Research Journal of Applied Sciences 3 (3): 225-232, 2008
ISSN: 1815-932X

Environmental Incomes Derived from Mountain Forest Ecosystems of Mt. Elgon National Park, Eastern Uganda

M. Buyinza
Faculty of Forestry and Nature Conservation, Makerere University, P.O.Box 7062 Kampala, Uganda

Abstract: The increasing degradation of the natural resource base and the quality of the environment are jeopardizing the livelihoods of millions of Ugandans and threatens the country's attainment of development targets including the Poverty Eradication Action Plan (PEAP). The purpose of this study was to examine the contributions of environmental incomes to people's livelihoods and determine the socio-economic factors that influence the household dependency on environmental resources around Mt. Elgon National Park (ENP), eastern Uganda. Data from a household survey conducted in 2005 were analyzed using logistic regression. The results shown a high rate of dependency on environmental resources among the poor people who collect several types of goods from the forest for both direct consumption and trading for their basic livelihoods. However, the rich households with diverse and reliable sources of incomes showed a low environmental resource dependency rate. The study further revealed that several household level factors such as ethnicity, distance of the settlement to the park boundary, age, household size, landholding and, the level of education significantly affect the total income derived from the national park. The important policy implication from this study is that an effective management strategy for national park and forest ecosystem should be consistent with the overall socio-economic development and any policy formulation process should clearly consider the socioeconomic characterization of the households.

Key words: Environmental income, dependency, local people, national park, mountain forest ecosystems

INTRODUCTION

Uganda's forests provide a range tangible and intangible benefits, which make major part of people's livelihood strategies in both urban and rural areas. The total contribution of the forest sector to Gross Domestic Product (GDP) is estimated at 6.1% (MWLE, 2002). This is presumed too low because many forest benefits are not reported to any recording system. In spite of this, there is inadequate information on the ecological and socio-economic importance of forests. These affects and influences people's perception of the resource often resulting in poor management and consequently forest degradation. Although, the national forest policy highlights the importance of forests and especially their contribution to rural economy, the need for information awareness is inadequately addressed (MWLE, 2002).

Most of the mountain forest in Uganda has been classified as protection forest. 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 (Anderson and Richards, 1987). 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 (MWLE, 2002). 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 protected areas to poverty eradication is poorly understood among policy and decision-makers (Anderson and Richards, 1987). Lack of recognition or poor perception of forestry shows clearly in 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 are for government (MWLE, 2002). 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.

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 (Kamugisha, 1993). 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.

Under the decentralization policy, local communities should be recognized as major stakeholders and ought assisted to understand their circumstances better, acquire skills to mobilize resources and plan for the conservation of protected areas. They must be assisted to understand their roles, rights and be facilitated to achieve them, only then will decentralization contribute to sustainable development. The need for integrated management of protected areas, therefore, is essential. Local community and protected areas are compatible if the community is involved in their management and sustainable use of the natural resources are developed so that the community can share the economic benefits accruing from them.

The study sought answers to the following questions: Do protected areas contribute to peoples incomes? What is the proportion of income from environmental resources among households with high and low income? What is the effects of education level, size of household, sex of household head, age of household and land size on environmental income.

MATERIALS AND METHODS

Study area: The elevation of mountain Elgon is between 1,800-2,800 m above sea level. The vegetation of Mount Elgon can be classified into 4 broad categories based primarily on altitudinal zonation (National Biomass Study, 1996; Howard, 1991).

Table 1: Commercial timber species of Mountain Elgon

Class	Botanical name
1	*Podocarpus imbriscata*
2	*Podocarpus nerrifolia*
	Eugenia Sp.
	Eugenia Sp.
3	*Helalanthus giganteus*
	Vernonia arborea
	Acer neveum
	Lithocarpus spicata

- Mixed montane forest (48%)-less than 2500 m, comprising both mixed montane forest (20%) and poor forest (28%)
- Bamboo and low canopy montane forest (21%)-2400-3000 m.
- High montane heath (7%) between 3000-3500 meters
- Moorland (24%) - > 3500 m.

Others have classified the forest into two: Between 1,800-3,000 m is mixed forest with dominant species of *Lithorcarps, Acer and Engelhardia*; > 2,000 m is pure *Casuarina* forest. Other valuable tree species are shown in Table 1.

The most preferred species in the mixed forest is *podocarpus imbriscata*. The big trees of *podocarpus* can be found in the area but seedlings are still in several plots. *Podocarpus* is useful for furniture and handicraft.

