"Economic Contribution to Local Livelihoods and Household Dependence On Non-Timber Forest Products: The Case of Yeki Woreda Forests, Southwest Ethiopia"

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Abstract- Yeki Woreda forest is one of the ecosystem resources in southwest Ethiopia which provides several economic, ecological and social benefits. The contribution to local livelihood of NTFPs from the forest is particularly important. The main purpose of this study was to evaluate the contribution of NTFPs from the forests to local livelihoods. Specifically, the study aimed at identifying the major NTFPs, assessing the subsistence and cash contribution of NTFPs to local households and identifying the determinants of household dependence on NTFPs around the forest. The study was conducted in three purposively selected potential NTFP Kebeles and a total of 170 households were randomly selected from the Kebeles using the proportions-to-size technique of sample allocation. Besides household survey, group discussions were conducted to collect the necessary data. The results indicated that NTFPs are more than a safety-net and households living around forests in the study area are considerably dependent on NTFPs. Some of the NTFPs include forest honey, climbers, forest coffee, spices (Korerima and Timiz), wild food (ero and acho), fuel wood (fire wood and charcoal) and other products (bamboo, ensosila, forest fodder, medicinal products such as damakese etc). These products provide important sources of income (13.1%) for households living around forests who also practice agricultural production. Honey is the most important NTFP in the study area followed by forest coffee and fuel wood. Honey, coffee, wild spices and 'ensosila' are mainly used for cash purposes where as climbers, bamboo, wild food, fuel wood, forest fodder and medicinal NTFPs are mainly (sometimes even entirely) used for subsistence. However, household dependence on NTFPs varied with differences in socioeconomic factors. Logistic regression predicted that distance to forest (-), land holding (+), availability of non-farm income (+), household years of residence in the area (+), educational level (-) and marital status of household head (+) significantly determine household participation in NTFP collection. Similarly, OLS regression predicted that share of NTFPs in household income varies significantly with family size (-), labour endowment (+), distance to town (+) and number of livestock (+). The study results indicated differences among local groups in participation and degrees of dependence on NTFPs that echo importance in designing and implementing NTFP based development programs

Index Terms- NTFPs, forest incomes, livelihoods, safety-net, dependence on NTFPs

I. Introduction

Forest ecosystems have long been acknowledged for the multiple benefits they provide at global as well as local levels (Arnold & Perez, 1998). They play important roles worldwide as providers of environmental services to nature in general – and humans in particular – and as sources of economically valuable products (ibid). These mainly include provision of timber and Non-Timber Forest Products (NTFPs), amenity and recreation, watershed protection, climate buffering, biodiversity conservation, etc (Nasi et al, 2002; Mitchel et al, 2007; Pearce & Pearce 2001).

Among these, there has been a growing consciousness about NTFPs in recent decades. Increasing the harvest and trade of NTFPs has been promoted by researchers, conservation and development organizations, and by governments as a means to achieve rural livelihood improvement in an environmentally sound way (Belchere et al, 2005; Arnold & Perez, 1998). This was based on a set of premises. Firstly, NTFPs contribute in important ways to the livelihoods and welfare of millions of peoples living in and adjacent to forests in developing countries; providing them with food, medicines, other material inputs, and a source of employment and income, particularly in hard times (Arnold & Perez, 1998). Thus, based on this, it has been argued that increasing the harvest and trade of NTFPs could support a nation's poverty reduction objective via providing better income and employment opportunities to the local rural people, acting as an engine for rural growth and contributing to improved national incomes (Belcher & Kuster, no date; Belcher & Schreckenberg, 2007; Arnold & Perez, 1998).

Secondly, exploitation of NTFPs is considered to be ecologically less destructive than timber harvesting/ or other uses of forestlands and therefore provides a more sound basis for sustainable forest management (Belchere & Kuster, no date; Arnold & Perez, 1998). The notion is that, with the harvest of NTFPs, the forest will remain standing and more or less biologically intact (Neumann and Hirsch, 2000). Thirdly, local people are considered to have control over forests and responsible for deforestation, and the harvest of NTFPs is assumed to be more valuable in the long term than timber production (Belchere & Kuster, no date). Thus, increased earnings from NTFPs provide incentives for the local people to conserve forests. Increased commercial harvest of NTFPs could add to the perceived value of

the forests, both at the local and national levels, thereby increasing the incentive to retain the forest resource, rather than conversion of the land for agricultural use (Arnold & Perez, 1998).

In short, it has been postulated that increasing the harvest and trade of NTFPs can provide incentives for conservation and address the problem of deforestation while increasing the welfare of forest inhabitants (Shone & Caviglia-Harris, 2005). Nevertheless, the expected ecological benefit of increasing the harvest and trade of NTFPs has been challenged in the literatures. According to many literatures, the expectation is too optimistic as it is based on questionable assumptions that the ecological prospects may not be realized. Rather, increasing the harvest and trade of NTFPs can be destructive and may even lead to species extinction under certain circumstances such as when harvesting requires killing the individual NTFP species, the regeneration rate of the NTFP species is too small and/or resource tenure system is poor (Belchere & Kuster, no date; Neumann and Hirsch 2000).

On the other hand, the expected poverty alleviation benefit of increasing the harvest and trade of NTFPs is supported by many literatures. There are two types of poverty alleviation; namely poverty avoidance, preventing people from falling deeper in to poverty, and poverty elimination, lifting people out of poverty for good (Sunderlin, 2003 as cited in Belchere & Kuster, no date). There is little doubt that NTFPs are of more crucial importance in poverty avoidance than in poverty elimination as the latter requires high and permanent increase in income and welfare (ibid). Even where the absolute value of NTFP-derived income is not high and permanent, increasing the harvest and trade of NTFPs can address poverty reduction through providing income at critical times and spreading risks (Belchere & Kuster, no date; Shackleton, 2006 cited in Belcher & Schreckenberg, 2007). Precisely, this expectation seems firm as it is based on documented importance of many NTFPs in rural livelihoods as well as the macro economies of many, particularly tropical, countries (Belcher & Schreckenberg, 2007).

In Ethiopia, studies indicate that forest resources, including NTFPs, provide valuable economic contributions both at household level and to the macro economy. Attempts to estimate the contribution of the forestry sector to the annual GDP of the country showed low values. For instance, Sisay et al. (2008) reported an estimate of 5.7% average contribution of the Ethiopian forestry sector to the GDP over the years 1995-2005. According to Tadesse (2008), the forestry sector contributed about 4.7% to the GDP of Ethiopia in 2006/7.

But, these figures explicitly tend to underestimate the true role of forests in the national economy. For Tadesse (2008), the contribution of the forestry sector in Ethiopia could exceed 6 billion USD per year (ETB 59.6 billion) even without including all of the forest benefits which is greater than half of the entire current GDP. The low values are attributed mainly to the fact that the non-marketed goods and services provided by forest ecosystems, such as NTFPs, are not often included (partly due to measurement difficulties) in the national accounts in many countries including Ethiopia, although they are critical to the society at large.

In Ethiopia, some studies indicated that considerable number of rural households depends on forest products including NTFPs. Many Ethiopians use the earnings from NTFPs to finance the purchase of consumable goods and other basic expenses (Mohammed et al., 2006). Recent studies in Ethiopia indicated that the share of NTFPs in the gross annual household income ranges from 73% in South West Ethiopia (Birhanu and Olani, 2004; cited in Ermias, 2011) to 27.4 % in Central Ethiopia (Aramde, 2006; cited in Ermias, 2011).

However, as indicated in the literatures, these benefits from exploitation of NTFPs are not often correctly captured in the national income accounting when contribution of the forestry sector is calculated and reported. This is because NTFPs are often consumed at home and transacted in the underground economy making them unobservable in the national income accounting. So, adequate empirical information to fill this information gap is essential. Thus, estimating the economic contribution of NTFPs in household livelihoods will be helpful to understand the true value of forest resources which is a crucial requirement for sustainable forest management and related land use decisions.

1.1. Problem Statement and objectives

A pressing issue currently addressed in the environmental and ecological economics literature is the reduction of the world's tropical forests. Some regions, once containing extensive forests are now experiencing dramatic declines of forest cover due to the conversion of forestlands to agricultural uses (Barbier and Burgess, 2001; Geist and Lambin, 2001; Kaimowitz and Angelsen, 1998, cited in Shone & Caviglia-Harris, 2005). In Ethiopia, being one of the tropical countries, the same tragic decline has been happening to the forests in the different regions of the country (USAID, 2008; Sisay, 2008). The main reasons of deforestation in the country include expansion of farmland with growing population pressure, increasing demand for construction and fuel wood, and poor forest resource management (Sisay, 2008).

One of the highly pressured forests in Ethiopia is the forests of southwest highlands (NTFP- PFM SWEP, 2009; Fikadu, 2008; Sutcliffe, 2009). The forests provide important source of NTFPs to the local community including forest coffee, honey, medicinal plants, edible wild plants, spices, fuel wood and bamboo (NTFP-PFM SWEP, 2009). These economic benefits of the rapidly degrading forests coupled with the high incidence of poverty among the surrounding community heightened the need for timely conservation activities as well as reduction of poverty (Abebe et al, 2007).

A widely recommended alternative in this regard is the use of sustainable practices in the management of forests one of which is the harvest of NTFPs (Mbuvi & Boon, 2008). In theory, these practices can provide win–win solutions because they address the problem of tropical deforestation while increasing the welfare of people living in and around forest (Shone & Caviglia-Harris, 2005). Such kinds of interventions to combine forest conservation and livelihood improvement in Ethiopia are being undertaken, particularly in south west Ethiopia (Abebe et al, 2007; Fikadu, 2008). These interventions involve NTFP-production-related-Projects that are meant to provide support to NTFP harvesters and participatory forest management arrangements (Abebe et al, 2007).

