

**NON-TIMBER FOREST PRODUCTS AND LOCAL PEOPLE'S FOREST
DEPENDENCE: A CASE OF BABIYA FOLLA FOREST, SOUTHWEST
ETHIOPIA**

MSc. THESIS

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**NON-TIMBER FOREST PRODUCTS AND LOCAL PEOPLES' FOREST
DEPENDENCE: A CASE OF BABIYA FOLLA FOREST, SOUTH WEST
ETHIOPIA.**

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Resource Management (Forest and Nature Conservation)**

By

Ayinalem Tariku Birechis

February, 2017

Jimma, Ethiopia

DEDICATION

I dedicate the thesis to my mother Rubi Danusa for her love and encouragement.

STATEMENT OF THE AUTHOR

First I declare that this thesis is my work and that all sources of the materials used for this thesis have been properly acknowledged. This thesis has been submitted to in partial fulfillment of the requirements for MSc. degree at Jimma University, College of Agriculture and Veterinary Medicine and is deposited at the University Library to be made available to borrowers under the rules of the library. I seriously declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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BIOGRAPHICAL SKETCH

Ayinalem Tariku was born on May 23, 1985 in Wayu town, Horro Guduru Wellega, Oromia National Regional State, Ethiopia. She attended her education at Lalise Wayu Primary School and Ambo Secondary and Preparatory School. Ayinalem has received BSc in Production Forestry from Hawassa University Wondo Genet College of Forestry and Natural Resources in July 2009. After the graduation, she has started working for Oromiya Forest and Wildlife Enterprise. She has joined the School of Graduate Studies at Jimma University to pursue her study leading to the Master of Science in Natural Resource Management (Forest and Nature Conservation) in 2014.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis Variance
CSA	Central Statistical Agency
ETB	Ethiopian Birr
FAO	Food and Agricultural Organization of the United Nations
HHs	Households
LHS	Land Holding Size
NTFP	Non-timber Forest Products
RFI	Relative Forest Income
SDI	Simpsons Diversification Index
SPSS	Statistical Package for Social Sciences Software
TFI	Total Forest Income
THI	Total Household Income
WC	Wealth Categories
WHO	World Health Organization

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ABSTRACT

Forest of southwest Ethiopia has a huge ecological and economic importance, but due to human induced factors, there is constantly high rate of forest degradation. There is need of sustainable use of forest resource through NTFP based forest management .Understanding forest resources use in terms of NTFPs helps in designing forest resource management through improving rural livelihood. The objective of the study was to assess contribution of Non-Timber Forest Products. The study was conducted at Babiya Folla Forest, southwest Ethiopia. Data were collected from 138 households through household interview by using structured questionnaire. The study results showed that the forest in the study area contribute different forest product in the form of NTFPs. About nine categories of NTFPs used by local communities were identified, namely forest coffee, honey, fuel wood, charcoal, bamboo, Liana, medicinal plant, material and animal feed. Almost the entire sampled household's harvested and used at least one type of NTFP. But distribution of the products among wealth categories were varies. Coffee is the major source of forest product to rich and medium category people, whereas charcoal, fuel wood and bamboo are the most source of forest product to poor people. The implication is that forest product utilization pattern varies with the value of the products among wealth categories. The forest product diversity index Result show that diversity of forest product obtained among wealth categories were 1.905, 1.683 and 1.075, poor, medium and rich respectively. Therefore, it indicates that poor are obtained more variety of forest products than the riches and medium. Relative percentage contribution of forest income of rich HHs was 46 % while the contribution for medium and poor HHs was 38 % and 19 % respectively. The relative importance of forest income varied significantly ($P=0.00$) across wealth categories. In terms of magnitude, forest income differed significantly ($P< 0.05$) with wealth category of households. The HH in the rich category benefited more than the poor. Forest income of a household is regressed against some household characteristics that may influence income levels. Forest income level was significantly and positively influenced by family size while distance from forest, land holding size and educational level were significantly and negatively related to forest income. Generally Income derived from forest product collection in the form of NTFPs contributes significantly to the annual income of sampled households in the study area. Therefore, policies and strategies that aim to improve the well-being of rural people and natural resource conservation should give attention to the contribution of NTFPs to the livelihoods of local people.

Key words: Forest, Forest income, NTFPs, Socio-economic, Dependency and Wealth category

1. INTRODUCTION

1.1. Background Information

Forest is a natural asset for wellbeing of people (Sunderlin *et al.*, 2005). Forest resources are among the natural resources that have substantial socio-economic, cultural and ecological importance. It is an essential source of earnings for the forest border households (Das, 2010). It also represents the key source of environmental capital from which people can draw materials of their livelihood activities. As a result the contribution of forest to rural livelihood has as important issue for poverty alleviation. Billions of people direct or indirect drive their basic necessity from forest. Worldwide, more than 1.6 billion people depend for varying degrees on forest for their livelihood (World Bank, 2004). More than 15 million people in Sub-Saharan earn their income from forest based enterprises such as fuel and charcoal sales, commercial hunting and handicraft production (Kaimowitz, 2003). Thus forests are a source of many products on which households depend for both subsistence consumption and income generation. Forest dependency is usually for livelihood diversification (Yemiru *et al.*, 2010). Even though forests resource has such huge values and function, they have been declining through time due to human induced impacts is continues. Annually, the rate of global deforestation is around 13 million hectares, most of which occurs in the developing world (FAO, 2010) .The decline in forest cover and the resulting forest degradation nowadays a global problem looking for a global solution.

Tropical forests provide Non-Timber Forest Products (NTFPs) of significant livelihood value leading to consideration of NTFPs harvest as a strategy for sustainable use and conservation of forests. Ethiopia is one of the tropical countries in which NTFPs play a significant role in rural livelihoods (Wirtu, 2002; Chilalo *et al.*, 2006).

Due to the diversity of NTFPs, they are extremely important to biodiversity conservation and forest management. NTFPs are also play an important role both in forest conservation and improving livelihoods for forest dwellers. They can provide the incentive for participatory

forest management (Ros-Tonen, 2000). The use of NTFPs is a possible solution to release the dependency of local people on timber. Thus, they can be a sustainable source of income for people living in or near the forests (Cocksedge, 2001). Currently the significance of forest to the livelihood forest dependent community has taken much research attention in developing countries (Adhikari *et al.*, 2004). This needs to be assessed in the different geographical regions in order to understand how different social economic settings of households influence dependence on forest based income. Understanding the degree of dependence on forest income by rural households may act as an assist in drafting policies for conservation given that public forests often suffer the problems of competition leading to unsustainable harvesting practices. Therefore, this study was aimed at provide relevant information about socio-economic contribution of NTFPs, estimation of level of local people forest dependence, which importance to improve approach of forest management.

1.2. Objective of the Study

1.2.1. General objective

- To assess contribution of Non-Timber Forest Product based forest management at Babiya Folla forest Southwest Ethiopia.

1.2.2. Specific objectives

- To assess socio-economic contribution of Non-Timber Forest product to household.
- To estimate the level of local people forest dependence.

1.2.3. Research question

- Which Forest products are obtained from Babiya Folla forest?
- What is the contribution of Non Timber Forest Products to household?
- Who is more dependent of Non-Timber Forest Products?

2. LITERATURE REVIEW

2.1. Forest Resource Use and Household Characteristics

People and the forests they live in or nearby are in some cases “islands” of comparative stability that are relatively untouched by rapidly changing socioeconomic systems (Sunderlin, *et al.*, 2005). Distinguishing between actual dependency on the forest, in the sense that the users would be left seriously worse off in their absence and those uses which reflect choice is very important (Byron and Arnold, 1999). Individuals from larger families may find it difficult to access alternative sources of subsistence, and thus become dependent on forest resources (Coulibaly *et al.*, 2009; Mamo, *et al.*, 2007). The age of the head of household bore positively related to forest resource utilization until a peak of physical strength and resembled inverted U shaped curve (Godoy *et al.*, 1997). Forest-related income forms an important part of rural income in many poor regions (Vedeld *et al.*, 2007). Many forest users depend on forest resources as alternatives, and use forest outputs as a matter of choice, not necessity (Byron and Arnold, 1999).

