defined by most participants was a young castrated bullock – a component of the local economy which represents wealth and value, is a major medium of exchange, and can be readily converted to cash in times of need.

Having established a range of forest activities and defined a 'numeraire', PEV follows a three stage process. To find the relative importance of different products, a ranking exercise is first performed on the picture cards representing forest activities. Respondents order these cards according to their perceived importance, and elaborate on why, when and how forest activities are carried out. Because information gathering relies on pictures rather than on direct questioning or observation, this is a good way of finding out about sensitive topics or activities.

Values are then established by distributing counters such as beans, seeds or stones between the cards representing forest activities and the 'numeraire' commodity. This gives an idea of the value of different forest uses relative to each other and to the 'numeraire'. The respondents then estimate the financial value of the 'numeraire' commodity, which provides the means whereby forest products and services can be translated into cash amounts – calculated as an average annual amount per family. Box 1 provides an example of how the forest use value was calculated for a family, this time using a cow as the 'numeraire'. This method of valuation is also known as 'contingent ranking' and is a variant of the 'contingent valuation method' often used by environmental economists (see a discussion of this in Richards, 1994).

Box 1 Forest Values for a Household in Oldonyo Orok

Mzee Ole Kapatto has a permanent *manyatta* on the edge of Oldonyo Orok forest. Because there is no physical demarcation of the forest boundary, nobody is quite sure where the forest reserve starts. He lives with his three wives, and his married sons and their children. None of his grandchildren attend school because the schools are expensive and far away, and their labour is needed by the household. The family manage about 100 livestock, of which three quarters are cattle and the remainder goats.

For the last three months, Mzee Ole Kapatto's younger son and grandsons have been in the forest grazing the mature cattle, leaving most of the smallstock, young animals and milk cows in the permanent *manyatta*. They have remained in the forest for the entire period, and will return once the 'grass rains' start. While grazing, the herders are reliant on the forest to provide all their pasture, shelter, fuel and medicines. There are not many game animals in the forest, but small birds and mammals provide a welcome supplement to their diet.

Although the rains were due last month, the area is still dry and the nearest water source, a stream about 2 km from the *manyatta*, is beginning to dry up. Mzee Ole Kapatto fears that his animals are getting very thin and may soon die, so he has been discussing with neighbouring *manyattas* the possibility of moving the whole family into the forest to be near pasture and water. This would be an emergency solution as the Forest Department has, in the past, evicted whole families from the forest.

Mzee Ole Kapatto's wives cook with fuelwood, and use small saplings to build the family's houses. These are obtained both from the forest reserve and surrounding bush. However it is getting more difficult to find trees suitable for construction purposes, and every year they go further up the hill to look for saplings. For less serious human and livestock illnesses, the family uses plant-based remedies. Most of these can be obtained from the surrounding bush, but a few rare species can only be found high in the forest. When animals or humans are seriously ill, the family prefers to seek outside help from local specialists, who use a combination of bought drugs and herbal medicines.

Mzee Ole Kapatto chose a milk cow as the 'numeraire' for valuation. It was important to define exactly which type of cow, because households differentiate minutely between species, ages and types of cattle. Although he rarely sells cattle, Mzee Ole Kapatto knows exactly what their price would be in regional markets. Forest products were then given a value in points relative to that of the milk cow (15 points) using the PEV. This gave the following result:

1. Grazing 12 points KSh 8,000 total KSh 1,402 per year	2. Water 12 points KSh 8,000 total KSh 1,402 per year	3. Construction 5 points KSh 3,333 total KSh 584 per year
4. Fuelwood 5 points KSh 3,333 total KSh 584 per year	5. Medicines 4 points KSh 2,667 total KSh 467 per year	6. Wild foods 3 points KSh 2,000 total KSh 351 per year
7. Utility items 2 points KSh 1,333 total KSh 234 per year	8. Honey 1 point KSh 667 total KSh 117 per year	9. Hunting 1 point KSh 667 total KSh 117 per year
Milk Cow (Numeraire) 15 points KSh 10,000 total		
According to this method of valuation, subsistence forest use was worth KSh 5,259 a year to Mzee Ole Kapatto. He and his wives said that grazing and water were the most important forest activities, because they were central to livestock production, which formed the basis of their survival.		

Relative Importance of Forest Products

As shown in Table 1, the PEV calculations indicate subsistence forest use values of about KSh 5,000 (about US\$ 100) a year for an average forest-adjacent household in Oldonyo Orok, with most values close to this average. Figure 1 shows how this estimated amount is distributed among the different forest products. In nearly all forest-adjacent households a high value is placed on forest grazing and water collection because, although individual households vary in terms of wealth and other attributes, all depend on a system of livestock production which is based on the availability of pasture and water. More distant households valued only forest grazing and water, giving an average of approximately KSh 2,000 a year.