However, such kinds of interventions for sustainable forest management are not adequately made and sustainable practices are not adequately adopted. Forests of the region are still experiencing heavy deforestation. One of the fundamental causes of

deforestation is that forests are often undervalued. The total economic value of not only the timber products they produce, but also the NTFPs, the environmental services and the existence values they provide are not fully considered when policy and investment decisions are made to destroy forests (Sutcliffe, 2009). An appropriate solution to this problem requires sufficient knowledge on the value of forest goods & services (including NTFPs) among the different forest stakeholders and official decision makers. This is because forest stakeholders and decision makers need to figure out whether the benefits from forests in a sustainable system are large enough to outweigh benefits in the alternative use of forestland to adopt or enforce sustainable practices (ibid). Hence, according to Fikadu (2008)**,** there is an urgent need to undertake detailed land evaluation of the high forest areas to determine where controlled expansion of agriculture should take place, sustainable logging can be allowed, and where pristine forest should be preserved for biodiversity conservation.
Unfortunately, lack of adequate information on forest benefits often constrains the possibility of making informed decision and even distorts the true value forest resources. This is because complete data on forest benefits is often difficult to obtain as they include some non-marketed forest goods & services that are difficult to measure without detailed empirical assessment (Tadesse, 2008). Thus, estimating the benefits from forests at the household level is very helpful to expose the true value of forests and make an informed decision regarding the allocation of forestlands. This study was meant to reflect on the potential of NTFPs management in sustainable forest systems as a strategy for simultaneous solution towards alleviating poverty and reducing deforestation around the forests of South West Ethiopia. For the seek of the same, the main objective of this study was to investigate the contribution of NTFPs to household livelihoods and household dependence on them in the case of Yeki Woreda forest in the south west of Ethiopia. The specific objectives included: i) identifying the major NTFPs produced by households ii) estimating NTFPs contribution to household income (subsistence and cash) iii) assessing the utilization in the household and relative importance in rural lives of NTFPs, and iv) identifying the factors that explain household dependence on incomes from NTFPs in the case of households living around the Yeki woreda forest, south west Ethiopia.

II. Literature Review

1.2. Defining NTFPs

The study of non-timber products is represented by initiatives arising from varied fields of study and desires. This has led to no conventional agreement on a universally acceptable terminology to describe the products of interest. The term ‘minor forest products has been used by the FAO/IUFRO so far though it has many shortcomings and more or less passed out of general use in the early 1990s (Wong, 2000). Instead, a plethora of alternative terms has grown up with single terms sometimes having a range of interpretations yet none of them are universally recognized. These terminologies include: non-timber forest products, alternative forest products, minor/miscellaneous forest products, non-timber plant products, non-timber resources and values, non-wood forest benefits/products/resources, non-wood goods and benefits/services, special forest products, etc(ibid).

As the terminologies for NTFP are varied and subject to conventional controversies, so are the definitions. For instance, FAO revised definition of NTFP in 1995 and Chandresekharan (1992) characterize NTFPs as products of biological origin other than wood derived from forests, other wooded land and trees outside forests in which hedgerows can be considered other wooded land. Similarly, De Beer and Mcdermott (1989) defined NTFPs as those products encompassing all biological materials other than timber, but only those which are extracted from forests for human use. Another slightly different definition by M. P. Shiva (1998) states that all usufructs/utility products of plant, animal and mineral origins, including tourism & recreation services, except timber obtainable from forests or afforested land areas are termed as NTFP (PCS, 2008).The very wide ranging definition delineates NTFPs as any non-timber benefit arising from woodland which embraces all forms of microclimatic, hydrological, sporting, recreational and educational benefits as well as Christmas trees (SFC, 2005).

Another view is that NTFPs are annually renewed non-timber products that require no management. This definition covers the fungi, berry, nut and pharmaceutical products but runs into difficulties over foliage/bark harvests, Christmas trees, wood fuel, and some other NTFPs, such as mosses, lichens and floral greens. It is also difficult to fit game into this definition as it is managed to some extent in many situations. Although NTFPs may be naturally occurring within a particular silvicultural regime, appropriate management may be beneficial to the natural resource. Similarly, although education and tourism/recreation benefits can be provided without management, the quality and extent of the benefits is often greatly enhanced by management. These benefits are an important part of the economic activity of the sector, and are key to ensuring its sustainability (ibid). Contrary to this, in another FAO Forestry Report, NTFPs have been defined by FAO as all goods for commercial, industrial or subsistence use derived from forests and their biomass, which can be sustainably extracted from a forest ecosystem in quantities and ways that do not downgrade the plant community basic reproductive functions (PCS, 2008).

Generally, though there is general consensus that NTFPs should be useful to human society and not include timber (Wong, 2000); the definitions forwarded by different parties involve considerable differences in interpretations (often conflicting) regarding the range of products to be included in the definition of NTFPs. According to Neumann & Hirsch (2000), the definition of NTFP has proven to be inexact and difficult at times because it is “defined not by what it is, but by what it is not”. Similarly, for Mallet (1999) this is because the limits of what constitutes a forest environment are not sufficiently clear. Forest products are traditionally defined as those that come from natural forests and the vast majority of plants and animals that are generally recognized as NTFPs are wild products of natural forests or species that have only recently been brought into cultivation and are still essentially genetically wild (Wong, 2000).

If NTFPs are to remain distinct from agricultural products, there needs to be a line drawn between wild and cultivated products as all cultivated plants and domesticated animals were once wild. Some definitions of ‘forest’ also include other tree-dominated biodiverse systems such as plantations and agroforestry. However, permitting all products derived from

diverse production systems would include highly modified cultivated crops which in no sense could be thought of as wild (and hence a NTFP). At the same time, there is also opposition to the inclusion of products from plantations, in particular, because they are artificial and have limited biodiversity. But such a definition would preclude plants that had been planted whether these were transplanted wildlings in a forest garden or enrichment planting of secondary forest. Besides the unclearness of definition of a forest environment, some difference in the definition of NTFPs comes from particular interests of the different disciplines. That is, for instance, some disciplines are interested in social and biological sustainability of forest environment, and thus are concerned that NTFPs should be coming from socially as well as biologically sustainable production systems (ibid).

Thus it can be concluded that there is no single universally recognized and applicable definition of NTFP to be used for academic, research or policy purposes, and hence the choice of appropriate definition depends on the objectives of the particular purpose/activity. In this study, NTFPs are defined as those products of plant and animal origin harvested from managed and unmanaged forest ecosystems, used by the rural people either for home consumption or sold in the market other than processed timber and not including services derived from the forests.

1.3. The Roles of NTFPs in Rural Livelihoods

Forests and trees contribute in complex ways to the livelihoods of rural families. Rural households in the vicinity of forests often combine their agricultural production with collection of forest produce and make use of a multitude of such products (Ogle, 1996). Findings suggest that the rural poor are heavily, at times almost completely, dependent on forest income (such as NTFPs) for their livelihoods. One reason for this is the low capital requirements associated with them (especially NTFPs) though some studies identified situations in which only those with sufficient capital can reap the forest benefits (Neumann and Hirsch, 2000).

The contribution of forest income to rural households must be seen in light of the role it plays in rural livelihoods. Following Cavendish (2003), we might distinguish between three different functions of NTFPs in rural livelihoods (Vedeld et al, 2004). The first function of NTFPs is as a Safety net against unexpected income shortfalls or cash needs. This role of NTFPs is in assisting households to cope in times of adversity manifested as unpredictable and irregular events that cause a temporary need for extra income (either shortfall of other incomes or extraordinary cash needs). Examples of such emergency events include family illness or death, natural disasters, economic crisis, and civil war. In these situations the changed or increased use of NTFPs is typically a coping strategy, with the products providing a 'safety' or 'emergency' net. During such times it is common for rural households to turn to NTFPs to tide them over what they perceive is a temporary setback. In this distinction, however, we do not use this term for the normal seasonal gap-filling functions that forests products often play, in particular before the main agricultural harvest. Another common usage of forests, which we also do not classify as safety net, is as a more regular income source for the poor who otherwise have few alternatives. It saves them from being even poorer (Vedeld et al, 2004; Shackleton & Shackleton, 2004).

The second function of NTFPs in rural livelihoods is its regular uses in support of current consumption. NTFPs are important to maintain the current level of consumption and prevent the household from falling into (deeper) poverty, but with no or limited scope of lifting people out of poverty. This role would largely correspond with the term "coping strategy" as a livelihood security by livelihood benefits of the ordinary daily use of NTFPs. These livelihood security aspects are manifest primarily as a direct benefit to rural households, as most have limited access to cash incomes. Being able to collect and use NTFPs to meet daily needs for energy, shelter, food and medicine allows scarce cash resources to be used to secure other household needs. Three different sets of activities can be distinguished in this case. These include: 1) Seasonal Gap-Filling in which NTFPs are most extensively used to overcome seasonal food shortfalls—that is, before the main harvest; 2) Regular Subsistence Uses which include NTFP uses that are done more or less continuously throughout the year and consumed directly such as firewood, fodder, wild food (including meat), and medicinal plants; 3) Low-Return Cash Activities which rural households are normally involved in to have diversified livelihood strategies (such as collection of honey, meat, nuts, and so on) however, only those low-return activities (Vedeld et al, 2004; Shackleton & Shackleton, 2004).

The third function of NTFPs in rural livelihoods is as a pathway out of poverty. Although NTFPs are extremely critical for the rural poor as a livelihood strategy, and often provide the means to close the income gap with wealthier classes, they rarely provide the means of socio-economic advancement (Neumann and Hirsch, 2000). Despite this, however, Some NTFPs can provide a means of socioeconomic advancement given favorable conditions (Neumann and Hirsch, 2000; Vedeld et al, 2004). Again, three different categories can be distinguished with in this function. The first category is the subsistence economy, with low product contribution and low integration in the cash economy.
However, though it would to some extent overlap with the category of low-return cash activities, this is not a subsistence economy in the conventional sense, as all cases have some cash income from the NTFPs and possibly also other sources. The second category is the diversified economy, with low product contribution and high integration. In this case, NTFP activities are maintained even in situations with a high degree of market integration and are able to compete with other cash income-generating activities. The third category is the specialized economy in which households focus on one particular NTFP with high product contribution and high integration (Vedeld et al, 2004). It is possible that relatively high rural incomes can be derived from NTFP extraction and sales, especially in situations where markets for high-value products are close to the resource base (Neumann and Hirsch, 2000).

These three roles are of course interlinked, and particular products can serve the three functions simultaneously. The distinction is, however, useful to clarify the role NTFPs do play in rural household livelihood (Vedeld et al, 2004). Generally, NTFPs are most extensively used to supplement household income during particular seasons in the year and to help meet dietary shortfalls. Many agricultural communities suffer from seasonal food shortages, which commonly occur at the time of year when stored food supplies have dwindled and new crops are only just being

harvested. During this period the consumption of forest and tree foods increases. Similarly, income-earning activities based on marketable forest products may be seasonal or year-round, or may be occasional when supplementary cash income is needed. Seasonality may reflect availability, needs for additional cash at particular points in the annual cycle (e.g., to purchase seed) or seasonal fluctuation in demand (e.g., for baskets for crop harvesting). NTFPs are also widely important as a subsistence and economic buffer in hard times (Arnold & Pérez, 1998).