2.2. Socio-economic value of NTFP

The local communities living in and around the forest mainly derive their livelihoods from forests which are the source of timber and non-timber forest products like honey, spices, wild food, medicine (Senbeta, 2006). According to Gardei (2006), the majority of farming communities in Southwest are forest dependents and major source of their livelihood and subsistence by providing variety of forest products. According to the study, more than 65 percent of the households who were involved in NTFPs did earn more than one thousand Birr in a year from the production of NTFPs alone, while around half of the people use the forest to generate cash income. NTFPs contribute to livelihood outcomes, including food security, health and well being, and income (FAO, 1995). In many parts of the world, these resources are critical for the socially most marginalized people, who are the main actors in NTFP extraction and may provide them with the only source of personal income (Ros Tonen, 1999). The dependence on forest product for energy or fuel is very common practice of human being from ancient times. Especially the use fuel wood for cooking food is still important in the modern world, particularly throughout the developing countries (Rehfuess, 2006). Forest provides a

wide range of products, including food and fruit, fodder for livestock, and medicines for both people and livestock. Forests supply goods of commercial, cultural, and sacred value, and they comprise a vital safety net in times of need (Anonymous, 2008). According to the World Bank 2001 report, globally more than 1.6 billion people depend for varying degrees on forest for their livelihoods. About 60 million indigenous people are almost wholly dependent on forest. Some 350 million people who live within or adjacent to dense forests depend on them to a higher degree for subsistence and income.

Access to forest resources helps rural households diversify their livelihood base and reduce their exposure to risk. Earnings from forest products are often important as a complement to other income. Very large numbers of households generate some of their income from selling forest products, often when farm production is not enough to provide self-sufficiency year round. Income from forest products is often used to purchase seeds, hire labor for cultivation, or generate working capital for trading activities (Warner *et al.*, 2008). Alike to other forest area community, the livelihood of Sheka people largely depend on timber and non timber forest products. According to the study conducted by Melca Mahiber (2007), Sheka people perceive forests as “pension card” passed to them.

2.2.1 Household Income Value of NTFPs

Many researchers have documented the role of environmental resources and non-timber forest products (NTFP) in the economic development of local communities and sustainable forest management. Available evidence from developing countries (Arnold and Bird, 1999; Adhikari, 2005; Narain *et al.*, 2008) focuses on quantifying the contribution of natural resources or forest products to rural income and analyzing the socioeconomic factors that affect forest dependence. Recent studies tracking household income conclude that NTFPs contribute between 10% and 60% of income (Cavendish, 2000; Fisher, 2004; Mamo *et al.*, 2007), and that this contribution varies substantially across households. Similarly, Neumann and Hirsch (2000) argue that, while NTFPs contribute to household income in many places, the contribution is geographically uneven, varies across social groups.

Farmers living near the natural forest depend on it for obtaining many NTFPs and timber. The major NTFPs in Ethiopia, namely forest coffee, honey and spices play an important part in household cash income. According to Ermias, 2012 report the mean cash income contribution of NTFPs to annual household income in the 2009/2010 production year was 47% of total income for all sampled households. Agriculture contributed slightly more than NTFPs (50%). In addition, several NTFPs were used for household subsistence. The remaining balance (3%) of household income was contributed by off-farm activities.

The contribution of NTFPs to improving livelihoods can best be assured through a process of gradual domestication of NTFPs in human-modified (agro) forest types. Rajesh Rajchal (2006) notes that intensified management and domestication of NTFPs may be an important means of improving livelihood of poor through higher yields, improved and more consistent quality and control over the timing of harvests and reduce pressure on wild and presumably endangered resources.

It is imperative to clearly understand the socio-economic contributions that NTFPs can make to rural livelihoods in order to design poverty mitigation strategies, policies, interventions, and business ventures that will protect forest assets for the poor in a targeted manner (Sjaastad *et al.* 2005). While more data on the quantification of rural incomes in Africa is called for, the socio-economic contributions of NTFPs to forest-based livelihoods in Africa have been qualitatively assessed. This section briefly summarizes – five of the most commonly recurring factors that affect levels of dependency on NTFPs for forest-dependent people in Africa. These five factors are access to forests and markets, wealth status, gender, education, and seasonality

2.2.2. Importance of NTFPs in rural livelihood

Livelihood is the set of capabilities, assets, and activities that furnish the means for people to meet their basic needs and support their wellbeing. Livelihoods are not simply the localized phenomena but are connected by environmental, economic, political and cultural processes to wider regional, national and global arena (FAO, 2007). Most rural poor people maintain diversified livelihood strategies both because they cannot obtain sufficient income from any single strategy to survive and to reduce risks. This is why most small farmers are not actually

solely small agriculturalists, and many include forest products in their livelihood systems (CIFOR, 2005). Approximated that more than half of the developing world relies on non-timber forest products (NTFPs) for nutritional and health needs. Many common forest areas provide a variety of resources to the dependent communities at free of cost such as firewood and small timber, animal fodder, green manure and various fruits and medicinal products (FAO,2002).

In many areas, rural populations are traditionally dependent on local forest resources to provide additional income through collection and marketing of NTFPs (Adepoju, 2007). For example, NTFPs add to peoples' livelihood security, especially for rural dwellers and may also have cultural significance and value (Shackleton and Shackleton, 2004). NTFPs are conventionally viewed as products of the poor unlike that of the timber for the rich. However, evidence showed that in developing countries forest products are also an essential component of the livelihood of urban households (Byron and Arnold, 1999). NTFPs cover a wide range of products, which are utilized in a variety of context and play important roles in various household livelihood strategies. It was ascertained that NTFPs also play a role in the household economy of not only the poor, but also the rich (Nguyen, 2006).

According to many reports, there is a rising consensus that NTFPs play an important role in the livelihoods of the rural poor as a source of food, medicine, construction materials, and income (FAO, 1995; WHO, 2000; Andel, 2006). Appears to account for a large share of a household's total income, but complements other livelihood activities (Shackleton and Shackleton, 2004). Understanding the extent of dependence on forest income by rural households may act as an aid in drafting policies for conservation given that public forests often suffer the problems of non-rivalry and non-excludability leading to unsustainable harvesting practices (Tugume *et al.*, 2015).

2.3. Conservation Value of NTFPs

The maintenance of a forest-like structure associated with NTFPs production is generally acknowledged as being positive, contributing to some of the classical forest environmental functions like carbon storage, nutrient cycling, erosion control and hydrological regulation (Myers, 1988). Moreover, forests and home gardens managed for NTFP production can retain

large amounts of plant and animal biodiversity (Michon and de Foresta, 1997), particularly when compared with alternative land uses (Boot, 1997), while providing an important source of income. However, the propositions outlined above, and their interpretation, have raised concern that arguments about the relatively benign impact of harvesting for NTFPs have been overstated or misunderstood.

In many parts of the world, local people are losing access to valued plant and animal species either through overexploitation and habitat destruction or loss of access as former harvesting areas are included within national parks or forest reserves. Achieving sustainable NTFPs harvest and forest conservation relies entirely on the ability to reconcile ecosystem productivity with human exploitation (Marshall *et al.* 2005). Higher demand increases pressure on the resource and as resources become depleted, three main strategies are employed to militate against short falls in supply: travel further to find the product, substituting the particular product with a similar product or to develop a more intensive or cultivated sources of supply (Cunningham, 2000; Ahenkan and Boon 2010).

It is often assumed that NTFPs are sustainably harvested and that this “green social security” will always be available to resource users. This is not always the case. The early interest in NTFPs was encouraged by the belief that NTFP commercialization that added sufficient value to forest products could contribute to forest conservation (Nepstad and Schwartzman 1992). Where NTFPs are harvested in a sustainable manner, this may indeed be the case (Sunderland *et al.* 2004; Belcher and Schreckenberg 2007). Several scientists have stressed that NTFPs can be harvested without much destruction of the forest, while maintaining essential environmental functions and preserving biological diversity (Anderson 1990; Peters 1996). The extraction of NTFPs is considered sustainable if it has no long-term deleterious effect on the regeneration of the harvested population, and when the yield remains more or less constant throughout the years (Cunningham, 2000). Nevertheless, uncontrolled extraction due to population increases, high demand for NTFPs and low prices has caused species extinction and forest degradation in many countries (Ahenkan and Boon 2010)

Forest biodiversity through NTFPs plays an important role in addressing poverty issues for marginalized, forest dependent communities. NTFPs contribute to livelihood outcomes,

including food security, health and well being, and income (FAO, 1995). In many parts of the world, these resources are critical for the socially most marginalized people, who are the main actors in NTFP extraction and may provide them with the only source of personal income (Ros Tonen, 1999).