Mt. Elgon which supports the largest forest reserve in Uganda with an area of 1,089 km^2 (Pomeroy, 1991). The forest is one of the biggest catchments areas whose rivers supply water to adjacent low lands that covers an area of about 4,000 km^2 in Uganda. The area supports a population of one million people. Human impact of forest resources mostly occurs in the mixed forest because it is accessible and relatively close to the villages. Land uses from the lower parts going upwards are: villages, dry land farm, forest boundary, plantation forest, shrub and natural forest. To investigate the human impact on the forest resources an inventory of the area was done.

Mt. Elgon region was first gazetted in 1938 as a forest reserve because of its importance as a water catchment. The reason for gazetting was to preserve nature profit the environment and sustain the socio-economic benefits of the forest (NEMA, 1998). In the forest reserve a number of human activities were allowed by Forest Department. The permits issued specified the nature of activity, duration in the forest and the rules to be followed. People were allowed to taking and use forest products in limited quantities.

In 1993, Mt. Elgon National Park was gazetted to cover the forest reserve and came under the management of Uganda Wildlife Authority. The abrupt change of management affected the surrounding communities because they had not been informed of the decision and

how the resources would be accessed. The people had to 'steal' resources as it was illegal to enter the park. The people were affected because they sacrificed of access rights. This has led to conflicts between the local people and the park authorities (Scott, 1998).

The boundary of Mt. Elgon National Park is shared by 3 districts: Mbale to the South and Kapchorwa to the North and Sironko to the Northwest. There are 58 parishes directly adjacent to the park boundary. The protected area begins a considerable distance up the mountain and most of the boundary is adjacent to land that is almost completely under agricultural production. Gombya-Ssembajwe *et al.* (2001), Wanale sub-county has a population density of over 300 people Km^{-2}. The land holding is 1 - 2 ha per household. The high population density around the park leads to constant encroachment because of the declining agricultural productivity of land due to the continuous and unsustainable farming methods (NEMA, 1998). The people see the park as wasted land that must be utilised. The Bagisu constitute 86% of population, the Banyole (8%) and other ethnic groups make up 6% (UBOS, 2002). The main economic activity is agriculture and since the 1970's they have grown traditional cash crops like arabicca coffee. Today, a lot of maize, beans, rice, bananas, potatoes and sorghum are grown.

Data collection: Data on environmental income and factors influencing income were collected through a household survey in villages surrounding the park. Five villages out of 12 surrounding the reserve were selected to capture variation in location, access to markets and income among villages. In each districts one village that is contiguous to the forest was selected randomly. The five survey villages were selected from Tingey, Kwen, Kongasis, Benet and Sironko sub-county. From each village 35 households (total 175 households) were selected at random and interviewed.

The respondents were asked about products they collect from the forest and time spent collecting them. Data on the respondent's education, age, duration of residence, household size and other socioeconomic information were collected. Respondents were asked about land ownership, crops grown and crop yields. In addition, respondents were asked to list all capital assets they own.

The study areas were selected on the basis of ecological and tenurial characteristics. Villages in highlands or wet areas and those in low dry lands, Villages that have communal lands and those without. A two by two matrix was developed. We sampled 30 households from each category using simple random sampling technique.

Conceptual model description: Descriptive statistics were used to describe the farmers' socio-economic characteristics, while Logit models were used to analyse household's dependence on the park's resources which was calculated as the ratio of annual income earned from forests (collection of minerals and forest products and labour income from mining) to the total annual income earned from wealth and other sources (agriculture, off-farm employment and the park).

The procedures that were followed to derive income from each source are explained below.

Household-annual income = Σ (Environmental income + Agriculture income+Return to wealth + Wage income)

Environmental income: The value of products such as rattan, medicinal plants, that have markets was estimated by multiplying the quantities collected by their respective market prices. Gold and tantalite mining constitutes another major source of income from the park. The value of products collected for subsistence purpose was derived using an opportunity cost approach.

Agriculture income: Annual household income from farming was computed by multiplying annual crop yields by respective prices.

Wage income: Income from daily wages and formal employment of all people in a household was used to estimate wage income. Income from daily wages was calculated by multiplying the number of days worked by the ongoing wage rate. Then, income from salaried jobs and business was added to the income from daily wages.

Return on wealth: The annual rate return on capital assets (livestock, bicycle, motorcycle), which are referred to as return to wealth, was computed as the product of capital assets using 10% interest rate. Capital depreciation was not considered, because a steady state households make annual investment to cover capital depreciation.

