

**ECOLOGICAL AND SOCIO-ECONOMIC CONTRIBUTION OF  
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**ABSTRACT**

*This paper explores the ecological and socio-economic contribution of Mt. Elgon forest park, eastern Uganda. An effort was taken to evaluate the importance of Mt. Elgon forest park resources to the local people by using the local plant knowledge to value the forest park resources. An integrated approach of participatory rural appraisal (PRA), Participatory Resource Valuation (PRV), household survey, group discussions and forest walks were conducted during the months of June to December, 2008 in Mutushet and Kortek Parishes, Kapchorwa District. Using random sampling methods, 120 respondents were selected and interviewed. Ten forest uses were identified with the highest dependence being in the supply of timber for income and domestic building poles, the latter having the highest average annual household value of UGx. 67919 (US\$37). The forest use most valued in both Mutushet and Koterk was medicine with an average annual household value of UGx. 60,371 (US\$ 33) and UGx. 75,464 (US\$ 42) respectively. The forest provision of medicine, domestic building materials, soil conservation, bush meat, charcoal and timber was more valued in Koterk, while provision of firewood, honey and pasture were more valued in Mutushet. The forest's provision of food was valued equally in the two areas with an average annual value of UGx. 30,186 per household. Forest park resources accounted for 55% of the household income. Participatory valuation approaches are recommended for estimation of forest park resources' value in a non-cash economy.*

**Keywords:** Forest use, degradation, participatory resource valuation.

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**INTRODUCTION**

Most of the mountain forest in Uganda has been classified as protection forest (Pomeroy, 1991). For the case of Mt. Elgon, the protected area begins a considerable way up the mountain and is bordered by high population density. Forestry is one of the most important elements of the environment and natural resources sector, with significant contribution to poor people's livelihoods in the mountain ecosystems. Forests and trees provide numerous products and services that the poor depend on for basic subsistence needs and increased agricultural production. Forestry

and other natural resources provide alternative opportunities and livelihood strategies for the poor people to diversify agricultural activities and increase incomes to sufficient survival levels i.e. enable acquisition of basic needs.

The majority of the people who earn their livelihoods from forestry related activities are the poorest and often marginalized (unemployed youth, women, elderly, internally displaced people/refugees, forest dwellers). They hardly grow their own fuel-wood, own land or possess productive assets. They depend heavily on access to forest resources for

survival. Although forestry is important to the lives of millions of Ugandans, especially the poorest sections of society, the environmental income of poor people, and their ability to improve their livelihoods, has not been adequately recognised in Uganda (Pomeroy, 1991). To some extent the contribution of forestry is mentioned in the Poverty Eradication Action Plan (PEAP), and it takes a very low profile both at national and local government levels. The current PEAP revision process is an opportunity to create an understanding of the contribution of forestry, advocate for raising its profile, and influence the decision making processes for resource allocation for forestry developments.

The contribution of Mt. Elgon forest park to poverty eradication is poorly understood among policy and decision-makers (Peluso, 1994). Lack of recognition or poor perception of forestry shows clearly a lack of national policy to promote investments in the forest sector. There has been very little recognition of the economic importance of the forest sub-sector both as a source of rural incomes, energy, and environmental benefits. Forestry is hardly considered as a priority for government. Many of the forestry-related services, including environmental services, are public goods and their contribution to poor people's incomes and livelihoods is currently undervalued.

Rural communities living around forests harvest a diversity of wild resources for home consumption and sale (Buyinza and Nabalegwa, 2007). The contribution these make to the rural economy has been little recognized, and few studies have attempted to place a monetary value to it (Shackelton *et al.*, 2002; Emerton, 1997a), which has been found to be of limited validity in subsistence economies (Emerton, 1997). The methods described by Godoy *et al.* (1993), vis-à-vis pricing for valuation, present a

problem in that (i) there are no local markets at which substitutes are available or affordable, (ii) asking people for their cash willingness to pay (or to be compensated) for forest resources is inappropriate in a non-cash economy where livelihoods depend on irreplaceable forest resources, (iii) the majority of the rural population do not keep records of forest use, (iv) forest use is season dependant, and (v) in most cases forest use is illegal and involves privileged knowledge. Consequently, resource economists have developed alternative methods for forest valuation that suit the area under study. One such outcome is the development of a participatory technique, participatory resource valuation (PRV), which follows a three-stage process; ranking, establishing of values by use of counters, and identifying the purchase price of the numeraire (a basic standard by which values are measured in a monetary system) commodity (Emerton, 1997). These can then be discounted to give average annual household use values at today's prices.