3. MATERIALS AND METHODS

3.1. Description of Study Area

The study was conducted at Babiya Folla Forest, which is located in Kersa District, Jimma zone, south west Ethiopia, which is located about 323 km Southwest of Addis Ababa and about 22 km East of Jimma town. Geographically it is found between $7^{\circ}43'-8^{\circ}00'$ North latitudes and $36^{\circ}56'-37^{\circ}14'$ East longitudes. The map of study area is described by the following figure.

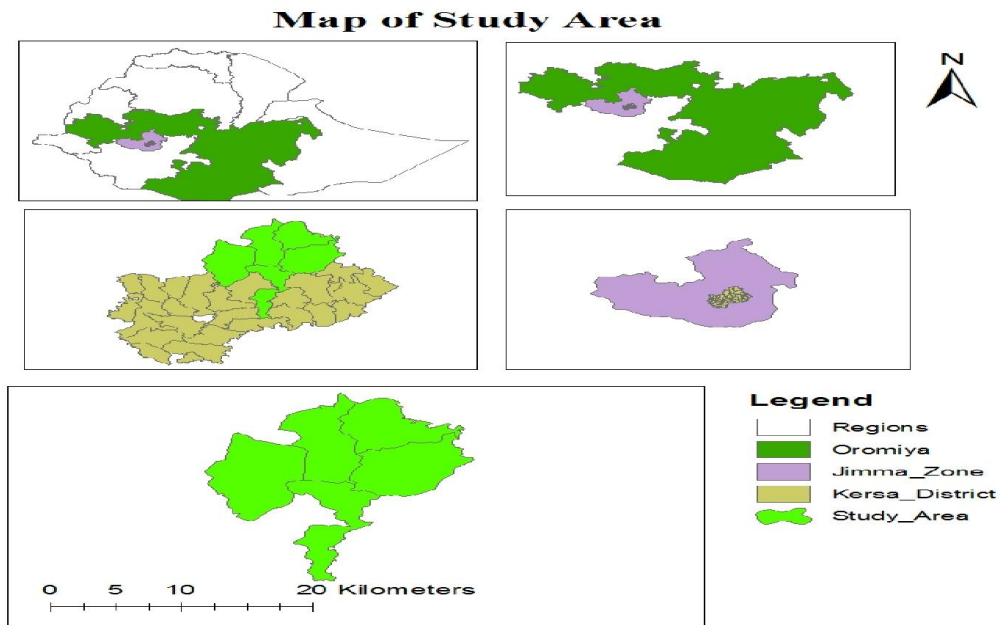


Figure 1: Map of study area

The present land configuration of the district is the result of tertiary volcanic (Acidic volcanic & Basaltic flow). The largest part of the district areas belong part of western highland and associated low land.

The altitude of the area ranges between 1600 – 2400 meter above sea level. The annual rain fall of the area ranges between 1000-1800 mm. The rainfall of the district is weakly bi-modal with spring a small rainy season during the months of April and May while summer along rainy season during the months of June, July and August.

According to Oromiya Forest and Wildlife Enterprise Jimma branch office, forest demarcation data (2014), the total concession area of the study area is estimated to be 3735.27ha, of which 555.27ha is plantation forest and the rest is natural forest. According to CSA (2014), national census report the total population of this district is 182918 of which 87801 (48%) males and 95117 (52%) female. Vegetation Coverage of the district area almost 65.1%, 30.5%, 2% and 2.4% do respectively consist cultivation, forest, and woodland and grass land. The largest dense forest does ideal for the harvesting the natural coffee.

3.2. Methods

3.2.1. Study Site Selection

Babiya Folla forest is purposively selected due to the extent of forest degradation at that area. The forest area surrounded by three District of Jimma zone (Manna, Limmu and Kersa Woreda). The five kebele of Kersa District were selected randomly.

3.2.2. Method of Data Collection

Both primary and secondary data were collected. Primary data was collected from the study area through a survey of individual households using a structured questionnaire. The collected data was focused on household's characteristics, Household incomes, and forest income in a form of non-timber forest products (NTFP). Non-Timber forest product is all goods derived from forests of both plant and animal origin other than timber (FAO, 2001). Structured and semi structured questionnaire was prepared to collect the information. Information was collected through household interview.

Information on household economy was considering the annual income of the households for the last production years. Incomes to the household was estimated for the four major activities; NTFP, crops, livestock and off-farm activities. Products which have market value were calculated by multiplying the quantity produced or consumed with nearby farmer gate price during the time of data collection.

Indirect use values of forest such as, medicinal plants, edible fruits, thatching grass and fodder are of importance to resource valuation, but no established market for them in the area. These forest products were not considered in valuation of forest income calculation (vedeld *et al.*,

2007). Off farm incomes consider, wage employment, own business, animal rent and hand craft based on information from individual on annual basis. The secondary data (background information) were gathered from district’s Administration office and Rural and Agricultural development office.

The sample size was determined using Cochran’s (1977) sample size determination formula (Barlett *et al.* 2001) and decided proportional to the total population size. Accordingly, a total of 138 households were sampled for this study (Table 1). The households for interview were selected based on simple random sampling techniques.

$$n_o = \frac{z^2 * (p)(q)}{d^2} n_1 = \frac{n_o}{(1 + \frac{n_o}{N})}$$

Where;

n_o = Desired sample size when population greater than 10,000

n_1 = Finite population correction factors less than 10, 000

Z = Standard normal deviation (1.96 for 95% confidence level)

P = 0.1 (proportion of population to be included in sample i.e. 10%)

q = 1-P i.e. (0.9)

N = Total number of population

d = Degree of accuracy desired (0.05)

Table 1. Sample size determination of the household from site

Name of kebele	Total member of HH	Sample size
Folla gubata	840	22
Adare dika	1082	29
Kusaye	1256	34
Mara kabaricho	988	26
Karsa Sumi	1002	27
Total	5168	138

The sample HHs living in the selected Kebeles was categorized into three wealth classes rich, medium and poor according to the set of criteria (Table 2). The purpose of wealth ranking in the study was to identify which wealth category was more depend on forest resource.

Table 2: Criteria for wealth ranking in Kersa District

Wealth category			
Criteria of wealth category	Rich	Medium	Poor
Land hold size	More than 2 ha	2 -1ha	<1 ha
Oxen	More than 2	2	≤1
coffee and permanent crop	More than 1ha	1-0.5ha	≤0.25ha
Cow and large ruminants	More than 5	4-3	≤2
Small ruminants goat and sheep	More than 6	5-3	≤2

Source: Kersa District Agriculture and Rural Development Office (2013)

3.2.3 Data Analysis

3.2.3.1 Forest product diversity index

The Shannon diversity index was calculated to measure forest products from forest among wealth category. Shannon diversity index was commonly used in ecology but has been applied to forest products diversity as economic diversity index (EDI). The formula of EDI is follow:

$$EDI = - \sum_{i=1}^n p_i \ln p_i$$

Where:

p_i = proportion of households in a village that rely on each main source forest products

N = number of classes of main sources

A household is classified into one category based on its main income source and p_i 's add up to one. The index ranges from zero to $\ln(n)$. In a village where all households have the same main source, $EDI = \text{Zero}$. Where there is an even distribution of all possible main sources among households in a village, $EDI = \ln(n)$ (Dewi *et al.*, 2005).

3.2.3.2. Measurement of household income diversification index

Diversification index was measured with the help of Simpson diversity index by using all available sources (Ellis, 2000). In this study, diversification levels of income of household calculated by using the inverse Simpson Diversity Index (SDI) (Illukpitiya and Yanagida, 2010):

$$SDI = 1 - \sum_{i=1}^N p_i^2$$

In the survey people recorded a number of different income sources N from which they generated income P_i .

$$\sum_{i=1}^N p_i^2 = \left(\frac{I_1}{I_T}\right)^2 + \left(\frac{I_2}{I_T}\right)^2 + \left(\frac{I_3}{I_T}\right)^2 + \left(\frac{I_4}{I_T}\right)^2$$

Total value (subsistence and cash) of products from crop production (I_1), livestock products (I_2), NTFPs (I_3) and off-farm activity (I_4) then sums up to total household income (I_T).

Where, P_i as the proportion of income coming from source i . The value of SID always falls between zero and one. If there is just one source of income, $P_i = 1$, so $SID = 0$. As the number of sources increase, the shares (P_i) decline, as does the sum of the squared shares, so that SID approaches to one. If there are k sources of income, then SID falls between zero and $1 - 1/k$ accordingly, households with most diversified incomes have the largest SID, and the less diversified incomes are associated with the smallest SID (Saha and Bahal, 2010).