1.4. Factors influencing household production of NTFPs

So far, it has been discussed that NTFP perform various functions in rural livelihood and that the majority of the rural households in the tropics produce NTFPs for different purposes. Although NTFP use by rural households is widespread, the extent of use and the quantities used vary depending on a number of factors affecting a household's decision to collect and use NTFP. Kant (2000:291), as cited in Kiplagat et al (2010), observes that due to the influence of social, economic or cultural dynamics which is usually manifested in terms of disparity in culture, gender, caste, ethnicity, political ideology, preferences, appropriation skills and settlements; communities acquire some sort of heterogeneity. Such disparities reflect the difference in capability and assets between households living close to forests and hence play a role in determining whether or not an individual household undertakes collection of forest products. Differences in capability and assets may be manifested by a complex set of factors such as levels of education, livestock and land holdings, awareness levels, age, gender, household sizes, and institutional arrangements within a given local context.

Findings with respect to the influence of wealth on NTFP collection are mixed. Land and livestock are indicators of wealth and the more livestock and land households have, the more well off they are and the lesser they depend on NTFPs (Kiplagat et al, 2010). Owing to improved off-farm employment opportunities and access to credit, total household income (wealth) may be associated with reduced forest clearance as a supplementary income-generating activity. On the other hand, the ownership of more assets may allow households to fulfill the capital requirements for forest exploitation and, thus, to exploit more forest resources (Coulibaly-Lingani et al, 2009; Paumgarten & Shackleton, 2009; Godoy et al, 1995). A higher level of formal schooling, on the other hand, is associated with less forest cutting due to higher opportunity costs of time and increased social status and economic opportunities (Kiplagat, 2010; Coulibaly-Lingani et al, 2009). Increase in education levels is expected to improve the chances of securing better opportunities within or outside the village hence decreases in time allocated to NTFP extraction (Gunatilake, 1998 cited in Mohamed, 2007).

In addition, intensity and type of NTFP collection is strongly linked to the gender. Women are often constrained in accessing and controlling land and forest resources, due to the construction of gender identities within households; and the physique needed to do certain jobs often prevents women engagement in certain NTFP collection activities. Furthermore, larger households (in terms of household size) clear more forest because they have more workers and more mouths to feed (Coulibaly-Lingani et al, 2009). But large households may also have lower per capita wealth/total income that they could be constrained to make much collection of forest products as they could fail to fulfill the associated capital requirements. The age of the head of household may be positively related to forest resource utilization until a peak of physical strength is reached as older people may possess superior knowledge about various forest resources, and may utilize more medicinal plants and wild foods (Coulibaly-Lingani et al, 2009; Mohamed, 2007).

Distances to forests and markets are common external forces that often influence forest extraction. The farther the forest from household, the longer it takes to reach forests, the higher the opportunity cost for the collection of NTFP and, thus the lower the interest to collect NTFP (Coulibaly-Lingani et al, 2009). Similarly, distance to market play an important role in enabling forest-dependent households to realize a significant part of their cash income through sale of NTFPs. Increased market access provided with markets situated near forest villages offer more market outlets for NTFPs, facilitate opportunities for better resource rent via reducing the transaction costs, and expands the size of NTFPs produced thereby (Ndoye et al, 1998).

Similarly, the titling of land results in significantly greater alterations of NTFP tenure and use. Legal title deeds are far more secure than customary claims based on ambiguously defined, usually unwritten property rights. Property rights are often poorly defined and local people may not have legal rights to use the forest. In contrast, open access resources offer opportunities for people with limited resources; the inability to exclude competitors often prevents producers from making a good living from those resources (Belcher et al 2005, cited in Mohamed, 2007). In the absence of clearly defined access, most commercially valuable NTFP will be over harvested in the wild and the potential to sustainable harvesting for livelihood enhancement will be limited. On-farm cultivation will increase the economic value of NTFP to landowner households, but will decrease NTFP access for landless households. On-farm cultivation of high value NTFP may reduce pressure to harvest from the wild, but may increase incentives to clear forest to cultivate these new crops. Therefore, the status of tenure partly determines the role of NTFP in the household livelihood (Neumann & Hirsch, 2000; Mohamed, 2007)

III. Research Methodology

3.1. the study area

The study was conducted in the Yeki Woreda. The woreda is one of the three woredas in the Sheka Sone in the SNNPRS (Figure 1). It is situated 565 kilometers away from Addis Ababa and 880 kilometers from Hawassa in the southwest Ethiopia, and lies between 7.2 & 7.43 degrees latitude north and 35.32 & 35.75 degrees longitude east. It shares boundaries with Bench-maji Zone in the south, Keffa Zone in the east, Gambella Region in the west and Anderacha Woreda of the same zone in the north (YWSEP, 2010/11).

Yeki Woreda lies in the highland areas of the Southwestern Ethiopia that constitutes the upper catchments of several important rivers, such as Baro, Akobo and Omo rivers. The rainfall pattern in the region, where the study woreda is located, is uni- modal from April through to October although rain can fall in any month (FA & SOSSE, 2011; NTFP- PFM SWEP, 2009). The woreda contains different climatic zones including 'dega'/ moist (15%),

'woina-dega'/ warm sub-moist (15%) and moist 'kola'/ warm moist (70%) (YWSEP, 2010/11).

Yeki is a small woreda covering a total of 48871 hechtares of land in area. The woreda has wide forest cover most of which lies in the north part of the district (to the north of Tepi town) **(**YWSEP, 2010/11**)**. Currently, the land use pattern shows that 8033 ha are forest land with 34229 ha, 1785 ha, and 386 ha used for farmland, grazing land and wetland out of the total area of the woreda respectively. Estimated to be more than 1000 hectares in size, Yeki Forest is very dense in parts. The dominant tree species in the forest include Weyra (Olia), Wanza (Cordia), Yezinjiro-Wenber ('Monkey's Seat'), Kerero (Angeria), Getema (Shifleria), Bisana (Croton) and Tikur-Enchet (Prune). On the other hand, Yeki forest is in a general state of disturbance mainly owing to illegal agricultural land expansion, illegal overgrazing and conflict between community members over NTFPs (FA & SOSSE, 2011). Considerable areas of the forest are cleared every year due to agricultural expansion and rising private investment ventures. Deforestation rates are estimated to be 2,530 ha/yr within which is approximately 1 percent per annum. In 2008 a group of community members illegally attempted to clear the forest for coffee plantation. In response the government excluded the community from the forest. Regeneration has improved, and the forest is currently still rehabilitating. In general, the forest areas proximal to human settlements are disturbed, whilst those further away are denser and less disturbed (FA & SOSSE, 2011; NTFP-PFM SWEP, 2009).

Figure 1: Map Location of Shekka Zone/Yeki Woreda

Regarding population, based on the 2008 population census, the population of Yeki Woreda was projected to be 119133 in 2010/11 of which 60635 are males and 58498 are females. Similarly the average population density is about 198 per kilometer square though it varies across kebeles within the woreda (YWSEP, 2010/11).

Agricultural practices are the main livelihood sources for the majority of the inhabitants. Individual income-scoring results shows that wild coffee is by far the dominant NTFP, the only other used for cash income being honey, smaller quantities of which are sold by some households. In addition, cardamom, black pepper ('timiz'), and timber for houses, farm tools, fencing and ladders are also common NTFPs but mostly for home consumption and they are important sources of cash income. Coffee sales are the biggest source of income with the widespread crop enset (false banana) being second in many cases. The other common crop cultivated in the Woreda is sorghum which mostly is used for home consumption. Livestock is an important off-farm activity besides day labouring, renting property, and petty trading. In the PFM program kebeles alone, the woreda has 48935 cattle, 11462 sheep, 5544 goat, 219 mule, 1000 horse, 47264 hen and 1643 donkeys (FA & SOSSE, 2011).

Recently, NTFP- PFM projects are being designed and implemented in south west Ethiopia with the main objective of maintaining a forested landscape in the region and supporting improved livelihoods of local communities through establishment of sustainable practices based on NTFPs. This is particularly done by establishing village level PFM Associations as legal entities. The PFM Associations are developing forest management plans which set out sustainable NTFP harvesting activities that maintain the integrity of the forest. The PFM Associations are supported by local Government Rural Development Coordinating Offices and NGO's. One of the program woredas is the Yeki Woreda which has got 13 kebeles, out of 22 kebles in the woreda, to be included in the PFM project (FA & SOSSE, 2011; Abebe et al, 2007; NTFP- PFM SWEP, 2009).

3.2. Data Collection Method

The study mainly used primary data that was collected through group discussions and household survey. In the group discussions, individuals who have lived in the area for a long time and have good knowledge of the study area were included. It was conducted by forming small groups of size 5 & 6. The group discussions provided general information on trends in forest cover, forest benefits, major NTFPs and their relative importance to livelihoods and marketing of NTFPs.

In the household survey, a preliminary semi-structured questionnaire was prepared and was further developed through reconnaissance survey. Using the information from the reconnaissance survey and group discussions, the production year was divided into three locally identified seasons to describe the patterns of livelihood activities in the study area. Then information related to income and expenditure was collected separately for each season. Such a questionnaire design was chosen to help respondents remember their incomes and expenditures more accurately. The questionnaire included questions about households' socio-economic and demographic characteristics, households' major assets, access to credit, households' collection and marketing of and annual revenue from NTFPs, and households' annual incomes from the different income sources and the associated expenditures.

The draft questionnaire was tested with some households not included in the sample before the survey was conducted. On the basis of the pre-test result, the necessary modifications were made before the final questionnaire was prepared. Then, enumerators familiar to the study area were recruited and trained, and finally, the survey was undertaken in January of 2012.

3.3. Sampling Method

Based on reconnaissance survey, potential NTFP kebeles were identified and specific survey kebeles were selected. Out of 13 potential NTFP kebeles in the study area, three were

purposively selected based on availability of NTFPs. Namely, the selected survey kebeles were Ermich, Kubito and Depi-chinegawa. The total sample size in this study was determined using the commonly used rule of thumb that states the minimum size of sample as N ≥ 50 + 8 m, where 'N' is minimum number of households and 'm' is the number of explanatory variables (Green, 1991). The explanatory variables planned to be used in this study were twelve with which the applied rule of thumb suggests the minimum sample size to be 146 (N ≥50 +8 x 12 ≥ 146). Accordingly, a total of 170 farm households were randomly selected from the selected survey kebeles. However, the allocation of sample size across survey kebeles was made based on the proportional to size techniques of sample allocation so that all sample units would have equal chances of being selected.

3.4. Data Analysis and regression models

To meet the objectives of the study, the data collected from survey was first checked carefully and then processed. During the data checking 16 questionnaires were found incomplete and removed from data processing and analysis. Then, the data processing was done with the remaining 154 questionnaires.