## MATERIALS AND METHODS

### Study Area

The study was conducted around Mt. Elgon National Park (1025'N and 340301E), approximately 100 km Northeast of Lake Victoria on the Kenya - Uganda border. According to Scott (1994), Mt. Elgon is one of the oldest volcanoes in East Africa. It rises to a height of about 4,320 m above sea level. The region receives an approximately bimodal pattern of rainfall, with the wettest months occurring from April to October. The mean annual rainfall ranges from 1500 mm on the eastern and northern slopes to 2000 mm in the south and the west. On lower slopes, the mean maximum temperatures decrease from 25°C to 28°C and mean minimum temperatures are 15°C to 16°C.

This study was based on information obtained through a questionnaire survey, field observation and group discussions. The household survey was conducted during the months of June to December, 2008. Primary data were obtained through household survey conducted in Mutushet and Kortek parishes, Kapchorwa District. Based on the sampling method devised by Arkin and Colton (1963), a sample size for each parish was calculated proportionally corresponding to the total number of households in the selected parish. A systematic random sampling method was adopted to select 54 households for the questionnaire survey.

Physiographically, this site is located in the middle mountain region. Settlement in the area started about 300 years ago by mainly Bagishu ethnic group. Mt. Elgon catchment occupies an area of about 124 ha and is about 6 km away from Mbale town. This site with sloping land represents a typical hill-farming situation. Deforestation leads to soil erosion, low agricultural productivity and increased household costs such as land management practices that ultimately lead to poverty in the area (Ellis-Jones *et al.*, 2000). Farming much of the mid-hills, and in Mt. Elgon Catchment in particular, is mostly of a subsistent nature. A majority of farm households in the area are small although there are few farmers who produce marketable surplus of fruits like orange and banana (Nabalegwa *et al.*, 2007).

The biophysical and socioeconomic information were gathered through discussion with the farmers and key informants like the village head and field survey. Specific information sought during the interview and listing exercise included plants used, how used, parts used, methods of harvesting, ease in getting these plants (to give an indication on abundance and distribution), whether for personal use or traded, monetary value (where applicable),

when collected, by whom and general view on conservation and management of the forest.

Household wealth ranking was done with the help of the sub-areas and three local people in each village. The households to be visited were sorted into four groups using the wealth ranking criteria as established by the local people; (i) well off, (ii) comfortable, (iii) poor and (iv) very poor. Issues considered by the villagers in ranking were whether (i) the household head had a regular source of income, even if from relatives, (ii) household head was engaged in any income earning activity within the village, (iii) depended entirely on the forest resources or (iv) on government relief food. Land size and its yield was considered, but was not of major consideration in the local people's wealth ranking. People who were able to feed their families and pay for primary educational needs, like school uniforms and writing materials, were regarded as comfortable, while those who depended on government and local NGOs for these were said to be poor. A few who did not meet these criteria were said to be very poor if they were unable to meet even their basic needs including housing; or whose land was thought to be of little value. Owning a house with walls of masonry and iron sheet roofing was regarded as an indication of wealth and the few who had such houses in addition to regular income were ranked as well off or rich.

The forest contribution to the household economy was estimated using the methods of Martin (1995), and Cunningham (2001). Wealth ranking, done during group discussions with village elders, livelihood analysis and household survey for plant usage and annual family earnings using data gathered during direct interviews was used to estimate average household resources.

### Determination of Forest Exploitation and Value

During the social survey meetings, participants were asked to identify and rank the forest uses, value them by assigning number of counters equivalent to the importance to them and identify an acceptable denominator (in this case radio), its average lifespan and its market price. The purchase price of the type of the radio used mainly in the area was established. This was then used to calculate the average annual household use values using the formula:

$$\frac{1}{T} \left[ \sum_{t=1}^{t=T} +r \right]^{(T-1)}$$

Where:

T is the total lifetime of the wealth item,

V the value of the forest activity,

r the discount rate and t the year.