3.2.3.3. Relative forest incomes

Forest income was calculated by estimating the total volume of all types of forest products collected by a household and multiplied by the local market price of each of the products per unit volume. Relative Forest Incomes (RFI) calculated as the proportion of total income originating from forest use and with total household income. It is measure the forest dependence (Vedeld *et al.*, 2004).

$$RFI = \frac{TFI}{THI} * 100$$

In this study, the collected data from household questionnaires were coded, computerized and analyzed using the Microsoft Excel and Statistical Package for Social Sciences (IBM SPSS) version 20 for different statistical purpose. The proportion of forest product collected from the forest and major NTFPs obtain among wealth category were analyzed using descriptive statistic such as percentage and mean. ANOVA were used to calculate and compare Mean annual income of NTFPs to household incomes among wealth categories. Mean annual household

income from different activities (crop, livestock, Forest income and off farm income) among wealth category were also analyzed by using one way ANOVA. Logistic regression was used to determine factors such as family size, land holding size and educational level that influence households' dependence on forest products.

4. RESULTS AND DISCUSSION

4.1. Forest products and distribution of households engaged in production

The forest in the study area provided the basis for the lives of respondent households through provision of various goods and services. Assessment of NTFP result showed that nine types of NTFPs used by local communities. (Table 3). The large proportion sampled households depend on forest for consumption and income generation. This result is similar with other finding that reported as the current study shows that people in rural communities adjacent to Mabira CFR depend on the forest for extraction of NTFPs used for both subsistence consumption and generation of income. The NTFPs extracted from Mabira CFR included firewood, charcoal, construction materials, wild foods, medicinal plants and raw materials for manufacture of secondary products like mingling sticks, tool handles, racks, baskets and mats among others (Tugume *et al.*, 2015).

Table 3: Major NTFPs household collected from the forest

NTFPs	Number of sample HHs	Proportion %
Honey	78	56.5
Forest coffee	87	63
Fuel wood	77	55.8
Charcoal	102	73.9
Bamboo	109	79
Lianas	90	65.2
Medical plant	94	68.1
Material	99	71.7
Animal feed	97	70.3

4.2. Major NTFP obtain among wealth category

The forest products and wealth category result showed that coffee is the major source of forest product to rich and medium category people. The proportions of households involved in production of coffee were 37.3% and 43.1% for rich and medium respectively. Whereas charcoal, fuel wood, bamboo and liana are the most source of forest product to poor people. Proportionally, 63.89%, 42.6%, 58.6% and 52.1% of poor households participated in

collection of charcoal, fuel wood, bamboo and liana respectively (Table 4). The implication is that forest product utilization pattern varies with the value of the products among wealth categories. This result supported by Hayilu (2013) who reported that analysis of forest products and wealth category result showed that coffee is the major source of forest product to rich and medium category people. Whereas, fuel wood is the most source of forest product to poor people. The contribution of spice to rich people was found to be almost negligible. This shows that forest product utilization pattern differ with the value of the products among wealth categories.

Table 4: NTFPs obtain among wealth category

Wealth Categories	Charcoal	Fuel wood	Honey	Forest coffee	Bamboo	Liana
POOR	63.89 (%)	42.6 (%)	36.7(%)	19.6 (%)	58.6 (%)	52.1(%)
MEDIUM	33.3 (%)	41 (%)	35 (%)	43.1(%)	24.1 (%)	33.3 (%)
RICH	2.8 (%)	16.4 (%)	28.3(%)	37.3 (%)	17.2 (%)	14.6 (%)

4.3. Diversity of forest products

Different categories of forest products were used by household need such as honey, Bamboo, lianas, medicinal plants, charcoal, fuel wood, construction materials and coffee. Households use these products as sources of different purposes and income generation. The forest product diversity index show that diversity of forest product obtained among wealth categories were 1.905, 1.683 and 1.075, poor, medium and rich respectively (Table 5). Therefore, forest products obtained vary among wealth categories. The poor are obtained more variety of forest products than the riches and medium .In terms of diversity; the poor are more forest dependent than the riches. This result supported by many previous studies. For instance, Griffin *et al.*, (1992) and Shackleton *et al.*, (2006) showed that rich households extracted a smaller amount of forest products. Arnold (2001) has reported that the poorer households depended on forests for a larger share of their overall livelihood. The poor are assumed more forest resource dependent (Timko *et al.*, 2010). Households that are better off depend to a less extent on NTFPs compared to poor households, means that poorer households are relatively more dependent on NTFP extraction (Tugume *et al.*, 2015).

Table 5: Diversity of forest products obtain from forest

Wealth category	Forest product Diversity index
Poor	1.905
Medium	1.683
Rich	1.075
P-value	0.000

4.4. Contribution of Non-timber forest products to household incomes

Depending on socioeconomic benefit of the households, NTFPs play an important role for subsistence and mostly for income generation. NTFPs were used directly to meet household needs for food, construction, medicine, tools and household equipment. As small number of NTFPs (mainly coffee, honey and fuel wood) are sold and contribute significantly to household incomes in the study area. The majority of respondent uses NTFPs from forest of their livelihood such as lianas, fuel wood, medicinal plants, farm tools, fodder, construction purposes and bamboo were support for household consumption.

The main commercial NTFPs are forest coffee, honey and fuel wood. Coffee is the major commercial NTFPs in the study area. In the sample, households were involved in the collection and sale of coffee with a mean annual income of 87.74 ETB, 5769.44 ETB and 14482 ETB for poor, medium and rich. The collection and sell of coffee in wealth categories were high significances difference. The collection and sale of different NTFPs in the study area are shown in Table 6.

Table 6: Mean annual income of NTFPs to household incomes

NTFPs	Poor		Medium		Rich		P-value
	Mean income	SE	Mean income	SE	Mean income	SE	
Coffee	87.74	28.073	5769.44	563.267	14482.88	1148.827	0.000
Honey	38.03	5.975	232.73	28.573	189.25	32.566	0.000
Fuel wood	538.39	48.852	739.23	71.171	600.97	125.438	0.233

SE= Standard error of mean

Also honey is the other major NTFPs for sale in the study area. The household respondents were involved in the collection and sale of honey with a mean income of 38.03 ETB poor, 232.73 ETB medium and 189.25 ETB rich. The other major NTFPs in the study area is fuel wood. The same as the above NTFPs the household respondents were involved in both collection and sale of fuel wood with a mean income 538.39 ETB poor and 739.23 ETB medium. But the rich collect only for consumption that estimated with the mean income of 600.97 ETB. Fig 2 implies that forest product utilization pattern varies with the value of the products among wealth categories.

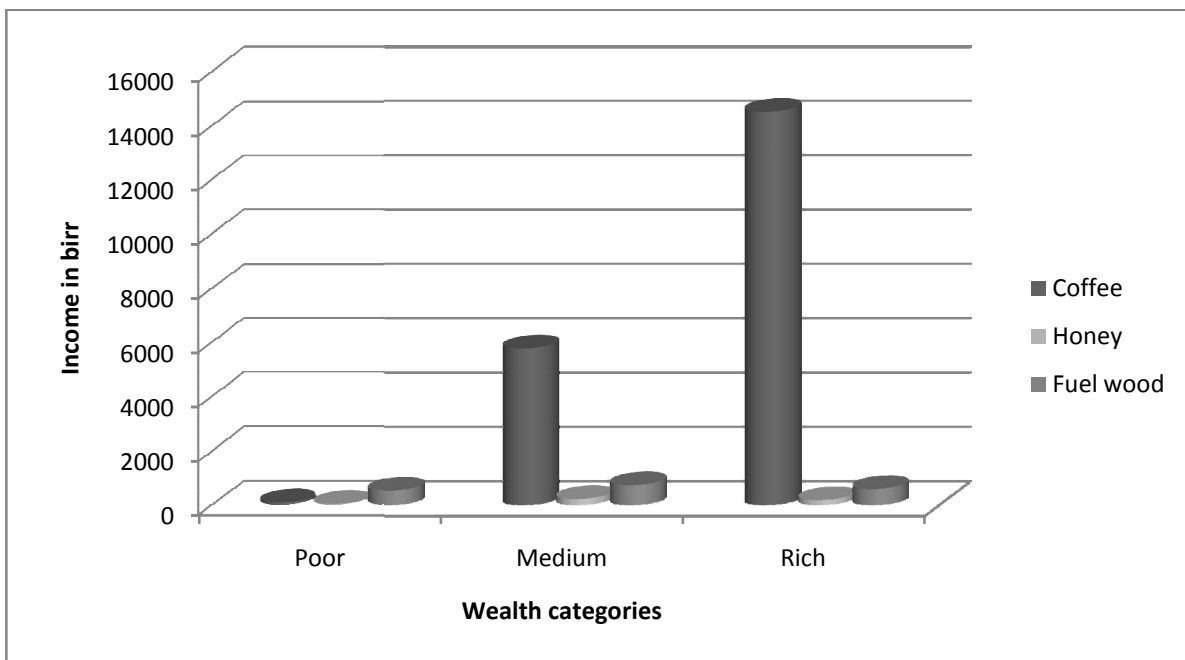


Figure 2: Proportion of Forest product to wealth categories

Coffee and honey are commercial products in the study area (Chilalo and Wiersum, 2011). Forest coffee, honey and fuel wood were the major sources of income for the sampled

