ORIGINAL ARTICLE

Benefits Gained from Woodland Resource Uses: The Cases of Lare District, Gambella Regional state of Ethiopia

[1]Paul Gatluak Puldeng, [2]Debela Hunde Feyssa, [3]Wubshet Chala*
[1]Department of Natural Resources Management, Jimma University, Ethiopia
[2]Watershed management, College of Agriculture and Veterinary Medicine, Jimma University,
[3]Department of Agricultural Economics, Jimma University, Ethiopia
*Corresponding author: wubshetchala@gmail.com

ABSTRACT

Forest income in general is important for the low income households. The Gambella lowland woodland has diverse woody plant species. The objective of this study was to identify the level of benefits gained by local households from the woodland uses from Gambella lowland woodland of Lare woreda. The benefits of woodland use values (timber products, wood fuel, wild edible fruits, medicinal plants, water consumption, fish resources extraction and Bush meat) of Lare area woodland were tested from 200 rural households' heads by using structured survey questionnaires. Timber product (e.g. log products) was seen more significant to local people livelihood support in which about 86% of respondents agreed on this use in a range of 100-301+ numbers of timber per household per year. Wood fuel consumption analysis revealed that, 82.5% of households' heads respondents consumed maximum head loads between (4-9+) head loads per household per month whereas about 17.5% of them were at the range of (1-3) head loads per household per month. Hence; the result indicated that community in the study area is using woodland uses to a high degree. Regarding wild edible fruits 63% of the respondent households were using wild edible fruits per household per year. Medical plant also used by the households who consumed (7-10+) bundles of medicinal plant per year. Therefore; multiple stakeholders have to support the community by provision of training on sustainable use of natural resources in the study area.

Keywords: Woodland, Lare, Benefits

INTRODUCTION

Local community often depends directly on natural forest resources. Many of these resources found in forest environment as forest products. More than 1.6 billion people in the World depend on various degrees on forests for their livelihood (World Bank, 2002). About 350 million people who live within or adjacent to dense forests depend on them to a high degree for subsistence and income generation. Forests also provide environmental services such as clean air and water, prevention of soil erosion, nutrient and carbon cycling, construction materials, edible fruits, renewable energy, oils and fats. They also provide cultural, spiritual and recreational benefits (Perrings, 2000). Economists have naturally focused on the market value of specific forest products, although non-market values of forests are now being increasingly appreciated. A significant number of studies on non-market values of forest have been carried out worldwide. A study done by Appiah *et al*. (2009) in Ghana reported that, forest income provides 38% of the total household income. A research result done by Kamanga *et al*. (2009) in Malawi showed that total forest income contributes 12% to total household income. Kengen (1997) stated that the valuation of woodland resources values has been a central issue in forestry for quite a long time. Until recently; however, most valuation studies were concentrated on wood products and little attention was given to developing a comprehensive valuation of all goods and services supplied by forests. Since inadequate studies were made in economic valuation of forest and wood lands in Ethiopia particularly in Gambela. Hence a study on economic valuation of low land wood land is important to identify the resource base and contribute for resource use planning. Therefore, the objective of this study was to identify the level of benefits gained by local households from the woodland uses at Gambella lowland woodland of Lare woreda.

MATERIALS AND METHODS

Methods

The study was conducted in Gambella Regional State in wood lands of Lare district, Southwestern of Ethiopia. Lare is one of the twelve woredas (district) in the Gambella National Regional State of Ethiopia.

Sources of data

Questioner survey was used to collect both primary and secondary data. Primary data were collected directly from 200 households' heads selected from 1438 population. The head of each household stood on behalf of his/her family size as a representative. Secondary data was collected from books, internet and journals.

Sampling methods and sample size selection strategies

In this survey, both non-random and random sampling techniques were used in sampling design. Six kebeles were selected purposely from the Lare woreda kebele's based on contingencies such as accessibility to woodland area occupation, time and budget. To selection of respondents, simple random sampling method was used.