## RESULTS AND DISCUSSION

### Socio-Economic Attributes

Of the total cultivated area of 54 hectares, about 80 percent is used for growing cereal crops, 7 percent for cash crops and 3 percent for fruit crops. Mt. Elgon supplies all the water used for agricultural activities in the region. Two crops are mainly grown in a year. In case of lowland, only a single crop of rice is grown

as summer crop and only a few farmers have recently started growing wheat as winter crop after rice. Some farmers have also grown spring maize in lowland before rice. The other crops grown in upland lands are maize, millet, buckwheat, Soybean and legumes. The overall cropping intensity is 147. Details on agricultural land, productivity of different crops and input use is presented in Table 1.

There are 54 households with the population of 354 and average family size of 6.65 in the area. Main ethnic groups are Gishu, Sabinu, Samia and Iteso (Table 2). People depend mainly on agriculture for their livelihood. About one fourth of the total land is occupied by marginal and small farm households, which comprise half of the total households. About one-half of the land is under medium farm households and less than one fourth is under the large holding. Given the limited opportunities for rural employment and low agricultural production, a few households have migrated to other adjoining villages. About 62.5 percent of the population, mostly Sabinus and Gishus go to other districts for wage labor.

### Forest Exploitation and Value

Ten forest uses were identified during two PRA meetings, one on the northern and the other on the

Table 1. Agricultural land, productivity of different crops and input use

Parameters	Variables	Number		
Agricultural land	Total cultivated area ha.	55		
	Average farm size	0.66		
	Lowland	0.25		
	Upland	0.62		
Land utilization (%)	Cereal crops	80		
	Cash crops	7		
	Fruits	3		
	Forest/pasture	10		
Area (ha) and productivity (kg)	Maize : Area	28.12		
	Productivity	1176		
	Rice : Area	9.38		
	Productivity	2257		
	Millet : Area	2.27		
	Productivity	867		
Input use	Inputs (kg)	Rice	Maize	Wheat
	Seed	84	30	115
	Urea	1.67	-	7.0
	DAP	1.0	-	-
	FYM	541	1438	456

Table 2. Demography and ethnicity

Parameters	Simple variables	Number
Demography	Total No of HH	54
	Population	356
	<15 years	148
	15-60 years	185
	>60 years	23
	Male	182
	Female	172
Ethnicity	Iteso	35
	Samia	73
	Sabiny	81
	Gishu	165
	Religion HH no.	
	Christian	38
	Islam	16

southern side of the hill. The radio was used as a standard unit of measure (Emerton, 1996 and Rosales *et al.* 2003). The forest uses identified and ranked high were timber, medicines, honey, building materials, food, hunting, fodder, charcoal, firewood, and soil conservation, harvesting. In Mutushet, the uses were ranked as medicines, building materials, firewood, honey, fodder, food, soil conservation, hunting, charcoal, and timber, in that order. At Koterk, medicine, building materials and food were ranked equally to Mutushet. Timber was ranked third, firewood and charcoal fourth and fifth, hunting and fodder seventh and eighth, honey ninth and soil conservation tenth. In both cases, ranking was based on relative importance of the commodity to the people and on relevant immediate use. To the majority of people in this area, conventional

medicine comes second to traditional medicine and hospitals were said to be far and expensive. Similarly, communication network was poor and therefore people relied on locally available commodities.

During the valuation process, counters equating the forest products to their importance were used to allocate points for the product. The value of these products was compared with the value of the radio in the local economy. The value of a radio was estimated to be UGX. 7,000, Discount rate: 3%; Lifespan of radio: about 5 years; the calculated use values are as shown in Table 3. The forest use most valued in Mutushet and Koterk was medicine with an average annual household value of UGX. 60,371.32 (US\$ 33) and UGX. 75,464.15 (US\$ 42) respectively. The forest provision of medicine, domestic building materials, soil conservation, bush meat, charcoal and

Table 3. Average annual household park forest resource use values

Mutushet				
Product	Points	Equivalents	Value	Annual Value*
Medicine	12	12/3 = 4	4 x 7000 = 28000	60371.32
Building materials	9	9/3 = 3	3 x 7000 = 21000	45278.49
Firewood	11	11/3 = 3.7	3.7 x 7000 = 25900	55843.31
Honey	8	8/3 = 2.7	2.7 x 7000 = 18900	40750.48
Fodder	6	6/3 = 2	2 x 7000 = 14000	30185.66
Food	6	6/3 = 2	2 x 7000 = 14000	30185.66
Soil conservation	1	1/3 = 0.3	0.3 x 7000 = 2100	4527.849
Hunting	5	5/3 = 1.7	1.7 x 7000 = 11900	25657.88
Charcoal	3	3/3 = 1	1 x 7000 = 700	15092.81
Timber	4	4/3 = 1.3	1.3 x 7000 = 9100	19620.66
Radio	3			
<b>Total</b>				<b>514.1</b>