The environmental income variable was transformed into a binary form (low income and high income) using 0.4 as a cut-off value. It was assumed that households whose income from environment accounted for 40% or less of the total income are considered less dependent and the rest are considered highly dependent. As such, the dependency variable was assigned a value of zero if the household's dependency score was < 0.4 and a value of 1 otherwise. The model used to estimate total environmental income is :

$$\text{In } [Pi/(1-Pi)] = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_k X_{ki}$$

Where:

Subscript ith	:	The observation in the sample.
p	:	The probability of the outcome.
β_0	:	The intercept.
$\beta_1, \beta_2, \ldots, \beta_k$	:	Coefficients associated with variable $X_1, X_2, \ldots X_k$.

The explanatory variables used were age, gender, education, household size, agricultural income, access to markets and landholding size.

Age: The average age of a household was 45, while the range was between 20 and 80. Collection of forest environment products and minerals from protected forests, which involves long walks and carrying heavy loads, can be labour intensive. According to Bahuguma (2000), collection of environmental products from the park is labour- intensive and restrictive, therefore, elderly people are less likely take the risk. Young adults are more likely to undertake these illegal and risky activities. As such, household's age may be expected to have a negative impact on contribution of the forest environment.

Landholding size: Landholding ranges from 0-8 ha and the mean was 1.4 ha. Families who own more land are likely to earn more income and therefore depend less on the nature reserve. Thus, land size is expected to have a negative impact on environmental contribution to livelihood.

It is important that the other components of poor people's livelihoods-such as agriculture, pastoralism/ livestock production, wage labour, non farm, off farm, income transfers, are also well understood in order to forge suitable management strategies to reduce poverty and reduce degradation of forest environmental resources. To understand the complex links between poverty and forests, we have to distinguish between direct and indirect causes of deforestation, as well as contextual factors that make it more likely for deforestation to occur. The conversion of forest for example to subsistence agriculture (a direct cause) may be a result of population increase (natural increase, migration, resettlement etc), international economic policies (e.g. macroeconomic adjustments), policy failures within and beyond the forestry sector, market failures and / or civil unrest, among others. There are underlying causes, that are linked and that reinforce each other. Therefore citing poverty as the cause of environmental degradation is not accurate, particularly because the reduction in forest cover and quality is not a prerogative of developing countries alone (Arnold and Bird, 1999).

There are some factors beyond the direct control of households that may influence their willingness and ability to take part in environmental income generating activities. These can relate to ecological, economic/ political conditions. These determine to what extent environmental income opportunities will be of interest to households and thereby their dependence. We adopt some of the factors highlighted by Vedeld *et al.* (2003), particularly those that will be relevant in this study.

Education: Some studies show that educated people will have greater off-farm employment opportunities than less educated people. In general, education is expected to open up diverse employment opportunities. As such, people with higher levels of education and subsistence agricultural activities. The range of education was from 0-10 years of education, with a mean value of 3.04 years of education.

Age of household: Young households tended to get more resources from the forest than older households. This is because a young household may be seeking more land to cultivate and thereby clearing a natural bush. Collection of valuable forest products can be a accumulation strategy to establish a household. Older households may have less time and needed physical strength to gather resources from the environment as these resources usually demand a lot of labour. On the other hand some young people consider forest product collection old-fashioned. They may also lack the necessary skills and experience as compared to old people.

Sex of household head: This was affected the availability of labour as female headed households tended to be poorer than male headed households. Many female headed households were divorced, widowed or their husband worked far away. The adult labour force was smaller for such households. The female-headed household was a young household and therefore did not have many productive members and were less engaged forest resources business. In general, men undertake hunting and mining activities while women carry out collection of wild vegetables and thatching grass. Cultivation and firewood collection are joint activities. Since, collection of forest products and minerals from protected areas is both labour intensive and risky, male-headed house-holds may be expected to be likely than female-headed households to depend on forests.

Household size: Household size ranges from 1-12 people and the average size was 5.74. Families with more labour

tend to extract more forest resources (Gunatilake, 1998). In addition, families with more labour can mobilize part of it to forest product collection and the rest to farm and other income-earning activities. Moreover, in forest-dependent communities, large families may have a higher propensity to extract resources from the reserve because they require more resources to meet their subsistence needs. This does not necessarily mean that large households derive a higher proportion of income from forest.