Data collection

Methods for valuing non-market priced (e.g. environmental) goods and services can be classified into revealed preference (indirect) and stated preference (direct) methods (Harris, 2006). Stated preference (direct) methods are used to elicit values of non-market priced (e.g. environmental) goods and services directly from respondents by means of survey techniques (Garrod and Willis, 1999). The values of woodland have been divided

into use and non-use values (Emerton, 2001; Campbell and Luckert, 2002). The same study divided the use values of woodland into direct, indirect and optional. In addition to this division, non-uses values of woodland are also of two types these are existence and bequest. In this study, the benefits of some woodland use values to the rural household (wood fuel, timber products, wild edible fruits, medicinal plants, water consumption, fish resources extraction and bush meat) of Lare area woodland were tested from the rural households' heads point of view using structured survey questionnaires.

Selected component units of woodland uses: The component units of natural lowland woodland uses which were used for this specific work are;

Direct uses value: timber products (e.g. Log), firewood (e.g. dry wood), wild edible fruits and medicinal plants (e.g. *Balanites egyptica*), and wildlife (e.g. White eared kob).

Indirect uses value: soil and water (e.g. surface water), livestock (e.g. cows), and fish resources (e.g. catfish);

Data analysis:
For identification of the benefits level of local households to each uses of woodland, continuous quantitative data were collected and analysis using descriptive statistics and correlation of each woodland use with variables were also tested.

Definition of the uses value of woodland

***Direct use value*:** a use value that is determined by the contribution that the environmental or natural resources make to the current consumption and production. The selected component units for this study were timber products, wood fuel, wild edible fruits and medicinal plants, and wildlife.

***Indirect use value*:** A value that includes all the benefits derived from functional services that the environment or natural resources or woodland values provided to support current consumption and production. The selected component unit water and fish resources

Independent variables: Family size per household, number of cows holding per household, size of cultivated land per household and total income of household were the explanatory variables which explains the degree of dependence of rural households to woodland use resources.

RESULTS AND DISCUSSION

The result revealed that people of Lare district get benefit from wood lands in different ways which includes Wood fuel (e.g. dry wood) consumption: The result showed that all local people are users of wood land resources (Fig 1). About 82.5% of households' heads respondents were consumed maximum head loads of wood fuel ranged from (4-9+) head loads per household per month whereas about 17.5% of them consumed in the range of (1-3) head loads per household per month. Head load is a bundled of woodfuel that a person loaded once a time. This shows the high dependency of local community to wood fuel consumption in this study area. The reason of high consumption was because communities in the study area are all having large family size and livestock which exposed them in uses of wood fuel. The second reason was that local community didn't have any option for energy use for their daily activities as well as for unless sun energy.

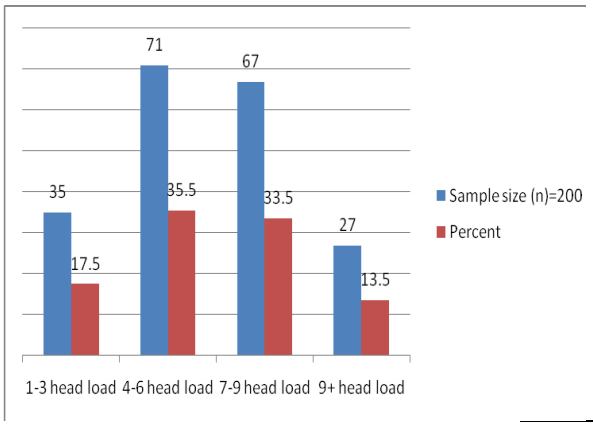

Figure 1. Wood fuel consumption (e.g. dry wood)

Timber products (e.g. log products) consumptions: The households' heads responses has shown that, about 86% of them were observed from the range of (100-301+) numbers of timber per household per year. Those who allocated below 100 timbers per year were only 14% of respondents (Table 1). This could not be surprising result because local community in this study area is using timbers for different purpose like for example tugul building, fencing, income generation.

Table 1. Timber products consumption (e.g. log products)

Number of timbers	Sample size (n)=200	Percent
less than 100 timbers	28	14.0
100-200 timbers	77	38.5
201-301 timbers	67	33.5
301+ timbers	28	14.0
Total	200	100.0

Wild edible fruits (e.g. *Balanites egyptica*) consumptions: The result showed that 63% of the respondent households were using (0-10) Lieeri of wild edible fruits per household per year with only 37% of them at maximum user level (11-16+) Lieeri (Table 2). Lieeri is the local name in Nuer language; it is an instrument that local community uses it for measurement of wild edible.