**Koterk**

Product	Points	Equivalentents	Value	Annual Value*
Medicine	15	15/3 = 5	5 x 7000 = 35000	75464.15
Building materials	13	13/3 = 4.3	4.3 x 7000 = 30100	64899.10
Firewood	10	10/3 = 3.3	3.3 x 7000 = 23100	49806.27
Honey	7	7/3 = 2.3	2.3 x 7000 = 16100	34713.44
Fodder	4	4/3 = 1.3	1.3 x 7000 = 9100	19620.66
Food	6	6/3 = 2	2 x 7000 = 14000	30185.66
Soil conservation	2	2/3 = 0.7	0.7 x 7000 = 4900	10564.96
Hunting	9	9/3 = 3	3 x 7000 = 21000	45278.49
Charcoal	9	9/3 = 3	3 x 7000 = 21000	45278.49
Timber	8	8/3 = 2.7	2.7 x 7000 = 18900	40750.48
Radio	3			
<b>Total</b>				<b>426561.7</b>

\*Annual value was calculated as shown in Table 4, using the formula  $1/T \sum [V/T (1+r)^{t-0}]$  with the value of t ranging from t = 1 to t = T, where T is the total lifetime of the radio, V the value of the forest activity, r the discounted rate and t the year.

Table 4. Discounted and annual values (in UGx.) of forest product

Mutushet	$V/T(1+r)^t$					$1/T \sum [V/T (1+r)^{t-0}]$
	Year 4	Year 3	Year 2	Year 1	Year 0	Average Annual Value
Medicine	56856	58561.68	60318.54	62128.08	63991.93	60371.2464
Building materials	42642	43921.26	45238.91	46596.07	47993.94	45278.4348
Firewood	52591.8	54169.55	55794.64	57468.49	59192.52	55843.402
Honey	38377.8	39529.13	40715.01	41936.45	43194.55	40750.5904
Fodder	28428	29280.84	30159.26	31064.05	31995.97	30185.6232
Food	28428	29280.84	30159.26	31064.05	31995.97	30185.6232
Soil conservation	4264.2	4392.126	4523.891	4659.607	4799.394	4527.84348
Hunting	24163.8	24888.71	25635.39	26404.44	27196.58	25657.7834
Charcoal	14214	14640.42	15079.63	15532.02	15997.97	15092.8093
Timber	18478.2	19032.55	19603.52	20191.63	20797.38	19620.653
<b>Total</b>						<b>327,514.0113</b>

Koterk	$V/T(1+r)^t$					$1/T \sum [V/T (1+r)^{t-0}]$
	Year 4	Year 3	Year 2	Year 1	Year 0	Average Annual Value
Medicine	71070	73202.1	75398.16	77660.1	79989.91	377320.267
Building materials	61120.2	62953.81	64842.43	66787.7	68791.32	324495.454
Firewood	46906.2	48313.39	49762.78	51255.66	52793.35	249031.373
Honey	32692.2	33672.97	34683.15	35723.65	36795.35	173567.315
Fodder	18478.2	19032.55	19603.52	20191.63	20797.38	98103.2754
Food	28428	29280.84	30159.26	31064.05	31995.97	150928.116
Soil conservation	9949.8	10248.29	10555.74	10872.42	11198.59	52824.838
Hunting	42642	43921.26	45238.91	46596.07	47993.94	226392.174
Charcoal	42642	43921.26	45238.91	46596.07	47993.94	226392.174
Timber	38377.8	39529.13	40715.01	41936.45	43194.55	203752.952
<b>Total</b>						<b>2082807.94</b>

timber was more valued in Koterk, while provision of firewood, honey and pasture were more valued in Mutushet. The forest's provision of food was valued equally in the two areas with an average annual value of UGx. 30, 186 per household. Table 4 shows the calculation of average annual values of the forest uses.

Superficially it seems that the forest is more valued for provision of primary human needs like food and housing in Koterk, and for secondary needs in Mutushet. But in reality, Mutushet is on the wetter northern side of the hill, on the main road to the major towns in the district and is much nearer to the forest. In addition, the forest is more accessible from this

side, thus making provisions of the primary requirements more available. Koterk is on the drier southern side of the hill where the terrain of the hill is broken, and therefore, it is more difficult to access the forest resources, thus increasing their value.