Market access: Good market access may imply less forest dependence because alternative income opportunities are better and forest availability lower. But the point that good access to markets and high prices of some forest products can influence some households to specialize in high value environmental products seems a challenge this to this assumption. Access to outside markets may influence forest resource extraction in different ways. On the one hand, access to markets may open up better employment opportunities, thereby making people less dependent on forest resources. On the other hand, market access may facilitate commercialization of forest resources and thus provide an incentive to extract more. Therefore, it is hard to determine, a priori, the impact of market accessibility on forest resources. Gunatilake (1998) showed that access to outside markets will reduce forest's total contribution. Gombya-Ssembajwe *et al*., (2001) found that indigenous people who live far from markets deplete forest resources more.

A "market access" index was developed following Gunatilake (1998). Distance to the nearest town, distance to ride a bus, number of buses available per day and availability of other facilities, such as school and medical centres, were used in developing an index value. Information on these variables was collected at a village level from key informants. Each village was assigned a rank on a scale of 1 to 10 based on the ascending order of market access. In other words, villages with more facilities were assigned a higher ranking. The average score of all four categories was used as a market access index.

Agriculture income: Prices of agricultural inputs and outputs may also influence people's livelihood on incomes from the forest especially if it is more profitable to invest in farming. This is true if the input prices are usually high and the product prices are low. This could be supported by several other factors but in this regard we are only concerned about if local people are involved in extraction of resources because they find crop production less paying. Gunatilake (1998) shows that higher agriculture income result in less contribution from the forest resources. This is expected because households would prefer work on their farms to forest product collection from the reserve. The range of agriculture income was US$ 0 - 1000 and the mean was US$300.

Education: Better educated households tend to have access to a wider range of income opportunities and they did not find it sufficiently rewarding to get involved in collecting forest products. It was also noted that both wealthier, better educated, resource rich and the less educated, resource poor groups venture in forest resources business. The difference is that the resource richer households were involved in commercial activities like logging, timber. Where as the poorer group participated more in gathering dead wood, fruits, medicines, small animals.

RESULTS AND DISCUSSION

Forests and trees are a natural resource that provides numerous goods and services, which are important to the livelihoods of the majority of the people of Uganda. For a long time Ugandans have harnessed fuelwood, timber and poles, or uses their derivatives for their energy needs, domestic comfort, security, or development. Of particular importance are the non-wood benefits from the forests and the environmental values that contribute significantly to the people's livelihoods, especially women and yet are not reflected in the national accounting systems.

Results of the model explaining the contribution of environmental resources to the socio-economic conditions (Table 2). The likelihood ratio test shows that the regression model is significant with a chi-square value of 36.4. This result indicates that the explanatory variables in the model are significantly related to environmental income. Since the upper bound R^2 for binary-choice models is approximately 0.4 (D'Souza *et al*. 1993), an R^2 value of 0.189 suggests that the model has reasonable explanatory power. The results show that the model predicts the dependent variable correctly by 84%.

Table 2: Logistic regression results

Variable	Coefficient	SE	Elasticity
Education	0.4	1.221	0.013
Age	-0.042**	0.115	-1.672
Gender	0.62	0.623	0.522
Land	-0.072	0.284	-0.052
Sum of agric. incomes	-0.0000227**	0.00004	-0.392
Market-Access	-0.292**	0.1	-0.884
Household Size	0.313*	0.116	0.838
Constant	0.642	1.362	0.544
R2	0.189		
Correct prediction	84.08%		
LR test	37.33		

LR: likelihood ratio, Coefficients significant at **p<0.05, *p<0.10

In this model, many explanatory variables have the expected effect on environmental income contribution. While, coefficients on the age, sum of agricultural incomes and access to market are statistically significant at 5%, variable household size is significant at 10%. The negative impact of age on environmental income suggests that younger households are more dependent on environmental resources. This may be due to the fact that environmental utilization activities in the park are illegal and young adults may be more willing than older people to take risks. Furthermore, with limited off-farm economic opportunities, younger households rely more on environmental resources to meet their basic needs. A study by Gombya-Ssembajwe *et al.* (2001) found that younger householders in rural Uganda are trapped in poverty owing to limited alternative economic opportunities.