Income in this study includes both subsistence and cash incomes. Accordingly, the calculation of the incomes, particularly from households' collection of NTFPs, involved the use of actual and surrogate market prices. Household incomes were calculated using market prices on the basis of information obtained from the respondents when available and, otherwise, surrogate market prices were used. And, all costs for material inputs, hired labour, transportation and marketing were deducted from the gross household incomes obtained from the corresponding income sources.

Then, the data was coded and entered into a computer. The entered data was used to make descriptive and econometric analyses. The descriptive analysis was employed to identify the major NTFPs, estimate their contribution to household incomes, and assess the households' utilization of them and their relative importance in rural lives.

The factors that determine household dependence on NTFP incomes were identified using econometric analysis. For the same purpose, first, a binary logistic regression of household participation in NTFPs production was run on a set of socioeconomic variables for the purpose of identifying factors that explain the likelihood a household participates in NTFP production. Then an OLS regression of the share of NTFPs income over a set of socioeconomic factors was employed to identify factors that determine the degree of household dependence on NTFPs.

Before the regressions were made, however, the fitted logistic and OLS models were tested for the assumptions of classical linear regression models. One of the classical assumptions is no multicollinearity exists between the explanatory variables that any of them are not a perfect linear combination of one or more of the remaining explanatory variables. The customary rules of thumb, however, state that multicollinearity problem is tolerable as long as the variance inflation factor (VIF) does not exceed 10 for any of the continuous explanatory variables and the coefficient of contingency for any of the dummy variables is close to zero**.** The highest VIFs in this study were equal to 2.846 (OLS model) & 3.294 (logit model), and the highest coefficients of contingency were 0.037 (OLS model) & 0.02272 (logit model) suggesting that there is no serious multicollinearity problem in the respective models.

Similarly, classical linear regression model assumes constant error variance. In this study, the Breusch-Pagan heteroskedasticity test for the OLS model indicated that the error variance is constant (chi2(1) = 0.22; Prob > chi2 = 0.6405) and hence there is no problem of heteroskedasticity. On the other hand, the test for outliers indicated the existence of influential outliers. According to the customary rules of thumb, observations with cook's D values greater than 1 and 4/n are highly influential and moderately influential outliers, respectively, where n is the number of explanatory variables. In this study, 1 highly influential outlier and 13 moderately influential outliers were found in the logit model whereas there were no influential outliers in the OLS model according to cook's D results. Accordingly, robust logistic regression was run to correct for outliers.

The logistic model was used because it is reasonable in describing the relationship between the response and the explanatory variables, and its closer approximation to the cumulative normal distribution and mathematical simplicity **(**Shariff et al, 2009) besides its wide application in related studies so far. The logistic distributions function (ibid) for identification of the user and non-user farmers of NTFPs can be defined as:

$$P_i = \frac{e^{Z_i}}{1 + e^{Z_i}}$$

Where *Pi i*s the probability of being user for the ith observation and *Zi* is a set of socioeconomic factors affecting participation (*Xi*) and the disturbance term (*Ui*) expressed as:

$$Z_i = \beta_0 + \sum_{i=1}^{n} \beta_i X_i + U_i$$

Where β_0 is the intercept, β_i are the slope parameters in the model and n is the number of explanatory variables.

The dependent variable in the OLS model was the share of NTFP income in household total income and the following econometric model was employed:

$$Y_i = \beta_0 + \sum_{i=1}^{n} \beta_i X_i + e_i$$

Where: Y_i is the share of NTFP income; $\beta_0 and \beta_i$ are the intercept and slope parameters, respectively, and e_i is the disturbance term.

3.5. EMPIRICAL MODEL AND VARIABLES USED IN THE ECONOMETRIC MODELS

The econometric analyses were based on the general frame work of rural household models which are frequently used in many studies to conceptualize the behavior of households in the use of environmental resources. Rural household models are broadly classified as separable and non-separable household models based on the possibility of separate consumption and production decisions by the household. This relates to whether farm output and factor markets exist, and whether there is a difference between market prices (of farm output and factors) and their values within the household – their shadow prices (Sadulete & Janvry, 1995; Löfgren and Robinson, 1999; Taylor and Adelman, 2002). Since markets are far from being perfect in the developing countries,

household production and consumption decisions are non-separable; that household decisions reflect both consumption and production needs of the household (Sadulete & Janvry, 1995; Löfgren and Robinson, 1999; Taylor and Adelman, 2002).

Hence, the farm household cannot be viewed as separately maximizing profits as a producer and utility as a consumer. This makes the use of non-separable household models binding in empirical studies conducted in developing countries. And thus, the non-separable household model is widely employed in the investigation of production behaviors and factors affecting it including behaviors in the production of NTFPs. The model assumes that the household maximizes utility subject to production functions, balances for factors and commodities, and a cash constraint besides non-negativity constraints for sales and purchase variables. Utility is a function of quantity of household consumption of the different goods in the households consumption bundle. Household consumption can be satisfied from own production of consumption goods, sales of own production of goods, sales of factors of production, and/or from households cash/liquid assets (borrowed or own saving) (Sadulete & Janvry, 1995; Löfgren and Robinson, 1999; Taylor and Adelman, 2002). The production function represents the technical constraints to the quantity of output of the different products that can be produced with the factors of production available for the farm household. Output levels from different factor allocations are determined by the levels of technology revealed in the production function. The balance for factors represents the household's endowment of the different factors of productions which sets the maximum limits for output levels from a given factor allocation and factor incomes, other things kept constant. The quantity of factors used up in the household's production of goods cannot be more than what is available for the household (Sadulete & Janvry, 1995; Löfgren and Robinson, 1999; Taylor and Adelman, 2002).

On the other hand, the balance for commodities represents the quantity of consumption goods and services (purchased or own production) available for consumption which sets the maximum limits for utility levels from a given allocation of household total income (from production and factor incomes). The quantity consumed of consumption goods cannot be more than the sum of the quantities purchased and produced by the household. Similarly, the cash constraint represents the household's liquidity constraint to finance consumption and production (Sadulete & Janvry, 1995; Löfgren and Robinson, 1999; Taylor and Adelman, 2002).

As this study was conducted in south west Ethiopia where markets are imperfect, as elsewhere in the LDC's, household production behaviors would be best explained by non-separable household models. Accordingly, the general framework of a non separable household model was used in this study to identify the factors affecting household's dependence on NTFPs from Yeki Woreda forests.

From the end solutions of the utility maximization problem of households, the non-separable household model summarizes household consumption, production, sales and purchase prices, and allocation of production factors to be governed by wealth, access to credit and non-farm income, level of technology and a set of other household socioeconomic characteristics. For the purpose of studying the factors affecting dependence on NTFPs, the latent variable in the regression could be production of NTFPs or amount of labour allocated for it. In this study, total household production of NTFP was estimated as a dependent variable to analyze the relationship between household's dependence on NTFPs and factors influencing it. However, since households collect and use various types of NTFPs measured in different units, households' physical production of NTFPs were changed in to monetary values using actual and surrogate market prices.

Additionally, the non-separable household model and review of literatures revealed that a number of socioeconomic factors influence NTFPs production. These were outlined to be used in this study although some of the proposed variables were modified during variable selection (Table 1).

Table1: Definition of variables and expected signs

Variables	Description	Type of Variable	Measurement /Value	Exp. Sign
PNTFP	Participation in NTFP collection	Dummy	1=participant, 0=otherwise	
INCNTFP	NTFPs Income	Continuous	ETB	
SHARENTFP	Share of NTFPs in total income	Continuous	No.	
SEX	Sex of household head	Dummy	1= male, 0=otherwise	+/-
AGE	Household head age	Continuous	Years	+/-
FAMSIZE	No. of household members	Continuous	No.	+/-
LABEDOWMT	No. of working age household members	Continuous	No.	+
DISTTOWN	Distance to market town	Continuous	Walking hours	-
DISTFOREST	Distance to forest	Continuous	Walking hours	-
LIVESTOCK	No. of livestock	Continuous	Tlu	+/-
CREDIT	Access to credit	Dummy	1= received, 0= otherwise	+
LANDSIZE	Total land owned		Hectares	+/-
OFFINC	Availability of non-farm income	Dummy	1= available, 0= otherwise	+

YRESIDENCE	Duration of household residence in the study area	Continuous	Years	+
EDUCATION	Education of household head	Continuous	Years of education	-
MARRIED	Marital status of household head	Dummy	1= married, 0= otherwise	+

IV. RESULTS AND DISCUSSIONS

4.1. RESULTS

4.1.1. Socioeconomic Characteristics of Sample Households

The households in the sample population exhibited varied socioeconomic characteristics. Out of the total sampled households 12.4 % were female headed households. Similarly, about 8.4% of the total sampled households were unmarried.

The age of household head showed a wide range in the sampled population and the mean age of household head was about 41 years (Table 2). The age composition of the sample population reveals that majority of the household heads are particularly adult working age population. Most of the sample population (63.6%) was below the mean age. About 31.2% of sampled population was less than 35 years of age and only 5.2% of them were above 64 years of age while the rest of them (63.6%) were from 35 to 64 years of age.

The average educational level of household heads was around 4 years (Table 2) and the majority of the sampled households were educated. About 85.1% of the household heads were primary education and the remaining were illiterate (7.8%) and high school or above (7.1%). Similarly, the majority of the sampled households (59.1%) were immigrants and the rest (40.9%) were native to the study area. In the ethnic composition of the sample population, the majority of the respondents were Shekicho (61.7%) and Keficho (20.8%) while Menja and Mezenger accounted for 5.19 % & 0.65%, respectively, and Amhara and Oromo accounted for 5.84% each

.

Table2: Household characteristics, land holding (ha) and livestock holding (tlu)

Household Characteristics	N	Min.	Max.	Mean	Sta. Dev.
Age	154	21	80	40.9	12.6
Education	154	0	13	4.2	3
Numbers of family members (Total)	154	1	14	4.8	2.6
Number of working age family members	154	1	13	3.1	1.9
Land holding					
Total land holding (ha)	154	0.021	5.125	0.99	0.88
Land holding per person (ha/person)	154	0.004	2	0.24	0.23
Landholding per worker (ha/worker)	154	0.009	2	0.36	0.29
Livestock holding					
Number of livestock (tlu)	154	0	34.8	3.6	4.7

Both large and small households were included in the sampled population. The mean number of family members and number of working age family members in a household were 4.8 and 3.1, respectively. Similarly, wide variations in household's possession of assets were also exhibited in the sampled population. Land is a main household asset in the sampled population. All of the sampled households possess some size of land the minimum land holding being 0.021 hectares. The mean total land holding of sampled households was about 0.99 hectares and, the mean land holding per unit household member and unit household working age member were 0.24 and 0.36 hectares, respectively (Table 2). Livestock is another fixed asset of households. About 83.7% of the respondents practice livestock rearing while 16.3% of the respondents do not have any livestock. Livestock holding also showed wide range in the sampled population (Table 2) and the average number of livestock in tlu was about 3.6.