Many rural communities have difficulties in meeting subsistence needs, especially when rains fail, and rely on the forest for livelihood. Forest resources thus prove to be an important source of non-cash income for Mbale and Kapchorwa households particularly for the poorest people. Barter trade is practised occasionally, especially in traditional medicine and in land leases where one pays the owner of the land by planting an agreed number of trees. The realisation of this non-cash dependency for livelihood prompted the use of market standard equivalent methods to evaluate the importance of the forest to the local people.

The value of a forest and estimation of its exploitation is best realised by interacting with and observing the activities of people living around the Mt. Elgon forest park (Buyinza and Nabalegwa, 2007). Hufschmidt *et al.* (1983) describe this as the most accurate method of valuing the products extracted from the forest, and ascribes to identifying, counting, weighing and measuring the products as they enter the village. Unfortunately this is limited in its applicability if the users are scattered in different villages.

Economic status of the community living around forest park influences exploitation of forest resources (Buyinza, 2009), making it necessary to understand the community in order to understand their valuation of the wild resources. It was for this reason that it was thought necessary to rank the households wealth wise before carrying out the interviews. Well-being ranking is a participatory method that uses local

criteria to highlight economic diversity (Bahuguma, 2000).

The major justification for forest conservation has been to preserve their ecological values either as major watershed areas or as habitat for diverse range of plants and animal species, especially weighted by those that are rare or endangered. Justification for conservation due to forest livelihood values have not been much emphasized (Cavendish). To demonstrate the significance of local forest use, Cavendish has shown the domestic forest use of Mt. Elgon forest park as being worth up to \$6 million a year, four times as much as the commercial logging value of the forest and more than the potential value of forest land under agriculture. These local use values provide an important economic and development justification for conservation.

The most difficult part of valuation is assigning the products a monetary value (Emerton, 1997). Ferraro and Kiss (2002) noted that cash measures have little relevance to the rural subsistence economies, especially when valuing forest resources that are used within the household, and recommended the use of contingent valuation and costless choice method. This is a Participatory Resource Valuation (PRV) technique where villagers express the value of forest products within the context of their own perceptions, needs and priorities rather than through conventional cash-based techniques (Emerton, 1997).

The valuation used here reveals that the average annual value, in Uganda shilling equivalent, per household was calculated at a mean of UGX. 37,2048 (US\$ 207) from Mutushet and Koterk data. This helps one reflect on shortcomings of globalisation of trade in which value is imputed to resources only when they enter external markets, meaning, as Posey (1999) observes, existing non-monetary values

recognised by local communities are ignored, despite knowledge that local biodiversity provides essential elements for survival, some of which are assumed to be free for the taking, like knowledge on medicinal plants by bio-prospectors. From household surveys, the average annual income per household was found to be UGx. 600,000 (US\$ 372) (Table 1). This annual income was based on income from both forest and farm produce, including livestock farming. This shows that the forest contributes about 55% to the household income, and confirmed the high dependency of local people on Mt. Elgon forest park resources.

## CONCLUSION AND RECOMMENDATIONS

Many studies have been carried out to establish a knowledge base on the contribution of forestry and natural resources to the household incomes of the poor dwellers in Mt. Elgon forest park. Forestry is one of the most important elements of the environment and natural resources sector, with significant contribution to poor people's livelihoods in the mountain ecosystems. Forests and trees provide numerous products and services that the poor depend on for basic subsistence needs and increased agricultural production. Forestry and other natural resources provide alternative opportunities and livelihood strategies for the poor people to diversify agricultural activities and increase incomes to sufficient survival levels.

The value of a forest and estimation of its exploitation is best realised by interacting with and observing the activities of people living around the Mt. Elgon forest park. The forest use most valued in Mutushet and Koterk was medicine with an average annual household value of UGx. 60,371.32 (US\$ 33) and UGx. 75,464.15 (US\$ 42) respectively. The forest provision of medicine, domestic building

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To demonstrate the importance of environmental resources to the national goals of poverty eradication, there is need to put together relevant information generated from previous research, household surveys, and field experience, for the purpose of providing the necessary information to government planning authorities and decision-makers. Such information will serve to fill the critical knowledge gap in poverty-forestry relationship and the contribution of the environment to people's ability to raise incomes and their quality of life.



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