The variable sum of agricultural incomes shows a negative relationship with environmental income to livelihood. This implies that households with high agriculture income are less dependent on environmental resources. Households with limited income from agriculture depend more on the environment to make a living (Gombya-Ssembajwe, 2000). If poor communities have diverse and reliable sources of incomes, they will extract less resources and get less income from the environment than if they have few and unreliable income sources. This is evident from various rural development efforts involving small and medium enterprises (like in Uganda), which do not fetch much income from the environment (forests) such as production of guinea fowl, bee-keeping, mushroom and other vegetable farming. We suggest that when other income opportunities arise, people would diversify and if it pays to adopt those better income opportunities than to rely on environmental incomes only. According to Vedeld *et al.* (2003), environmental income decreases with increasing total household income.

Market access has a negative relationship with environmental income. People living in isolated areas with limited access to external markets are likely to remain poor and will continue to depend on environmental resources. In contrast, communities living closer to town tend to have a wide range of employment opportunities, including small businesses. For example, villages that are closer to arabicca coffee estates and towns has lower interaction with the natural environment because most households in these villages had year-round employment. Furthermore, returns to labour and agriculture income may be high in villages that are closer to markets. This result supports the argument of Angelsen and Kaimowitz (1999) that higher rural wage and greater off-farm employment opportunities reduce deforestation.

Household size has a positive relationship with environmental income. This suggests that large families tend to rely greatly on environmental resources. With limited income opportunities and higher unemployment, large families are likely to rely on environmental resources to meet their basic needs. In addition, environmental projects such as honey collection are labour intensive and therefore larger householders are more likely to undertake these activities. Barham *et al.* (1999) found the same relationship between household size and income from environmental products and services.

The other parameters such as education, gender and land use are not statistically significant, but have consistent elasticity values (Table 2). The elasticity values indicate the percentage change in environmental income in response to a 1% change from the mean value of an explanatory variable. For example, a 1% increase from the mean value of agricultural income (US$ 400) will decrease the probability of households' high environmental income by about 0.3%, holding all else constant. Similarly, a 1% increase from the mean value of market access index will decrease the probability of a high environmental income by about 0.884%. As such, a 1% increase in the average age of a household will decrease the probability of his or her high environmental income by 1.4%. However, a 1% increase from the average household size will increase the probability of household's high dependence by 0.841%.

The park is a source of cash crops, food crops and vegetables to especially bamboo shoots locally known as "Malewa" and mushrooms. These grow wild and are rare outside particular ecosystems. "Malewa" can only grow at an altitude between 3000 and 2400 m above sea level (Scott, 1994). Cash crops grown are cabbage, passion juice, carrots beans, peas and Irish potatoes. People resisted eviction as they depended on natural environment.

Most of the men living around the park are polygamists. They need enough land to be able to feed big families. They experienced food shortages even after extension workers educated them on how to use small pieces of land for higher productivity or better yield. Land in the lower lands is not enough for them for farming.

With a big family dominated by young children who cannot participate in growing crops or bringing in income, there is bound to be inadequate supply of food. The pieces of land are inadequate henceforth pressure is

bound to increase on the park to get more land and food to feed the many mouths. Respondents used to get medicine especially for headache and stomachache. Fruits, such as guavas and passion fruits honey, mushrooms and greens are collected from the park. These items are no longer available to the people. Many people depend on forest products for their livelihoods. Forest products are some of the most important free goods and safety nets produced in nature providing shelter and food security that are critical to poor rural households.

Medicines harvested from the tree Barks are not allowed. People feel deprived of these resources and harvest them illegally causing conflicts. Livestock is not grazed in the park. People used to hunt for bush meat in form of calabase monkeys, bush bucks and blue and red tailed monkeys which they do not get any more.

CONCLUSION AND RECOMMENDATIONS

It is important to consider a broader array of assets and rights in order to identify people depending on environmental resources for their livelihoods. Income from environmental resources are important in situations where people are unable to obtain sufficient income, from agriculture or wage employment. Understanding the dependency of households on the park is critical for developing management strategies. This study found that households in villages with higher average income are less dependent on the park. Furthermore, income from agriculture and access to outside markets reduce environmental income. Raising income from agriculture and creating access to markets will increase the opportunity cost of households' environmental products collection from the park. These findings suggest that protected areas management strategies must involve households and large families. Due to limited employment opportunities, young adults will be more likely to pursue risky and illegal activities. Therefore, developing innovative means of diverting their energies to other productive activities will result in a "double whammy" effect.

The average age of a household was 45, while the range was between 20 and 80. Collection of environmental products and minerals from the park involved walking long distances and carrying heavy loads. The collection of products from the parks was restrictive and therefore, the elderly people did not take the risk of entering into the park. As such, age had a negative impact on environmental income.