The majority of the sampled households had limited access to credit and non-farm income. Only about 9.8% of the sampled households earned non-farm income while the rest (90.2%) did not earn any non-farm income. Similarly, only 18.8% of the respondents received credit services and the remaining 81.2% of the respondents did not receive any credit.

4.1.2. Access to Forests and Markets

The group discussions and key informant interviews indicated that access to forests is not regulated though the study area is one of the Woredas targeted for participatory forest management. Key informants stated that the forest is a state property and the local government is on the way to implement participatory forest management practices through organizing forest dependent households in cooperatives. It was planned to establish formally recognized user groups (cooperatives) and hand over the forests to them on the basis of contractual agreements. The contractual agreements will provide a legal accountability upon the user groups and then will be utilized to monitor and enforce sustainable forest use. Yet, practical implementation has not progressed beyond delineation of some of the forests and no single user group was formally established. Except the prohibition of timber production, which is considered an illegal activity, the exploitation of other forest products was not regulated. There were

no clearly articulated harvest rules being enforced till the survey was completed.

The group discussions indicated that access rules are unclear and that some believe the forest to be an open access property. It was recognized that there is some community claim on the forest based on traditionally inherited access rights practiced through a customary forest use system called *'Kobo'*. However, these rights were not yet formally recognized in the study area and are not enforced. Those claiming the rights are not legitimate to prevent access by others and to practice the customary rights they claim. While forest land is *de jure* state property, the surrounding dwellers usually harvest from the forests with no formally recognized access rights. Therefore, the situation was a confusion of weakened customary rights mixed with poorly enforced state property that led to a *de facto* open access situation.

In the survey, about 40.3% of the sampled households used NTFPs and claimed customary access rights through '*Kobo'*, 19.5% of them used NTFPs with out the traditional rights and the rest of them did not use NTFPs. The average distance from homestead to forests was about 1.64 in walking hours.

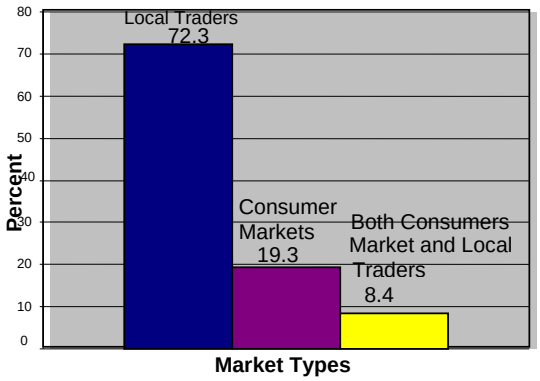

Figure 2: Percentage Distribution of Households by Markets they Sold NTFPs

Group discussions also indicated that households in the study area collect NTFPs from forests and sell them both in the local markets to consumers and to local traders. However, the marketing of NTFPs is a difficult task mainly because of the need to travel long distances to markets whereas there is lack of transport services. Usually, pack animals are used to transport NTFPs. In the survey, the average distance from homestead to market town was about 1.3 in walking hours. Similarly, about 54% of the sampled households sold NTFPs collected from forests in the study area of which 72.3%, 19.3% and 8.4% sold their NTFPs to local traders, consumer markets and both markets, respectively (Figure 2).

4.1.3. NTFP Availability and Use Patterns

Information from group discussion has reflected that households in the study area are considerably dependent on forest resources, particularly collection of NTFPs, in their livelihood. Almost all of the participants emphasized on the importance of forest benefits, both environmental and livelihood. Regarding forest benefits, participants enumerated a number of NTFPs that are obtained from the local forests including coffee, honey, spices, wild foods, medicinal plants, fuel wood, bamboo, climbers, cosmetic species and fodder (Table 3).

Table 3: Types of NTFPs available in the study area (obtained from group discussions).

NTFPs	Description	Remark
Coffee	Wild coffee	Commercial but scarcely available
Honey	From hanging beehives in forest & wild honey	Important commercial product
Korerima (Ethiopian cardamom/*Aframomum corrorima*)	Wild Spice	
Timiz (Long paper/ *Piper capense*)	Wild Spice	
'Acho'	Wild food	Used also for medicinal purposes
'Ero'	Wild food	
'Komegno'	Medicinal NTFP	Rarely used usually for own use
'Damakese'	Medicinal NTFP	Rarely used usually for own use
'Tenadam'	Medicinal NTFP	Rarely used usually for own use
'Suruma'	Medicinal NTFP	Rarely used usually for own use
'Enkoko'	Medicinal NTFP	Rarely used usually for own use

Firewood	Fuel wood	
Charcoal	Fuel wood	Rarely used
Bamboo		Scarcely available
Climbers		Very important for making beehives & construction of houses
'Ensosila'	Cosmetic NTFP	
Forest fodder	Forest grazing	

However, the degree of utilization varies among the different NTFPs. Some of the NTFPs are not abundantly available (such as bamboo, *ero*, *acho*) due to agro-ecological and biological factors. While others are relatively abundant, utilization is seriously hindered by religious and cultural factors in some cases. For instance, the use of most medicinal plants is religiously forbidden (especially '*Komegno'*) and the commercial use of climbers is considered a taboo and thus such products are rarely utilized despite their abundance in the forest. Only little bamboo is available in the peripheral relatively wet parts of the study area, whereas '*ero'* is only seasonally available and '*acho'* is an occasionally available NTFP that they are used rarely.

The availability of NTFPs generally has shown a declining trend in the recent past being threatened by human encroachment. For instance, the availability of forest honey has remarkably declined in recent times because of the negative impact of deforestation on bee forage and thus affecting the availability of forest bees. Similarly, according to the group discussion, forest honey has also been declining as forest bees are fleeing to a recently established modern commercial bee farm.

In this study about 10 categories of NTFPs (13 different individual NTFPs) used by households were identified in the study area (Table 4). About 60.4% of the respondents used one or more of these NTFPs from the natural forests in their locality. The most frequently collected NTFPs are forest honey and climbers. Fuel wood (firewood and charcoal) is the third widely used NTFP followed by wild food ('*acho'* and '*ero'*) and bamboo. Similarly, forest coffee and spices ('*timiz'* and '*korerima'*) were collected by 8.4% of the respondents each while other NTFPs (forest fodder, medicinal NTFPs ('*damakese'*), and '*ensosila'*) were collected by 9% of the respondents (Table 4).

Table 4: Types of NTFPs and Distribution of User Households.

NTFPs	N	Proportions (%)
Forest honey	67	43.5
Climbers	65	42.2
Bamboo	19	12.3
Firewood (fuel wood)	19	12.3
Forest Coffee	13	8.4
'*Aco'* (wild food)	11	7.1
'*Ero'* (wild food)	8	5.2
'*Timiz'* (wild spice)	8	5.2
'*Ensosila'* (cosmetic NTFP)	8	5.2
'*Korerima'* (wild spice)	5	3.2
Forest Fodder	5	3.2
'*Damakese'* (medicinal plant)	1	0.6
Charcoal (fuel wood)	1	0.6

4.1.4. Importance of NTFPs in the Household Livelihood

The main livelihood activity in the study area is agricultural crop and livestock production (Table 5). The majority of the respondents (99.3%) were found to practice diversified agricultural crop production such as garden coffee, *enset*, maize, sorghum, and the average number of crops grown in the study year was about 3. About 83.7% of the respondents practice livestock rearing while 16.3% of the respondents do not have any livestock. Agricultural crop and livestock production is the most widely observed activity and important source of income (76.1%) in the study area.

Next to agriculture, households in the study area collect and utilize non timber forest products (NTFPs). About 60.4% of the sampled households are engaged in the collection of NTFPs from the forests in their locality. The average share of income from NTFPs is about 13.1% and is the second important source of household income as well as the second widely practiced activity.

Table 5: The Mean Household Incomes from Different Sources and Relative Contributions.

Source of Income	N	Mean annual Income	Relative Contribution (%)
Agriculture	154	13316	76.1
NTFPs	154	2553.5	13.1
Non-farm Activity	154	590.75	4.2

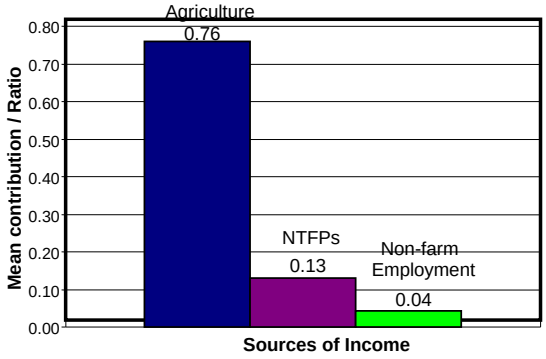

Figure 3: The Mean Contribution to Total Household Income of the Different Income Sources

The third frequently observed activity is non-farm employment (*non-farm activity in this study is defined as non-agricultural and non-forestry *activities such as small businesses, crafts, local brewery, day labour, etc).* About 9.7% of the sampled households were engaged in non-farm activities. Similarly, the average share of non-farm income in the total household income was only about 4.2%. The remaining portion of income (6.6%) was obtained from other sources such as remittances and timber.

4.1.5. Participation and Household Assortment in NTFP Collection

As it has been indicated, considerable proportion of households in the study area is engaged in the collection of NTFPs and the combined average annual NTFP income of the sampled households is about ETB 2553.5. For the participating households, the average annual income from NTFPs is about ETB 4228.3 and it makes about 22% of their total income (Table 6).

Table 6: Distribution of Households by Participation in NTFP Collection and Mean Income

	N	Proportion (%)	NTFP Income in ETB			
			Mean	Min.	Max.	Contribution to Income (%)
Non-participant	61	39.6	-	-	-	-
Participant	93	60.4	4228.3	50	5190 7.4	21.8
Combined	154	100	2553.5	0	5190 7.4	13.1

Both the participating and non-participating groups of the sampled households showed varied socioeconomic characteristics. However, a specific pattern is observed in the socioeconomic characteristics of households who participated in the collection of NTFPs. Compared to the non-participating households; female headed, married and native households; and those who received credit services and did not have non-farm incomes made larger proportion in the group of household who participated in NTFP collection (Table 7).