respondents whereas charcoal, material, medicinal plants, animal feed and bamboo were used for household consumption. These findings agree with those of Adilo (2007) who reported that major sources of cash income for households, in absolute terms, were NTFPs, such as forest coffee, honey and spices. Similarly, Forest is the source of different products on which local community depends. The study result showed that coffee, honey and fuel wood were the major forest products for sale in the study area. Coffee is an important cash crop and forest plays a major role in providing coffee (Hayilu, 2013). Taye and Wirtu (2004) reported that most farming communities in southwest Ethiopia were forest dependent. Households located within Ethiopia forest highly dependent upon forest resources for fuel wood, livestock grazing and building materials (Mamo *et al.*, 2007). In certain circumstances non timber forest products are the most important forest product. For instances, Chilalo and Wiersum (2011) has reported coffee forming the most important non timber forest in southwest Ethiopia. Ogundele *et al.* (2012) study from Nigeria shows that fuel wood and spices are harvestable forest products. Yemiru *et al.* (2010) has also reported the distinct forest product value to lower and higher classes in Southern Ethiopia. Poorer households have less access to high value forest products relative to better off households (Adhikari *et al.*, 2004). In most cases poor households are the one who utilize the lower value of non-timber forest products (Ambrose-Oji, 2003). Pouliot *et al.* (2012) has reported similar experiences of forest product categories for better off and poor households in Burkina Faso and Ghana.

4.5. Relative forest income among wealth category

The annual income of forest income for different wealth groups of the study sites amounted to Birr 15331.2 for the rich, Birr 6908.61 for the medium and Birr 961 for the poor. Forest income contributes more to the rich people than the poor people. While relative percentage contribution of forest income of rich HHs was 46 % while the contribution for medium and poor HHs was 38 % and 19 % respectively for the study site. The forest is major source of their livelihood and subsistence by providing them a variety of NTFPs. This finding agree with the study conducted by Sutcliffe (2012), in the Masha and Andracha Woreda demonstrated that forest products those mainly contributed to household income generation and household consumption comprise

diverse forest products forest honey, medicinal plants and wild coffee which are collected by local people.

The purpose of forest dependency varies among poor, medium and rich households. Households from better off depend on forest totally for cash. The relative forest income contribution for rich was around 46% of forest income. Whereas, 38% and 19% were for medium and poor respectively. Only half of the poor households depend on forest for cash. The relative forest income contributions to poor households were less than 50% and less integrated to cash economy.

Table 7: Relative forest income among wealth category

Wealth categories	Mean forest income (ETB)	RFI %
Poor	961.00	19
Medium	6908.61	38
Rich	15331.16	46
P-value	0.000	0.000

RFI=Relative Forest Income

The relative importance of forest income varied significantly ($P < 0.00$) across wealth categories. In terms of magnitude, forest income differed significantly ($P < 0.05$) with wealth category of households. The HH in the rich category benefited more than the poor. This result is agreed with many case studies conducted in and outside Ethiopia. Ambrose (2003), Berhanu (2004) and Muzayen (2009) found that rich wealth group derived higher income than the poor wealth group which was similarly to result of this study.

Similar purpose of forest dependency has been reported from Bolivia, indicating better off households look for cash income, where as poor household depend on forest for subsistence income (Belcher, 2005 Uberhuage *et al.*, 2012). Middle and rich families mostly integrate to their livelihood for the forest products which have a market demand (Tynsong and Tiwari, 2012).

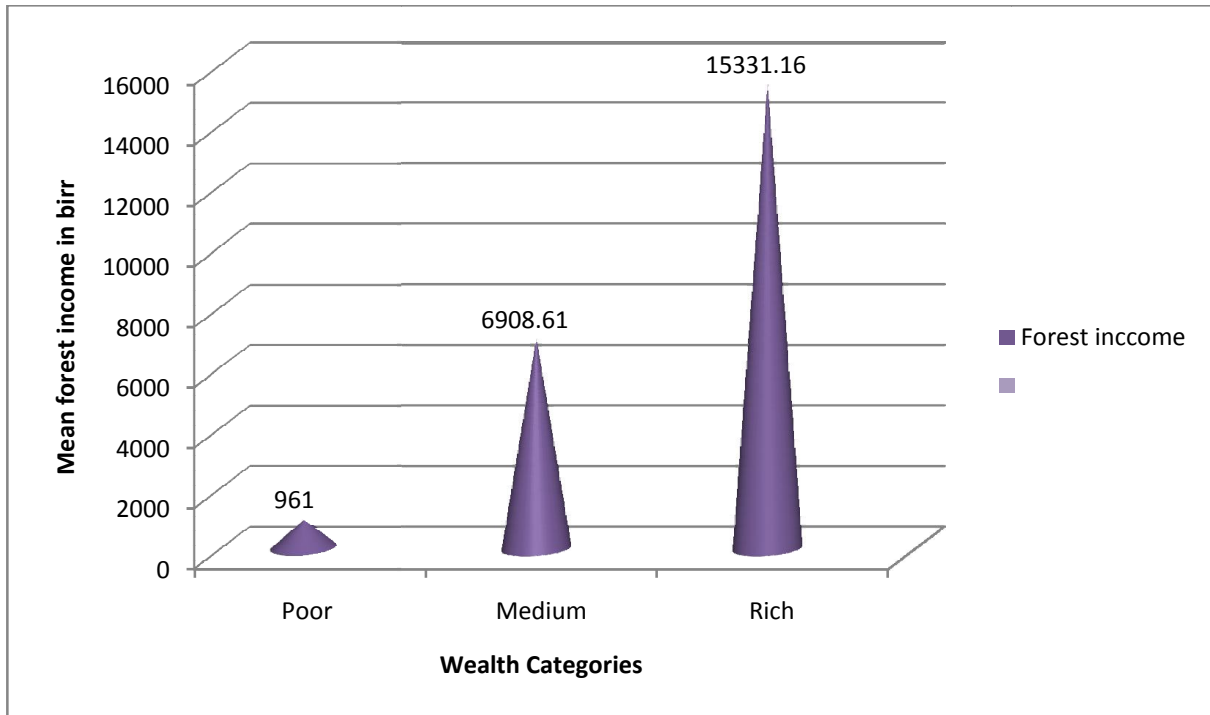


Figure 3. Proportion of Forest incomes to wealth categories

4.6. Mean annual household income by livelihood activities

The sources of income for households included crop production, livestock production, harvesting of NTFPs and engagement in off farm activities. However, the main sources of income (cash) for the households were agriculture (crop and livestock production), collection of NTFPs and off-farm activities. The following table shows the mean annual household income from different activities.

Table 8: Mean annual household income by livelihood activities.

Sources of HH income	Poor		Medium		Rich		P-value
	Mean income	SE	Mean income	SE	Mean income	SE	
Crop income	4151.39	675.121	6165.70	369.205	11738.25	1016.613	0.000
Livestock income	288.47	66.099	1908.80	61.582	2705.12	140.826	0.000
Forest income	961.00	60.514	6908.61	587.149	15331.61	1185.039	0.000
Off farm income	1275.29	186.555	1133.21	126.843	1445.11	223.717	.406

SE=Standard error of mean

As farming is a common activity of many rural communities, almost all sampled households were engaged in agricultural activities, such as production of teff, coffee, maize, barley, enset and wheat. But, productivity remains unsatisfactory due to small landholding and the lack of improved varieties. Thus, most households grew crops primarily for home consumption. As a result, the contribution of agriculture to cash income of the households not satisfies their demand of income.