Table 2. Wild edible fruits consumption (e.g. *Balanites egyptica*)

Amount of lieeri	Sample size (n)=200	Percent
< 5 Lieeri* of WEF	66	33.0
5-10 Lieeri of WEF	60	30.0
11-16 Lieeri of WEF	50	25.0
16+ Lieeri of WEF	24	12.0
Total	200	100.0

WEF=wild edible fruits A lieeri= 1 kg on average

Medicinal plant (e.g. *Balanites aegyptica*) consumptions: It is one of the direct woodland uses in which its degree of contribution to the local households' livelihood was tested. Based on the result, households who consumed (7-10+) bundles of medicinal plant per year are 35% while the majority of them which are about 65% were found using only (0-6) bundle per household per year (Table 3). Bundle is a method used for measurement of medicinal plant by rural community in this study area; means bunch of roots, stems and leafs of plants that local households use for traditional medication. The result showed that more than half of respondents were not using medicinal plant further; this was the reason that, health center is available to

local community and were getting immediate medication from the health center at any time.

Table 3. Medicinal plants consumption (e.g. *Balanites egyptica*)

Bundle of medicine plants	Sample size (n)=200	Percentage
< 3 bundles of medicinal plants	60	30.0
3-6 bundles of medicinal plants	69	34.5
7-10 bundles of medicinal plants	53	26.5
10+ bundles of medicinal plants	18	9.0
Total	200	100.0

Hunt meat (e.g. white eared kob meat) consumptions: It is one of woodland direct use which gives local households sevice for their daily consumptions. The result revealed about 23% were using (5-7+) zuoon of hunt meat (HM) whereas about 67% were using only (0-4) zuoon of HM per household per year (Table 4). Zuon is the local name in Nuer language; it is an instrument that local communities use for measurement of hunt meat or domestic. The reason for less consumption of hunt meat is due to restriction of them by government.

Table 4. Hunt meat consumption (e.g. white eared kob meat)

Zuon of hunt meat	Sample size (n)=200	Percent
< 2 zuoon of HM	101	50.5
2-4 zuoon of HM	53	26.5
5-7 zuoon of HM	33	16.5
7+ zuoon of HM	13	6.5
Total	200	100.0

HM=hunt meat

Water resource (e.g. surface water) consumptions: It is one of the indirect uses of woodland value which has a great role in local people livelihood. For its importance, data for its consumption were collected from the households' heads point of view; the result indicated that 57% of respondents were found using water per household per month in a range of (2881-4321) and 43% of them were found at range of (720-2880) litres per household per month (Fig 2). This is because water is vital resources in this study area since it is very lowland area which even need more water for drinking due to the hot weather condition. The water used for bath and livestock consumption was not given consideration in this study due to its difficulty to measure and estimate; in this case, only a liter of drinking water per household per month was measured.

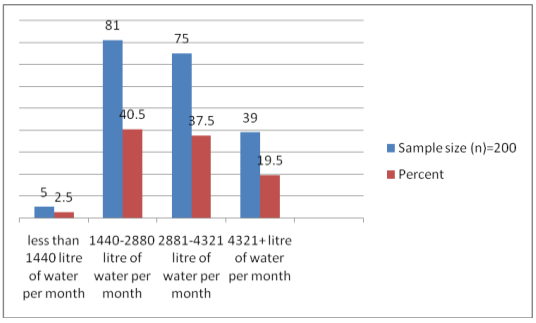

Figure 2. Water consumption (e.g. surface water)

Fish resources (e.g. Catfish resources) extractions: The households' heads dependency level were estimated and the result indicated that 32% of respondents were allocated to the range of (32-42+) numbers of fish per household per year whereas about 68% of them were seen from the range of (0-31) numbers of fishes per household per year (Fig 3). The core reason is that, fish resources is seasonal use to the local community of the study area since they are using nomadic way of

life and having only four months chance for fish resources extraction.