Similarly, the mean number of years of education of household head and distance from homestead to forest were significantly smaller (at 1% level of significance) for the group of households who participated in the collection of NTFPs than those who did not. On the other hand, the mean number of years of household residence in the study area; number of livestock (tlu); household land holding and distance from homestead to market town were significantly higher (at 1% level of significance) for the group of households who participated in the collection of NTFPs than those who did not (Table 8).

The mean NTFP incomes of the different categories of households were found statistically the same for each other. Within the households who participated in NTFP collection, the differences in the mean NTFP incomes of male headed and female headed households, married and unmarried households, immigrants and natives, those received credit and did not receive credit, and those who had non-farm income and did not have non-farm income were all statistically zero at 10% level of significance. However, sex of household head, marital status and availability of non-farm income have shown significant association with household participation in NTFP collection at 10% and smaller levels of significance whereas access to credit and the birth place of the household showed no statistically significant association with participation at 10% level of significance (Table 7).

Table 7: Pattern of Household Participation in NTFP Collection, Measures of Association and Differences in Mean NTFP Incomes by Household Categories

Household characteristic		Participation		Association		Mean NTFP Income	
		Participant (%)	Non-participant (%)	Pearson chi2(1)	P	Participant	Combined
Sex	Male (1)	83.9	93.4	3.12	0.077	4570	2640
	Female (0)	16.1	6.6			2452	1936
	Mean (1) - Mean(0)	-	-	-	-	2117.83 (p=0.223)	704.54 (p=0.582)
Received credit	Yes (1)	20.4	16.4	0.39	0.531	4988	3268
	No (0)	79.6	83.6			4033	2388
	Mean(1) - Mean(0)	-	-	-	-	954.93 (p=0.548)	880.43 (p=0.413)
Non-farm income available	Yes (1)	6.5	14.8	2.89	0.089	3504	1402
	No (0)	93.5	85.2			4278	2678
	Mean(1) - Mean(0)	-	-	-	-	-774.15 (p=0.767)	-1276.11 (p=0.368)
Married	Yes (1)	98.9	80.3	16.48	0.000	4145	2705
	No (0)	1.1	19.7			1188	913.85

	Mean(1) - Mean(0)	-	-	-	-	-7734.87 (p=0.212)	1790.78 (p=0.236)
Native	Yes (1)	43	37.7	0.43	0.512	3745	2378
	No (0)	57	62.3			4593	2675
	Mean(1) - Mean(0)	-	-	-	-	-847.19 (p=0.469)	-296.77 (p=0.729)

Table 8: Household Characteristics and Mean Comparisons by Participant and Non-participant Households

Variables	Mean		Mean Differences	
	Participants (1)	Non-participants (0)	Mean (1)- Mean (0)	P
AGE	41.27	40.43	0.843	0.685
FAMSIZE	4.96	4.61	0.35	0.423
LABEDOWMT	3.02	3.31	-0.29	0.406
DISTTOWN	1.74	0.6	1.138	0.000
DISTFOREST	1.08	2.49	-1.406	0.000
LIVESTOCK	4.511	2.121	2.39	0.001
LANDSIZE	1.23	0.64	0.595	0.000
YRESIDENCE	31.16	25.35	5.81	0.012
EDUCATION	3.24	5.64	-2.4	0.000

4.1.6. Relative Income Contribution of NTFPs to Household Livelihood

This part presents relative contribution of individual NTFPs to household total income and utilization of the individual NTFPs by households. Among the NTFPs, forest honey is the most widely collected as well as the highest, aggregate and average, contributor to income (Table 9). About 43.5% of the households collected forest honey and on aggregate made a total sum of ETB 281460 in the study year from the collection of forest honey. On average, the households who collected forest honey received about ETB 4201 per annum per user household and this constitutes about 20.2% of the total household income of user households on average. As recognized during group discussions, this may be because of the relatively good potential of the study area for forest honey production and the relatively better market opportunity as honey is a widely traded commercial product both at local and national levels. Hence, it is possible that households collect relatively larger quantities of forest honey and sell with relatively better market outlets and price.

Besides, among the households who collected forest honey, 89.2% sold their product to local traders and 10.8% of them sold their product in the local markets directly to consumers. Similarly, while forest honey is usually marketed by the husbands for the majority (87.7%) of the user households, 6% of the user households mainly used hired labour to collect forest honey.

Forest coffee is not a widely reported NTFP in the sampled population. Only 8.4% of the respondents collected wild coffee from the natural forests in their locality. However, forest coffee offered the second largest aggregate and average user income next to forest honey (Table 9). The aggregate income of user households from forest coffee was about ETB 34532 in the study year and the average income from forest coffee was about ETB 2656.3 per user household collecting the forest coffee per annum. Similarly, the contribution of income from forest coffee to the total user household income was about 12.7% on average. This might be because of the existence of relatively well established coffee production in home gardens. The study area is one of the top garden coffee producing regions in Ethiopia opening up market outlets for wild coffee as well. All of the households who collected forest coffee sold their product mainly for local traders. Similarly, forest coffee is usually marketed and collected by the husbands for all of the user households and none of the user households used hired labour to collect forest coffee.

Table 9: Relative Contributions of NTFPs to Household Income

Types of NTFPs	N	NTFP Income (ETB)		
		SUM	Mean	Share in Total Income (Ratio)
Coffee	13	34532	2656.3	0.127
Firewood	19	36708	1932	0.135
Honey	67	281460	4200.9	0.202
Acho	11	952	86.55	0.004
Ero	8	1344	168	0.009

Ensosila	8	3381	422.62	0.022
Korerima	5	8520	1704	0.066
Timiz	8	2588.13	323.52	0.026
Climbers	65	13081	201.24	0.015
Bamboo	19	3820	201.05	0.018
Fodder	5	6750	1350	0.068
Damakese	1	6	6	0
Charcoal	1	90	90	0.008

Fuel wood is the third widely observed as well as third highest aggregate and average income NTFP in the study area (Table 9). Fuel wood was collected by 12.9% of the respondents and their aggregate income from fuel wood was about ETB 36798 per annum. Particularly firewood among fuel wood products was collected by 12.3% of the respondents and an aggregate income of ETB 36708 was made by the users of the particular product. On average, the income from fire wood was about ETB 1932 per user household per annum and it, on average, constitutes about 13.5% of total income of user households collecting the product. On the other hand, only one household reported producing charcoal out of the total sampled households as can be seen from Table 9. Generally, fuel wood was entirely sold in consumer markets, mainly by wives & daughters (80%), and none of the user households used hired labour to collect fuel wood.

Climbers are the second widely collected forest products (42.2% of the households) but only the forth NTFP in terms of the aggregate income. Further, climbers are one of the least NTFPs in terms of average income per household and percentage contribution to total household income (Table 9). The households who collected climbers obtained a total sum of ETB 13081 on aggregate. The average income from climbers is about ETB 201.24 per user household collecting the product and the average contribution to total household income is about 1.5% for user households (Table 9). The low contribution of climbers may be because most households collected little quantities of climbers, mostly for subsistence use. As recognized during group discussions, commercial use of climbers is culturally considered taboo in the study area. Mostly, climbers are used for home consumption and in little quantities to make beehives, build houses or make other construction activities.

Similarly, none of the households who collected climbers sell their product and the majority of them (96.9%) used family labour to collect climbers. Some of the user households used hired labour to collect climbers. But, this should not be surprising as households often hire labour to make and hang beehives in forests and as climbers is used in making beehives. Hence, making and hanging beehives involves collection of climbers and such collections were recorded as collected by hired labour.

The rest of the NTFPs offered by far smaller aggregate income to users relative to the aforementioned NTFP categories (Table 9). For instance, wild food and bamboo are relatively frequently observed types of NTFPs. Each has been collected by 12.3 % of the respondents. However, the aggregate income of user households from wild food (‘*acho’* and ‘*ero’*) was only ETB 2296 per annum. Individually, the aggregate incomes from ‘*acho’* and ‘*ero’* were ETB 952 and ETB 1344, respectively, and the average incomes of user households collecting the products were ETB 86.55 and ETB 168 per user household per annum, respectively. The average percentage contribution to total user household income of ‘*acho’* and ‘*ero’* were 0.4% and 0.9%, respectively (Table 9). The small income contribution of wild food may be because of little availability of the particular NTFPs. During the group discussions, it was identified that ‘*acho’* is an edible leaf of a wild plant (also used for medicinal purpose especially for gastritis).

Likewise, ‘*ero’* is available only and in the wettest parts of the study area. Besides, these products are mostly used for subsistence use and the market for them is limited to local markets as they are perishable products and are not popularly used in other areas. As a result, they are collected in small quantities although they are collected by many households. In agreement with this, survey results indicated that larger proportions of household collection of wild food (65.4% and 91.1% of the total collection of ‘*acho’* and ‘*erro’* on average) were used for subsistence. About 54.5% and 12.5% of the households who collected ‘*acho’* and ‘*erro’*, respectively, sold at least part of their total collection but entirely in consumer markets. Wild food is usually collected and marketed by using family labour.

Similarly, bamboo offered only ETB 3820 of aggregate income to user households per annum. The average income from bamboo was ETB 201.05 per user household collecting the product per annum and the average percentage contribution of income from bamboo to the total user household income was about 1.8%. Like, wild food bamboo has been observed as frequently as fire wood alone (excluding charcoal) but it is relatively of very smaller contribution in household incomes (Table 9). This may be because bamboo is a subsistence product available in little quantity in the study area. As participants indicated during the group discussion, forest bamboo is abundantly available and widely used and traded in neighboring woredas. But, only little stock of bamboo trees are available in the wettest and remotest parts of the study area that are adjacent to the neighboring woredas. On the other hand, all the households who collected bamboo used their entire collection for subsistence purposes and mainly used family labour to collect the product.

Wild spices (‘*korerima’* and ‘*timiz’*), on the other hand, were collected by 8.4% of the respondents and their aggregate income from wild spices was about ETB 11108.13 per annum. Individually, ‘*korerima’* and ‘*timiz’* were collected by about 3.2% and 5.2% of the respondents, respectively, and their aggregate

income from each of the products was ETB 8520 and ETB 2588.13 per annum, respectively. The average incomes from '*korerima'* and '*timiz'* were ETB 1704 and ETB 323.52 per user household collecting the products per annum, respectively, and the average percentage contribution to total user household income of each of the products was about 6.6% and 2.6%, respectively (Table 9).