Farmers in the study area exploited diverse sources of income, i.e. crop and livestock production, and forest products, mainly, NTFPs. Today, many rural households diversify their livelihoods and combine various strategies to obtain food, consumer goods and income, without focusing on a single activity (Ros-Tonenand Wiersum 2003). Similarly, Paumgarten (2007) noted that Livelihood diversification has been identified as a strategy for maximizing incomes from a variety of sources and opportunities as well as a coping mechanism through which households try to spread risk.

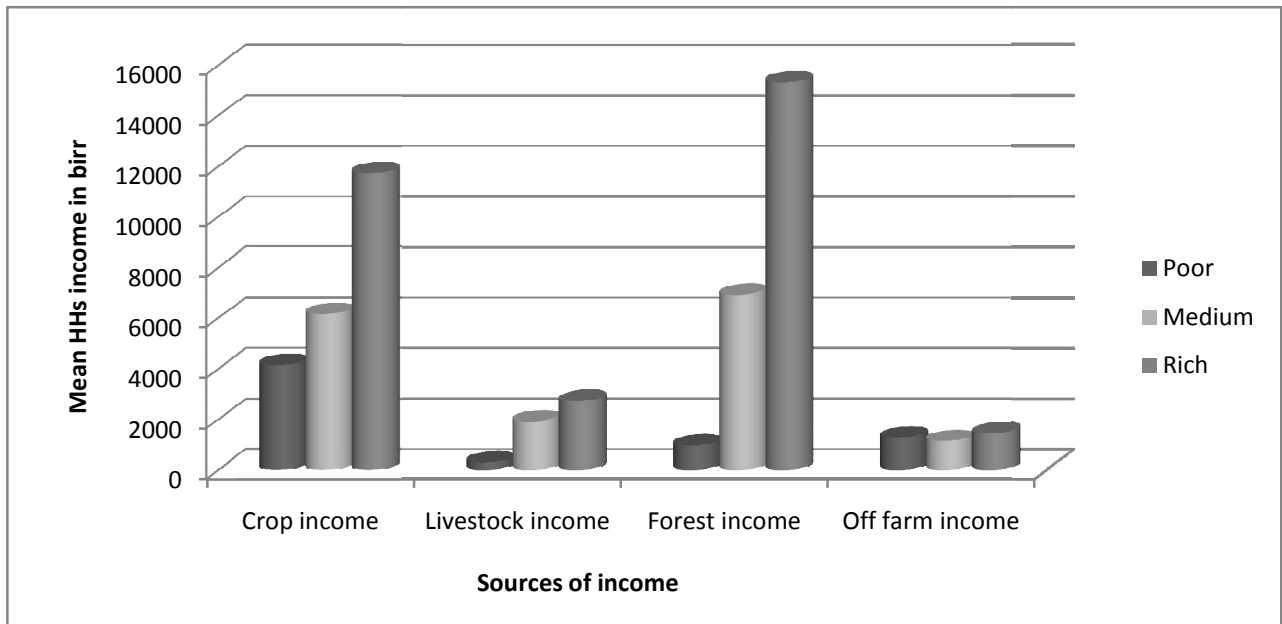


Figure 4: Proportion of household income among wealth categories

4.7. Diversification of households incomes with wealth categories

Household income diversity index result show that, mean degrees of diversification of poor were 0.28 SID, household are more specialized livelihood and predominantly engaged in off farm and with some NTFPs they earn a low income (Table 6). This indicates that such a specialization strategy provides household livelihood income generated because of the engagement in activities were found to be generally low. The degree of diversification among the household of wealth categories of medium and rich income sources 0.35 and 0.41 SID. Implies diversification values the household tends toward diversified. Belcher (2005) has classified household livelihood strategy as diversified and specialized strategy based on cash economy integration and contribution.

Table 9: Diversification of household income

wealth category	SDI
Poor	0.28
Medium	0.35
Rich	0.41
P-value	0.007

SDI= Simpson Diversity Index

4.8. Determinants of forest income dependence

Several reasons exist why households with different socioeconomic and demographic characteristics depend of NTFPs differently. These are related to consumption motives and responses to different challenges households encounter. In order to assess the likelihood of resource users to depend on the forest for NTFPs, logistic regression was performed where dependency on NTFPs was regressed by several independent variables.

The result of logistic regression models is presented (Table 8) forest income of a household is regressed against some household characteristics that may influence income levels. The results indicate that distance from forest is one such factor, which is negatively related to forest income. This implies that people living closer to the forests were heavily depending on forest because of that easy access. Therefore as the distance far from forest the dependence of people on forest become less. This is in line with the report of (Mamo *et al*, 2007) for this implies that,

as distance from the forest increases, the income generated by households from the forest decreases.

The other determinant factor that influence on forest dependence is family size. The results of this study reveal that family size has been positively related to forest income. This indicates that households who have larger family sizes engage more on forest products. This study supported by (Hegde and Enters 2000) showed that families with more labor tended to extract more forest resources. This was because they were either able to mobilize part of their families to undertake forest dependent activities. Furthermore, larger families had higher subsistence needs, and that may be another reason to depend more on forest resources. Forest income level was significantly and positively influenced by family size (Teshome, B *et al.*, 2015).

Table 10: Regression result of household total forest income on selected explanatory variables

	Beta	Std. Error	T value	P-value
(Constant)	-888.67	1706.94	-0.521	0.604
AGE	-38.165	25.364	-1.505	0.135
DF	-895.48	356.086	-2.515	0.013
LHS	-1792.2	300.145	-5.971	0
EDL	-985.28	216.556	-4.55	0
FZ	242.688	69.694	3.482	0.001

DF=Distance from forest, LHS=Land holding size, EDL=Educational level, FZ=Family size

Education level: The relationship between the education level of the resource user and dependency on forest cover was significant. The result indicated that, the education level was negatively related to forest income. There was significant association between the level of education and degree of dependency on forest in study area. As level of education increases the level of forest dependency is decrease. Some studies revealed that education level has a tendency to reduce forest dependency, because those educated provides a wider range of job options (Adhikari *et al*, 2004). Similarly supported by another study who reported that a higher level of education provides a wider range of job options. Therefore according to this study level of education and forest dependency has inverse relation. This shows that education level has a

tendency to reduce forest dependency, because educated need to find other options than forest product collection (Dolisca *et al.*, 2006).

Land holding size: Though the relationship between land ownership and dependence on the forest was significant the negative coefficient suggests that the more land an individual owns the less the probability of depending on the forest. The result indicates that respondents with more land holding size were less likely to depend on the forest than respondents that had less or no land at all. Land can be utilized for other production purposes like agriculture or sale or it could be rented which provides alternative sources of income for livelihood than NTFPs. Generally land holding size was negatively related to forest product obtain. That means respondents with large land holding size less dependence on forest product and respondents with less or no land more depended on forest for different activities of their life.

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Forest of southwest Ethiopia has a huge ecological and economic importance, but due to human induced factors, there is constantly high rate of forest degradation. There is need of sustainable use of forest resource through NTFP based forest management. Understanding forest resources use in terms of NTFPs helps in designing forest resource management through improving rural livelihood. Tropical forests provide NTFPs of significant livelihood value, leading to consideration of NTFPs harvest as a strategy for sustainable use and conservation of forests. Forest plays a major role to the well being of households.

The forest in the study area provided the basis for the lives of respondent households through provision of various goods and services. Assessment of NTFP result showed that nine types of NTFPs used by local communities. The large proportion sampled households depend on forest for consumption and income generation. The forest products and wealth category result showed that coffee is the major source of forest product to rich and medium category people. Whereas charcoal, fuel wood and bamboo are the most source of forest product to poor people. The implication is that forest product utilization pattern varies with the value of the products among wealth categories.

The forest product diversity index result shows that diversity of forest product obtained were different among wealth categories. Therefore, it indicates that poor are obtained more variety of forest products than the riches and medium. The relative importance of forest income varied significantly across wealth categories. In terms of magnitude, the households in the rich category benefited more than the poor. Forest income of a household is regressed against some household characteristics that may influence income levels. The results indicate that distance from forest, land holding size and educational level are such factors, which is negatively related to forest income, while family size has been positively related to forest income. Generally forests provide NTFPs of significant livelihood value, leading to consideration of NTFPs harvest as a strategy for sustainable use and conservation of forests.

5.2 Recommendation

- ❖ Income derived from the collection of NTFPs contributes significantly to the annual income of sampled households in the study area. Therefore, policies and strategies that intend to improve the well-being of rural people and natural resource conservation should give attention to the contribution of NTFPs to the livelihoods of local people.
- ❖ Because of the important role that NTFPs in local forest use, it is important to continue research on the possibilities for NTFPs to contribute to sustainable forest management.
- ❖ To use the resource sustainably and manage the forest properly in the study area, the study recommends that, it is better if the approach of forest management change in to participatory forest management.
- ❖ This study focused mainly on socioeconomic benefits of forest and the level of forest dependency. Further studies on species diversity and composition recommended in the study area.