According to Reardon and Vosti (1995), rural poverty increases the need for resources and local people's dependency on the park. Command-and-control approaches of restricting access to the park will only escalate "park-people" conflicts. Managers of the park must embrace a proactive approach and work with local communities to address their socioeconomic concerns.

There is a growing consensus among these stakeholders for replacing these plantations with an agroforestry system providing tea. The are several reasons for this preference: Arabicca coffee is considered a traditional crop in Mbale district; civil society and government agencies are familiar in coffee production; arabicca coffee estates provide perennial employment to local people with significant multiplier economic effects and intercropping of trees with arabicca coffee will be an economically viable alternative to alleviate poverty among the rural populations. However, a comprehensive feasibility analysis of agroforestry type arabicca coffee plantations must be conducted. This analysis must consider the social, economic and ecological aspects of the proposed change. Secondly, a management plan of the park, involving all key stakeholders, must be developed. The plan should specify both short-term and long-term objectives and goals. Thirdly, institutions must be identified to facilitate the implementation of the plan and ensure equitable distribution of benefits to local communities.

REFERENCES

Anderson, D. and Richards, 1987. Conservation in Africa, People, Politics and Practice: Conservation with a human face, conflict and reconciliation in Africa landuse planning. Cambridge University Press.

Angelsen, A. and D. Kaimowitz, 1999. Rethinking the causes of deforestation: Lessons from economic models. World Bank Observer, 14: 73-98.

Arnold, M. and P. Bird, 1999. Forestry and the Poverty-Environment Nexus. Paper prepared for the UNDP/EC Expert workshop on Poverty and the Environment, Brussels, Belgium.

Bahuguma, V.K., 2000. Forests in the Economy of the Rural Poor: An estimation of the dependence level. Ambio, 29: 126-129.

Barham, B.L., O.T. Coomes and Y. Takasaki, 1999. Rain Forest Livelihoods: Income Generation, Household Wealth and Forest Use. Unasylva, 50: 34-42.

D'Souza, G., D. Cyphers and T. Philips, 1993. Factors affecting the adoption of agricultural practices. Agric. Res. Econ. Rev., pp: 159-165.

Gombya-Ssembajjwe, W., 2000. Sacred Forests: An Alternative Way of Conserving Forest Resources. In Community-Based Forest Resources Management in East Africa, W. Gombya-Ssembajjwe and A.Y. Banana (Eds.). Kampala, Uganda: Makerere University Press.

Gombya-Ssembajwe, W.S., J. Bahati, M. Wantsusi and S. Matovu, 2001. Bufuma-Naboti Settlement and Bufuma Forest, Mbale District, Uganda. Makerere University. UFRIC.

Gunatilake, H.M., 1998. The role of rural development in protecting tropical rainforests: Evidence from Sri Lanka. J. Environ. Manage., 53: 273-292.

Howard, P.C., 1991. Nature Conservation in Uganda's Tropical Forest Reserves. IUCN, Gland, Switzerland and Cambridge, UK., pp: Xvii+313.

Kamugisha, J.R., 1993. Management of Natural Resources and Environment in Uganda. Policy and Legislation Landmarks, 1890-1990. Regional Soil Conservation Unit/SIDA, Nairobi.

MWLE, 2002. Ministry of Water, Lands and Environment: The National forestry Plan: Final Version. Republic of Uganda.

National Biomass Study, 1996. Progress Report. Forest Department, Kampala, Uganda.

NEMA, 1998. National Environment Management Authority. Uganda Environment Profile, Kampala Uganda.

Pomeroy, D., 1991. Sustainable Development of Forest Conservation in Uganda. Technical Report No. 4, IUCN NORAD and Ministry of Environment Protection, Uganda.

Reardon, T. and S. Vosti, 1995. Links between Rural Poverty and the Environment in Developing Countries. World Dev., 23: 1495-1506.

Scott, 1994. An Assessment of Natural Resource Use by Communities from Mt. Elgon National Park. UNDP/Technical report No. 15.

Scott, P., 1998. From Conflict to Collaboration: People and Forest at Mount Elgon, Uganda. IUCN East Africa Regional Office, Nairobi Kenya.

UBOS, 2002. Uganda Bureau of Statistics. Population and Housing Census. Kampala Uganda.

Vedeld, P., A. Angelsen, E. Sjaastad and G. Berg, 2003. Counting on the Environment: Forest Environmental Incomes and the Rural Poor. Aas, Noragric, Agricultural University of Norway.