It has been recognized during the group discussions that the study area has rich potential in wild spices and they are considerably available species in the forests of the study area. Paradoxically, however, collection of wild spices is less frequently observed in the study area and the aggregate income for user households from them is very small. Among the wild spices, however, '*korerima'* offered relatively higher aggregate and average user household income than '*timiz'* though the latter is more frequently observed product. This may be because of differences in market opportunities for the products. In fact, survey results indicated that user households sell larger proportion of their total collection of wild spices (94% and 66.2% of the total collection of '*korerima'* and '*timiz'*, respectively). However, the majority of the households who collected '*korerima'* (60%) sold their product to local traders and the rest of them (40%) sold it in consumer markets while '*timiz'* was entirely sold in consumer markets. And all of the households mainly used family labour to collect both '*korerima'* and '*timiz'*.

The other NTFPs ('*ensosila'*, forest fodder and medicinal plants) are even less frequently observed in the sampled population (Table 9). '*Ensosila'*, a cosmetic NTFP, has been collected by 5.2% of the respondents and their aggregate income from the product was ETB 3381 per annum. The average income from '*ensosila'* was about ETB 422.62 per user household collecting the product per annum and the average percentage contribution of income from '*ensosila'* to total user household income was about 2.2% (Table 9).

Similarly, forest fodder was used by 3.2% of the respondents, and their aggregate income from forest fodder was about ETB 6750 per annum, their average income from forest fodder was about ETB 1350 per annum and the average contribution of income from forest fodder to their income was about 6.8% (Table 9). The small frequency and aggregate income from forest fodder may be because of small number of livestock per household in the study area (which was about 4.3 on average number of livestock in tlu). But, only one respondent was found to use medicinal NTFP (specifically '*damakese'*) out of the total sampled households. This may not be surprising as, usually, only few individuals have the knowledge of traditional medicine and the medicinal plants in rural areas which is kept secret by the individuals to secure incomes from traditional medication service. Besides, most species of medicinal use are also available in own gardens or around homestead. And the expansion of modern medical services may also affect the use of forest medicinal plants negatively.

4.1.7. Utilization of NTFPs Income: Subsistence and Commercial Use

This part presents the user household utilization of the incomes from the individual NTFPs. However, since transportation; marketing and input costs are hardly divisible to sort out net NTFP income in to subsistence and commercial/cash income, the ratio of the quantities of the NTFPs used for subsistence and commercial purpose out of the total quantity of NTFP collected were compared. Based on the comparison of the quantity ratios, some of the NTFPs ('*ensosila'*, forest coffee, forest honey, '*korerima'and* '*timiz'*) were found to be mainly of commercial use while others (climbers, bamboo, '*acho'*, '*ero'*, fire wood/fuel wood, forest fodder and medicinal NTFPs) were mainly of subsistence use (Table 10).

'*Ensosila'* was sold by all households who collected the products and was entirely used for cash purposes (Table 10). All of the households who collected forest coffee sold at least part of their total collection while only 30.8% of them used some part of their total collection for subsistence. Similarly, '*Korerima'* was sold by all of the households who collected the product and only 20% used part of the total collection for subsistence. And on average, (Table 10), much larger proportions of the total household collection of coffee (95.4%) and '*Korerima'* (94%) were sold for cash.

The majority of the households who collected forest honey and '*timiz'* used their products for domestic purposes. About 97% of the households who collected forest honey sold their honey product while 74.6% of them used at least some fraction of their honey product for subsistence. Similarly, '*timiz'* was sold by 75% of the households who collected the product and about 50% of them used some part of their total collection for subsistence purpose. And on average, (Table 10), larger proportions of the total household collection of honey (89.3%) and '*timiz'* (66.2%) were used for cash purposes.

On the other hand, climbers, bamboo, forest fodder and medicinal NTFPs (specifically '*damakese'*) were entirely used for subsistence purposes by all of the households who collected the respective products (Table 10).

Similarly, fire wood, charcoal, '*acho'* and '*ero'* were seldom used for cash purposes. All of the households who collected fire wood, charcoal, '*acho'* and '*ero'* used at least part of their total collection for subsistence whereas fire wood, charcoal; '*acho'* and '*ero'* were used for cash purposes by 21.1%, 100%, 54.5%, and 12.5%, respectively, of the households who collected the respective products. And on average, (Table 10), larger proportion of the total household collection of fire wood (95%); charcoal (50%); '*acho'* (65.4%) and '*ero'* (91.1%) were used for subsistence purposes. Here, it should be noticed that charcoal and medicinal NTFPs were found to be used only by one respondent each and, hence, generally rarely observed NTFPs in the study.

Table 10: Household Utilization of NTFPs for Subsistence and Cash Purposes

Types of NTFPs	N	Purpose used for (Ratio)	
		Subsistence	Commercial
Coffee	13	0.046	0.954
Firewood	19	0.95	0.05
Honey	67	0.107	0.893
Acho	11	0.654	0.346
Ero	8	0.911	0.089
Ensosila	8	0	1
Korerima	5	0.06	0.94
Timiz	8	0.338	0.662

Climbers	65	1	0
Bamboo	19	1	0
Fodder	5	1	0
Damakese	1	1	0
Charcoal	1	0.5	0.5

4.1.8. Factors Affecting Household Dependence on NTFPs

4.1.8.1. Determinants of Household Participation in NTFPs Collection

Out of the thirteen explanatory variables in the fitted logit model, six variables were significant at 10% level of significance or less (Table 11). According to the Wald chi-square test, the variations in the likelihood of household participation in NTFP collection (dependent variable) explained in the fitted model are significant at 1% level of significance. The fitted model also correctly explained 52.2% of the variations in the observed values of the dependent variable. The significant explanatory variables in the fitted model were distance to forest, total land size, availability of non-farm income, years of household residence in the study area, educational level and marital status of household head which are presented below.

Distance to forest (DISTFOREST): Distance to forest showed the expected negative relationship to the likelihood of household participation in NTFP collection. It was hypothesized that the likelihood of household participation in NTFP collection decreases the longer it takes to reach forests. Likewise, distance to forests in this study showed a significant negative relationship to the likelihood of household participation in NTFP collection at 1% level of significance. Other things being constant, the odds ratio for distance to forest indicated that the likelihood of household participation in NTFP collection decreases by a factor of 0.28 as distance to forest increases by one walking hour.

Table 11: The Robust Estimates of Logit Model for Participation in NTFP Collection

Explanatory Variables	Robust			
	Coefficients	St. Errors	P>|z|	Odds Ratio
SEX	-1.18	0.7853	0.132	0.31
AGE	-0.03	0.0371	0.359	0.97
FAMSIZE	-0.15	0.1458	0.306	0.86
LABEDOWMT	0.09	0.2829	0.75	1.09
DISTTOWN	0.64	0.4081	0.116	1.89
DISTFOREST	-1.28	0.3486	0.000	0.28
LIVESTOCK	0.02	0.1077	0.832	1.02
CREDIT	0.74	0.6962	0.289	2.09
LANDSIZE	0.91	0.4554	0.045	2.49
OFFINC	1.93	0.851	0.023	6.88
YRESIDENCE	0.04	0.024	0.083	1.04
EDUCATION	-0.3	0.1168	0.009	0.74
MARRIED	5.21	1.25	0.000	182.37
CONSTANT	-0.85	1.92	0.658	

No. of obs. =154, Wald chi2(13) = 36.58, Prob > chi2 = 0.0005, Pseudo R2 = 0.522, Log pseudo-likelihood = -49.422769

Land size owned (LANDSIZE): The total size of land owned also showed a significant positive relation ship to the likelihood of household participation in NTFP collection at 5% level of significance. Other things being constant, the odds ratio for total size of land owned indicated that the likelihood of household participation in NTFP collection increases by a factor of 2.49 as total land size owned increases by one hectare.

Availability of non-farm income (OFFINC): Availability of non-farm income showed a significant positive relation to the likelihood of household participation in NTFP collection at 5% level of significance. Other things being constant, the odds ratio indicated that the likelihood of household participation in NTFP collection increases by a factor of 6.88 for those households having non-farm income available than otherwise.

Duration of residence (YRESIDENCE): It was hypothesized that the longer the period of time a household lives in the study area, the more the accumulated forest knowledge and the higher the likelihood of household participation in NTFP collection. As hypothesized, number of years of household residence in the study area showed a significant positive relationship to likelihood of household participation in NTFP collection at 10% level of significance. Other things being constant, the odds ratio indicated that the likelihood of household participation in NTFP collection decreases by a factor of 1.04 as residence duration increases by one year.

Education of household head (EDUCATION): Educational level of households showed the expected significant negative relationship to the likelihood of household participation in NTFP collection at 1% level of significance. Other things being constant, the odds ratio indicated that the likelihood of household participation in NTFP collection decreases by a factor of 0.74 as educational level increases by one year.

Marital status of household head (MARRIED): Marital status of household head showed the expected significant positive relationship to the likelihood of household participation in NTFP collection at 1% level of significance. Other things being constant, the odds ratio indicated that the likelihood of household participation in NTFP collection increases by a factor of 182.37 for those households having married household heads than otherwise.

4.1.8.2. Factors Affecting Share of NTFP Income in Household Income

The results from the survey also showed that there were variations in the degree of dependence on NTFPs. Four of the explanatory variables fitted in the OLS model were significantly related with the share of NTFPs in household income at 10% or smaller level of significance (Table 12). The F-test showed that the variations explained in the model are significant at 1% level of significance. The adjusted R-squared value indicated that the model correctly predicted 40.2% of the variations in the share of NTFP income (Table 12). This part presents the significant predictors of share of NTFP income in household income.

Number of household members (FAMSIZE): Number of household members showed a significant negative relationship to the share of NTFP income at 1% level of significance. Other things being constant, the OLS estimate of the coefficient of FAMSIZE indicated that the share of NTFP income decreases by 0.026 units as number of household members increases by one unit.

Number of working age household members (LABEDOWMT): Number of working age household members, as expected, showed a significant positive relation ship to the share of NTFP income at 10% level of significance. Other things being constant, the OLS estimate of the coefficient of LABEDOWMT indicated that the share of NTFP income increases by 0.026 units as number of working age household members increases by one unit.

Distance to market town (DISTTOWN): Distance to market town showed unexpected positive relation ship to the share of NTFP income. It was hypothesized that the share of NTFP income decreases with increases in the distance from homestead to market town and vice versa. In this study, however, distance to market showed a significant positive relation ship with share of NTFP income at 1% level of significance. Other things being constant, the OLS estimate of the coefficient of DISTTOWN indicated that the share of NTFP income the increases by 0.046 units as distance to market town increases by one walking hour.