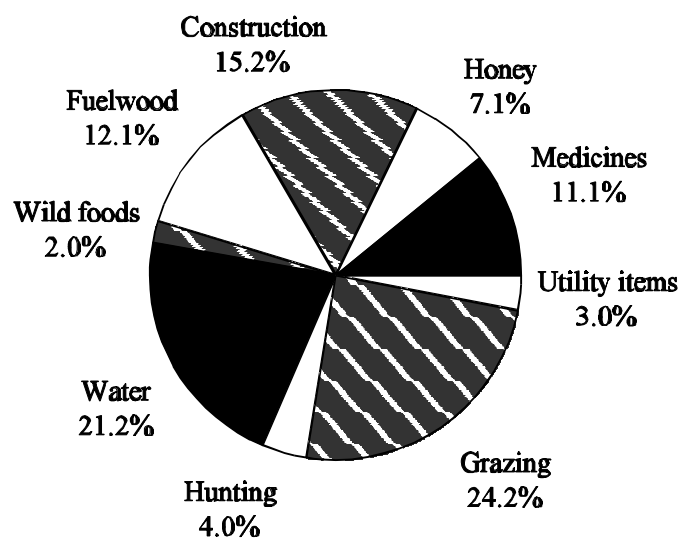
Table 1: Summary of annual forest use values for forest-adjacent households (KSh/household)

Forest activity	Percent of households	(KSh/year)		95% Confidence intervals
		Average value	Median value	
Grazing	95	1,130	947	1,128-1,133
Water	95	995	1,052	992-998
Fuelwood	90	596	584	593-596
Construction	89	748	762	743-750
Medicines	85	565	573	562-568
Honey	64	468	435	465-472
Hunting	58	265	234	261-269
Wild foods	49	156	117	150-162
Utility items ¹	43	302	333	295-309
All activities	-	4,778	4,778	4,775-4,780

¹Materials for tools, weapons and domestic appliances.

Other forest products were given significant, although somewhat lower, values. Virtually all house construction and domestic energy sources are wood-based, and plant medicines are a common way of treating human and livestock disease because bought drugs are expensive and in short supply. Therefore the forest is valued as a source for construction materials, fuelwood and medicines. Honey, wild foods and hunting in the forest are considered to be of less importance, as they are widely available outside the forest reserve.

Figure 1: Distribution of estimated forest use values per forest-adjacent household.



Implications for Forest Management and Conservation in Oldonyo Orok

The calculations highlight the value of Oldonyo Orok forest as a source of support to local livelihoods, especially as dry-season refuge for livestock herds. These values provide the major rationale for conserving the forest, and have the following important implications for future forest management planning and practice:

- ! The high value of Oldonyo Orok forest as a source of dry-season refuge for local pastoralists provides an important justification for conservation. Excluding access to forest grazing and water could impose a cost of up to KSh 2 million a year on local households by taking away a vital source of fallback for livestock production. Losing this dry-season refuge will also have wider effects on local pastoralist livelihoods and their capacity to cope with drought. Conservation should be based on a strategy of managed grazing in order to support sustainable local livelihoods;
- ! Production systems are being transformed in the forest-adjacent area and are becoming more diverse. This may increase conflict over scarce resources, including the forest. Local wood demands will rise sharply in the future because of expanding urban and commercial markets and changing production systems. Although sustainable forest exploitation can meet some of these demands, alternative sources of wood-based products will also be required, especially for fuel and construction. Priorities may continue to

change, and forest management should be responsive to these changes;

- ! The role of local practices and knowledge in future conservation systems should be recognised, and channels of authority clarified. Forest management must be integrated with local constraints and practices, and be flexible to adapt to meet changing circumstances.

Conclusion

Thus it is argued here that the major value of the forest lies in the goods and services it supplies to surrounding populations. Forest degradation would limit the local availability of trees for shelter, fuel, medicines and foods, and changes in land-use might destroy dry-season forest refuge for livestock herds. The annual benefits of forest use are estimated to be as high as KSh 5,000 per forest-adjacent household, equal to about a third of the net annual value of subsistence livestock production and a total annual value of KSh 2.4 million to the forest-adjacent population as a whole – taking into account both forest-adjacent households and occasional grazers. Maintaining these values therefore provides an important justification for conserving the forest.

References

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