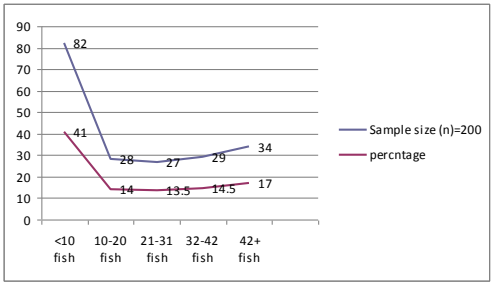

Figure 3. Fish resources extraction (e.g. Catfish resources)

Component of woodland uses in correlation with different variables: The correlation analysis indicated that, an increase in family member and total income of local households has strong correlation with woodland resources consumption (Table 5). The positive sign of the Pearson correlation coefficients implies that an increase in family member by 1 persons and total income of household by 1 ETB respectively, resulted in an increase of consumption of woodfuel (e.g. dry wood), timber products (e.g. log products), wild edible fruits and medicinal Plants (e.g. *Balanites aegyptica*) for both, hunt Meat (e.g. white eared kob meat), water Resources (e.g. Surface water) and fish (e.g. Catfish resource). In the same situation, an increase in size of land (e.g. cultivated land) and livestock (e.g. cows) numbers found to have weak correlation with woodland resources use. It showed that, an increase in the size of cultivated land of the household by 1 ha and livestock holding by 1 numbers; results in the reduction of dependency level of rural households to woodland resources use.

Table 5. Correlation of woodland uses with variables

Explanatory variables		WF	TP	WEF	MP	HM	WR	FR
FSH	Pearson Correlation	0.129	0.102	0.148	0.207	0.194	0.149	0.121
	Sig.	0.068	0.151	0.036	0.003	0.006	0.035	0.087
NCHH	Pearson Correlation	-0.187	-0.129	-0.136	-0.268	-0.372		-0.109
	Sig.	0.008	0.068	0.055	0.000	0.000		0.126
SCLH	Pearson Correlation	-0.297	-0.248	-0.185	- 0.175	-0.176		-0.199
	Sig.	0.000	0.000	0.009	0.014	0.013		0.005
TIH	Pearson Correlation	0.141	0.145	0.144	0.134	-0.016		0.122
	Sig.	0.047	0.041	0.041	0.059	0.825		0.086

FSH=Family Size of Household, NCHH=Numbers of cows holding per Household, SCLH=Size of Cultivated Land per Household, TIH=Total Income per Household, WF=Wood Fuel, TP=Timber Product, WEF= Wild Edible Fruits, MP=Medicinal Plants, HM=Hunt Meat, WR=Water Resources and FR=Fish Resources. List wise N = 200

Woodland uses component units and right which seem main agent for deforestation acceleration: Rural people in the study area were having

public right in uses of any resources type (Table 6). They were using their traditional knowledge for use of woodland resources. All of respondents reported use of open grazing system on common land permanently in all seasons of the year for their livestock feed which is also very harmful to young growing seedlings of trees and grasses species as it lacking resistance in injury or damage. Daily consumption of more numbers of wood fuel's head loads and numbers of timbers product by rural people in this study area have seen one of the deforestation agent. Traditionally; both deadwood and timbers products are collected for energy uses; this custom is still practiced by the rural community who live within woodland area. Local communities are still using timbers products for their tugul construction, fence, and as sources for livestock energy use.

Table 6. Permission for woodland resources uses, grazing system and Main of deforestation accelerating agent

Permission for woodland resources uses	Sample size	Percent
Public right under knowledge of local community with no permission body	200	100%
Grazing system	Sample size	Percent
Open grazing on common land permanently in all seasons of the year	200	100%
Main of deforestation accelerating agent	Sample size	Percent
Fuel wood and timber products extraction	200	100%

CONCLUSIONS

The Gambela low land woodland has great contribution to the local community livelihood who are living around it. The result revealed that Lare wereda woodland is very important in that, it contributes significantly to the livelihood of the local communities at various levels for income generation and subsistence. The result of the present study revealed that, woodland products like timber products (e.g. log products), wood fuel (e.g. dry wood), wild edible fruits and medicinal plants (e.g. Balanites aegyptica) were woodland uses that are extracted most by local community in the study area. Log products and head load of wood fuels were seen more significant to local people livelihood support in which about 86% and 82.5% of respondents were using it ranging from 100-301+ number of log per household per year and 4-9+ head load per household per month respectively. The reason for this consumption is because local community of this area are using log products for tugul construction and don't have other energy sources in use. Therefore, awareness creation coupled with community support for sustainable utilization of woodland resources is essential being supported with further economic valuation studies in Gambela regional state.

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