6. REFERENCES

- Adepoju, K. 2007. Economic Valuation of Non-Timber Forest Products, Nigeria.
- Adhikari, B. 2005. 'Poverty, Property Rights, and Collective Action: Understanding the Distributive Aspects of Common Property Resource Management', *Environment and Development Economics* **10 (1)**, 7–31.
- Adilo, M. 2007. The contribution of non-timber forest products to rural livelihood in Southwest Ethiopia. MSc Thesis. Wageningen: Wageningen University
- Ahenkan, A., Boon E (2010). Commercialization of non-timber forest products in Ghana: Processing, packaging and marketing. *Food Agric and Env*, **8**: 962-969.
- Ambrose, B.2003.The contribution of NTFPs to the Livelihood of the forest poor; Evidence from Tropical Forest Zone of Southwest Cameroon *International Forestry Review*, 5; 106-117.
- Andel, T. 2006. Non-timber forest products: The value of wild plants, Netherlands: Wageningen, <http://www.agromi/agrodoks/Agromisa>[accessed Feb, 27, 2010].
- Anderson, A.B. (ed.) 1990. Alternatives to deforestation: steps towards sustainable use of the Amazon rain forest. Columbia University Press, New York, USA.
- Aramde, F. 2006. Diversity and Socio-Economic Importance of Non timber Forest Products of Menagesha Suba Forest Area, Central Ethiopia. MSc. Thesis, University of Hawassa, Wondo Genet, Ethiopia.
- Arnold, J.E.M. and Ruizperez, M. 2001. Can non-timber forest products match tropical forest conservation and development objectives? *Ecological Economics* 39: 437-447.
- Arnold, J.E.M., and P. Bird. (1999), 'Forest and the poverty-Environment Nexus', Paper presented at the UNDP-EC Expert workshop on poverty and the environment, Brussels, Belgium.
- Barlett, J.E., Kotrlik, J.W. and Higgins, C.C. 2001. Organizational research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, **19(1)**:43
- Belcher, B.M.2005.Forest product markets, Forest and poverty reduction .*International Forestry Review*
- Berhanu, D. 2004. Contribution of NTFPs to Rural House Hold Economy. MSc. Thesis, Wondo Genet College of forestry and Natural Resources.
- Boot R.G.A. 1997. Extraction of non-timber forest products from tropical rain forest. Does diversity come at a price? *Netherlands Journal of Agricultural Science* 45: 439-50.

Byron, N. and Arnold, M.1999. What futures for peoples of tropical forests? *World Development*, 27(5):789 - 805.

Cavendish, W. 2000. Empirical regularities in the poverty-environment relationship in rural households: Evidence from Zimbabwe. *World Development* 28 (11): 1979-2003.

Chilalo, M., Gole, T. and Abebe, Y. 2006. Counting on forests: the role of non-timber forest products in rural household and national economy of Ethiopia. In: Commercialization of Ethiopian agriculture. Proceedings of the 8th Annual Conference of Agricultural Economics Society of Ethiopia (2005: Addis Ababa). Addis Ababa. Ethiopia. Pp 179-196.

Chilalo, M., and Wiersum, K.F., 2011. The role of Non-timber Forest products for livelihood diversification in Southwest Ethiopia. *Ethiopia e-Journal for research and innovation Foresight*, 3;44-59.

Coulibaly-Lingani, P., Tigabu, M., Savadogo, P., Oden, P-Ch. and Ouadba J-M. 2009. Determinants of access to forest products in southern Burkina Faso. *Forest Policy and Economics*, 11: 516–524.

Cunningham, A.B. 2000. People, Wild Plant Use and Conservation. *Applied Ethno-botany*. London: Earthscan.

Das, N. 2010. Incidence of forest income on reduction of inequality: Evidence from forest dependent households in milieu of joint forest management. *Ecological Economics*, 69:1617–1625.

Desalegne, D. 1997. Economic Value of Medicinal Plants in Ethiopia, A Case study. Paper Prepared for the National Workshop on Biodiversity Conservation and Sustainable use of medicinal plants in Ethiopia. April 26-May 1, 1998, Addis Ababa.

Dewi, S., Belcher, B. and Puntodewo, A. 2005. Village Economic Opportunity, Forest Dependence, and Rural Livelihoods in East Kalimantan, Indonesia. *World Development*, 33(9):1419–1434.

EARO and IPGRI. 2004. Conservation of Genetic Resource of NTFPs in Ethiopia. in: proceeding of the first national work shop on NTFPs in Ethiopia, 5-6 April 2004, AA, Ethiopia, Wubalem Tadesse and Mbogga, M.(eds).

Ellis, F. 2000. The Determinants of Rural Livelihood Diversification in Developing Countries *Journal of Development and Agricultural Economics*, 51(2):289-302.

Ermias, M., Zeleke, E. Demel, T. 2012 Non-timber forest products and household incomes in Bonga forest area, southwestern Ethiopia *Ethiopia. International Forestry review* 12(1): 66-77.

FAO. 1995. Non Wood Forest Products for Rural Income and Sustainable Forestry. The Food and Agriculture Organization of the United Nations, Rome, Italy.

FAO. 2002 . Non-wood forest products .Food and Agriculture Organization of the United Nations. Rome, 2002

FAO. 2007. Negotiation and Mediation Technologies for Natural Resource Management: Prepared in the frame work of the Livelihood Support Program (LSP), An International program for improving support for enhancing livelihood of the rural poor. Food and Agriculture Organization of the United Nations, Rome, 2007

FAO. 2010. Global forest resources assessment 2010.Food and Agriculture Organization of the United Nations, Rome, 2010

Fisher, M. 2004. Household welfare and forest dependence in Southern Malawi. *Environment and Development Economics* 9: 135-154

Gardei, S. 2006. Local valuation of forests in South West Ethiopia. Non timber Forest Products Research and Development Project in SW Ethiopia, Wageningen, Series No. 6. Netherlands.

Griffin, N.J., Banks, D.I., Mavrandonis, J., Shackleton, C.M. and Shackleton, S.E. (1992) Household Energy and Wood Use in a Peripheral Rural Area of the Eastern Transvaal Lowveld. Department of Minerals and Energy Affairs,Pretoria.

Hayilu, B.2013. Forest dependency among forest user communities in and around Belete-Gera Forest Southwest, Ethiopia

Hegde, R. and Enters, T. 2000 Forest Products and Household Economy: A Case Study from Mudumalai Wildlife Sanctuary, Southern India. *Environmental Conservation*, **27**, 250-259.

Illukpitiya, P. and Yanagida, J.F. 2010. Farming vs. forests: trade-off between agriculture and the extraction of non-timber forest products. *Ecological Economics*, **69**:1952–1963. .

Jeannette, V.R. 2000. Non Timber Forest Products. Their role in sustainable forest diversity support group, Wageningen, the Netherlands.

Joost F. Duivenvoorden², Hendrik Balslev³, Jaime Cavalier³, Cesar Grández³, Hanna

Kaimowitz, D.2003.Forest Law Enforcement and Rural Livelihood. CIFOR, Bogor Indonesia.

Mamo, G., Sjaastad, E. and Vedeld, P. (2007) Economic Dependence of Forest Resources: A Case from Dendi District, Ethiopia. *Forest Policy and Economics*, **9**, 916-927

Marshall, B., Webb, B. and Tilley, N. (2005) Rationalisation of Current Research on Guns, Gangs and Other Weapons: Phase 1, London: Jill Dando Institute of Crime Science, University College London

Michon, G., and H. de Foresta. 1997. Agroforests: pre-domestication of forest trees or true domestication of forest ecosystems? *Netherlands Journal of Agricultural Science* **45**:451-462.

- Muzayen, S. 2009. The Role of Non Timber Forest Products to Rural Livelihoods and Forest Conservation: A Case Study at Harana Bulluk District Oromia National Regional State, Ethiopia.
- Myers, N. 1988. Tropical forests: Much more than stocks of wood. *Journal of Tropical Ecology* 4: 209-221.
- Nadkarni and Y. Kuehl (2013): Forests Beyond Trees: NTFPs as Tools for Climate Change Mitigation and Adaptation.
- Narain, U., Gupta, S. and Veld, K. van't 2008. Poverty and resource dependence in rural India. *Ecological Economics* 66, 161-176.
- Nepstad, D. and Schwartzman, S. 1992. Non-timber forest products from tropical forests. Evaluation a conservation and development strategy. *Advances in Economic Botany* 9. The New York Botanical Garden, New York.
- Nguyen, T.Q. 2006. Forest Devolution in Dak Lak, Vietnam: Improving forest management or livelihoods of the Poor? in: Mahanty, S. (ed), *Hanging in the Balance: Equity in Community Based Natural Resource Management, Asia*. people, a potential for sustainable development of the Southeast Ethiopian highlands. In: *Proceedings*
- Ogundele, F.O., Utin, E.A., Iwara, A.L., Njara, G.N., and Deekor, T.N., 2012. An assessment of non timber forest products (NTFPs) utilization on rural livelihood in Ini local government area of Akwa ibom State, Nigeria. *Journal of Biodiversity and Environmental Sciences*, 2:1-3.
- Rajesh, R. 2006. Analytical Review of the Definitions of Non Timber Forest Product. <http://www.forestrynepal.org/article/rrajchal/456> (Retrieved May 25, 2010)
- Rehfuess, E. 2006. Fuel for Life: Household energy and health. Publication of the World Health Organization, France: *Review*, 12, 284-294.
- Ros Tonen, M. A. F. 1999. NTFP Research in the Tropenbos programme. In seminar proceedings: NTFP research in the Tropenbos programme: results and perspectives.
- Saha, B. and Bahal, R. 2010. Livelihood Diversification Pursued by Farmers in West Bengal. *Indian Research Journal of Extension Education*, **10(2)**:1-9.
- Senbeta, F. 2006. Biodiversity and ecology of Afromontane rainforests with wild *Coffea arabica* L. populations in Ethiopia. Dissertation, University of Bonn
- Seyoum A. 2007. Economic value of Afromontane Forests of Sheka: Forest of Sheka. In: Fetene M (ed), Addis Ababa, Ethiopia: MEHBER, pp. 183–218.
- Shackleton, C.M. 2004. Assessment of the Livelihoods Importance of Forestry, Forests and Forest Products in South Africa. Rhodes University, South Africa.
- Shackleton, C.M. and Shackleton, S.E. (2006) Household Wealth Status and Natural Resource Use in the Kat River

Shylajan, C.S. and Mythili, G. 2007. Community Dependence on Non timber Forest Products: A household analysis and its implication for forest conservation, Mumbai: India Gandhi Institute of Development Research

Sunderland, T. C. H., Harrison, S. T. and Ndoye, O. (2004) 'Commercialization of Non -timber Forest Products in Africa: History, Context and Prospects', in T. C. H. Sunderland and O. Ndoye (eds), Forest Products, Livelihoods and Conservation: Case-studies of Non-Timber Forest Product Systems. Vol. 2: Africa. Bogor: CIFOR.

Sunderlin, W.D., Angelsen, A., Belcher, B., Burgers, P., Nasi, R., Santoso, L. and Wunder, S. 2005. Livelihoods, Forests, and Conservation in Developing Countries: An Overview. World Development 33: 1383-1402

Taye B, Wirtu O. 2004. Marketing study of NTFPs in South Western Ethiopia.

Teshome, B. , Kassa, H. , Mohammed, Z. and Padoch, C. (2015) Contribution of Dry Forest Products to Household Income and Determinants of Forest Income Levels in the Northwestern and Southern Lowlands of Ethiopia. *Natural Resources*.

Timko, J. A., Waeber, P. O., & Kozak, R. A. (2010). The socio economic contribution of Non Timber forest products to rural livelihoods in Subsaharan Africa. Knowledge gaps and new directions. *International Forestry*

Tugume, P., Butinza, M., Namaalwa, J., Esezah, k.2015. Socio-economic predictors of dependence on Non-timber forest products: lessons from Mabira Central Forest Reserve Communities

Tynsong, H. and Tiwar, B.K., 2012. Contribution of NTFPs to cash income of the War Khasi community of south Menghalaya ,North East India. *Forestry study in chaina*,14:1-8.

Uberhuaga ,P.,Smith-Hall,C., and Helles,F.,2012. Forest income and Dependency in Lowland Bolivia.*Environmental and Sustainability*, 14:3-23

Vedeld, P., Angelsen, A., Bojö, J., Sjaastad, E. and Berg G.K. 2007. Forest environmental incomes and the rural poor. *Forest Policy and Economics*, (9): 869–879.

Wirtu, D. 2002. Forests and forestry role in food security: the forgotten food security efforts.

In: Forest and Environment. Proceedings of the fourth annual conference of the forestry society of Ethiopia. 14-15 January 2002.

World Bank.2004.Marketing Service Working for poor People.

World Health Organization –WHO. 2000. Food Security and Nutrition Survey. USA.

Yemiru, T., Roos, A., Campbell, B.M. and Bohlin, F. 2010. Forest incomes and poverty alleviation under participatory forest management in the Bale Highlands, Southern

Zemedu, A. and Mesfin, T. 2001. Prospects for Sustainable Use and Development of Wild Food plants in Ethiopia. *Economic Botany*, 55(1): 47- 62.

7. APPENDIX

Appendix 1.

Part I Demographic Information :

1. General Household Characteristics Information: Mark (√) where required.

1.1 Name of the household head (serial number): _____,

1.2 Zone: _____,

1.3 District: _____,

1.4 Kebele: _____,

1.5 Wealth status(√): (1). Poor _____, (2). Medium _____, (3). Better-off _____,

1.6 Age: (years): _____,

1.7 Sex (√): (1). Male: _____, (2). Female: _____

1.8 Marital status(√): (1). Single: _____, (2) Married: _____, (3). Divorced: _____, (4). Separated: _____,

1.9 Education level (completed) (√): (1) Illiterate: _____, (2). 1- 4th Grade: _____, (3). 5- 8th grade: _____, (4). 9- 10th grade: _____, (5). Above 10th grade: _____,

1.10 Length of residence in the area (year): (years) _____,

1.11 Occupation(√): (1). Farmer: _____, (2). Daily laborer _____, (3). Pity trader: _____, (4). Government employee: _____, (5). Others specify: _____,

1.12 Distance from forest resource (√): (1). Less than 5kms. _____, (2). 5-10kms _____, (3). 11-

1.13 15kms. _____, (4). 16-20kms _____, (5). Greater than 20kms. _____,

1.14 Family size: _____

Part II Household Income :

2. Agricultural production:

2.1 What is the size of the total land that your household presently own? _____

hectares or fachasa _____

Types of crop	Area (ha)	Productivity per ha	Total productivity	Farm gate price (kg)	Total income (birr)
Maize					
Sorghum					
Wheat					

Barley					
Millet					
Beans					
Coffee					
Chat					
Enset					
Teff					
Potato					
Sweat potato					

3. Livestock production:

Do you own the following livestock and did you sell any last year?

Type of livestock	Numbers owned (Heads)	Number sold last year	Price/animal (Birr)	Total income (Birr)
Cattle				
Goats				
Sheep				
Mule				
Horse				
Donkeys				
Chicken				

4. Forest use and Forest product marketing

What are the NTFPs that you collect from Babiya Folla forest?

Major NTFP products	Purpose (sale/ consumption)	Use Pattern (seasonal/continues)
Forest coffee		
Honey		
Fuel wood		
Charcoal		
Bamboo		
liana		
Medicinal plant		
Material		
Animal feed		

4.1 Have you sold any forest product from Babiya Folla forest last year?

(1). Yes (2). No

4.2 If “Yes” how much incomes do you get from sales of the following forest products in Babiya Folla forest?

Activities	Amount of product collected (kg)(m ³)(load) (bag)	Amount of product sold (kg)(m ³)(load) (bag)	Price/kg(m ³) (Birr)	Total income (Birr)	Remarks
Charcoal					
Fuel wood					
Spices					
Honey					

Forest coffee					

4.3 How much of the following forest products did you use for your own household consumption?

Product type	Amount of consumed product (kg)(m³)(load)(bag)	Price/kg(m³) (Birr)	Total consumed (Birr)	Remarks
Charcoal				
Fuel wood				
Spices				
Honey				
Forest coffee				

5. Off farm income

5.1 Did your household get any cash income from the following sources? If yes, how much is last year?

Income source	Income/month	Months/year	Total
Land rent			
Own business			
Wage employment			
Animal rent			
Animal products			
Hand craft			