Number of livestock (LIVESTOCK): The number of livestock also showed a significant positive relation ship to the share of NTFP income at 1% level of significance. Other things being constant, the OLS estimate of the coefficient of LIVESTOCK indicated that the share of NTFP income increases by 0.009 units as number of livestock increases by one unit.

Table 12: Estimates of OLS Regression of Share of NTFPs in Household Income

Explanatory Variables	Coefficients	St. Errors	Standardized Coefficients (Beta)	P>|t|
SEX	0.0212	0.0348	0.0531	0.544
AGE	-0.00012	0.0015	-0.0095	0.938
FAMSIZE	-0.026	0.0077	-0.4366	0.001
LABEDOWMT	0.026	0.0133	0.302	0.055
DISTTOWN	0.046	0.0154	0.3623	0.004
DISTFOREST	0.003	0.0202	-0.0178	0.881
LIVESTOCK	0.009	0.0031	0.3356	0.004
CREDIT	0.0211	0.0359	0.0578	0.56
LANDSIZE	-0.0069	0.0152	-0.0451	0.651
OFFINC	-0.0731	0.0531	-0.1223	0.173
YRESIDENCE	-0.0007	0.0012	-0.0693	0.561
EDUCATION	-0.0004	0.0057	-0.0062	0.949
MARRIED	-0.035	0.1394	-0.0246	0.803
CONSTANT	0.1986	0.1585		0.214

Number of obs = 93, F(13, 79) = 5.76, Prob > F = 0.0000
R-squared = 0.4866, Adj R-squared = 0.4021 Root MSE = 0.11414

4.2. DISCUSSIONS

4.2.1. Contribution of NTFPs to Household Livelihood

Households in the study area are considerably dependent on the collection of NTFPs. These NTFPs in the study area include forest honey, climbers, forest coffee, spices (*Korerima* and *Timiz*), wild food (*ero* and *acho*), fuel wood (fire wood and charcoal) and other products (bamboo, *ensosila*, forest fodder, medicinal products such as *damakese* etc). Among the NTFPs identified in this study, the major categories include forest honey, climbers, fuel wood and forest coffee. Forest honey, climbers and fuel wood were the top three frequently collected NTFP categories. But, the top three NTFPs in terms of contribution to household income were forest honey, forest coffee and fuel wood. The income from climbers is low though it is collected by many households. This may be because households collect climbers in little quantities, just enough for home use, as climbers are only a subsistence NTFP in the study area.

Next to agriculture, NTFPs are the second important source of income to households in the study area. Altogether, NTFPs provided an average annual income of 2553.5 Ethiopian Birr per one household unit in the study and NTFP income on average made about 13.1% of the total household income. The contribution of NTFPs to total household income in this study, however, is much smaller than estimates of other studies. Mohammed (2007) estimated the cash contribution of NTFPs to be 41% and 52% of the total household cash income in Shecka and Bench-Maji zones of southwest Ethiopia, respectively. The study indicated that agricultural cash income contributes (54% in the total household cash income) more than NTFP cash income in Sheka zone while it contributes (46%) less than NTFP cash income in Bench-Maji zone.

Similarly, Muzayen (2009) estimated a 35% contribution of NTFP income to total household income providing the second largest income next to agriculture to households in Harana Bulluk woreda of Bale zone. A study in five different villages of south west Ethiopia, by Schravesande-Gardei (2006), indicated that bamboo, spices, honey, and coffee were major commercial NTFPs and NTFPs contributed from 30% up to more than 75% of household cash income across villages. Bognetteau and Wirtu (2007) stated that for middle income and better-off households NTFPs provide an important part of their total income ranging from 30% to 70% in southwest Ethiopia. A meta-analysis by Vedeld et al. (2006) based on 51 case studies from 17 developing countries indicated that agricultural income, forest environmental income and off-farm income, on average accounted for 37%, 22% and 38% of the total income, respectively, and the main sources of forest environmental income are fuel wood, wild foods and fodder. The differences from the finding in this study may be partially because of methodological differences and variations in agro-

ecological contexts of the studies. Besides, the institutional context in this study can also be of crucial importance. Although the study area is one of PFM program areas, exploitation rules and regulations were not practically installed, and the forest was left de-facto open access until this study was completed. It seems this, being coupled with the fact that the study area is one of high income garden coffee producing regions; might lessen the contribution of NTFPs to household income. Similarly, for Bognetteau and Wirtu (2007), the returns from NTFP collection and sale in southwest Ethiopia are often low due to weak market linkages, low and fluctuating prices, and the poor quality of the products – often due to poor post harvest handling. As a result, products often fail to gain recognition for their specific characteristics, especially their organic nature.

It is, however, essential to see the contribution of NTFPs from the perspective of pattern of NTFP use and the roles they play in the livelihoods of households living around forests. Participation of households in NTFP collection indicated that the majority of the respondents were engaged in NTFP collection. About 60.4% of the sampled households collected and utilized one or more of these NTFPs. And the pattern of participation literally showed regularity across different categories of households. On the other hand, the participating households are less educated and living near to forests but richer, living distant from markets and having greater length of residence in the study area relative to those who did not participate in NTFP collection. These indicate that NTFP collection is not an occupation of only marginalized or deprived peoples rather it is also an alternative source of income and an occupation based on a choice among alternatives.

Besides, households in the study area use NTFPs both for subsistence and cash purposes. Some of the NTFPs (‘*ensosila’*, forest coffee, forest honey, ‘*korerima’* and ‘*timiz’*) were found to be mainly of commercial use. Similarly, fire wood; charcoal; ‘*acho’* and ‘*ero’* were also used for cash purposes though they were mainly used for subsistence purposes On the other hand, however, climbers; bamboo; forest fodder and medicinal NTFPs were entirely used for subsistence purposes by all of the households who collected the respective products.

The literatures identify three types of roles NTFPs can play in household livelihood, namely as ‘safety-nets’, ‘support to current consumption’ and as ‘a path out of poverty’. The regularity in the pattern of use of NTFPs, the greater average wealth of NTFP collectors and commercial use of many of the NTFPs observed in different degrees in this study indicate that many of the NTFPs in the study area are more than a safety-net. Besides, some of the NTFPs offered considerable contribution to household income (for instance, 20.2% income received from forest honey) indicate that NTFPs provided significant ‘support to current consumption’. The results are comparable to Bognetteau and Wirtu (2007) which stated that “….for the poorer households NTFPs usually contribute less in financial terms, but they are an important safety net, especially through the open access situation of some of these products” in southwest Ethiopia.

However, NTFPs do not seem currently providing an imperative ‘pathway out of poverty’ in the study area as the contribution of NTFPs in this study is generally much smaller than other studies. But, rates of NTFP exploitations also seem below potential. For instance, Schravesande-Gardei (2006) reported that 18% of the respondent households in southwest Ethiopia were engaged in spice collection and the author emphasized the existence of a significant potential for spice production. In this study, lower percentage (8.4%) of respondents reported that they exploited spices from the forest, which might indicate that this potential is being underutilized.

Besides, there are potential opportunities that could be explored more for some of the NTFPs. For instance, for Bognetteau and Wirtu (2007), reported that some NTFPs in southwest Ethiopia have markets beyond the region and even abroad which include forest coffee, forest honey and wild spices. These NTFPs particularly are enjoying fortunate market and technological opportunities that they can be developed further and might contribute in greater extents to household incomes. Similarly in this study, forest coffee, forest honey and ‘*korerima’* collectors sold their products mainly to traders indicating that the products shared the fortunate market opportunities beyond local areas. Hence, these may be an indication of the possibility of commercial development of forest coffee, forest honey and ‘*korerima’*, and the potential of the products for economic advancement.

4.2.2. Factors Affecting Dependence on NTFPs

The above part indicated that NTFPs in the study area provide considerable income to the majority of households living adjacent to the forests. However, participation and the share of NTFPs in the total household income was varied between households. Logistic regression result predicted that distance to forest, land holding, availability of non-farm income, household years of residence in the area, educational level and marital status of household head significantly determine whether a household participates in NTFP collection. On the other hand, OLS regression of share of NTFPs in the total household income on a set of explanatory variables predicted that share of NTFPs varies significantly with family size, labour endowment, distance to town and number of livestock.

Richer households in this study were found to have more dependence and likelihood of participation in NTFP collection. Land size affected participation in NTFP collection positively but its impact on the share of NTFP income was statistically weak, though negative. Number of livestock affected the share of NTFPs in household income positively but showed statistically weak association to the likelihood of participation in NTFP collection, though positive. The effect of wealth was not hypothesized ex ante as this may depend on the role of NTFPs in household livelihoods. Larger land size and number of livestock, being an indicator of wealth, offers better opportunities for off-farm employment and access to credit. Richer households are likely to be more well off and less dependent on NTFPs as source of supplementary income, particularly as a safety-net to unexpected income shortfalls. On the other hand, larger land size and number of livestock are indicators of more wealth and relaxed subsistence constraints allowing households to fulfill capital requirements for NTFP collection. Hence, larger wealth can be associated with more likelihood of participation and quantity of NTFP collection (Kiplagat et al, 2010; Coulibaly-Lingani et al, 2009; Paumgarten &Shackleton, 2009; Godoy et al, 1995).

Some empirical results supported the finding in this study. Gubbi & MacMillan (2008) confirmed that agricultural land holding positively affects NTFP income and Muzeyin (2009)

confirmed that total land holding and income from NTFPs were positively correlated. On the other hand, Babulo et. al. (2008) did not support the finding in this study and reported that households with large plots of land are less likely to engage in forest extraction as a dominant strategy. Similarly, Mcelwee (2008) reported that land holding was negatively correlated with relative forest incomes and Fisher (2004) reported a negative correlation between farm size per capita and reliance on low return forest activities. The finding in this study is also comparable with Mohammed (2007) who revealed that livestock holding positively affected household decision to collect and use forest coffee. On the other hand, Fisher (2004) did not support the finding in this study and reported a negative correlation between number of goats owned and the share of earnings from both low return and high return forest activities. Mcelwee (2008) reported that livestock holding was negatively correlated with relative forest incomes.

The role of NTFPs in the study seems more than a safety-net since NTFPs were used as sources of considerable income by the majority of households in this study. And it seems this is inconsistence with the displayed significant positive association of land size to the likelihood of household participation in NTFP collection and that of livestock to the share of NTFP income.

Availability of non-farm income affected the likelihood of household participation in NTFP collection positively. This may be because non-farm income can reduce liquidity constraints in the collection of NTFPs, and allow households smooth their consumption and enables them to afford the requirements for starting NTFP business. Marital status of household head affected the likelihood of household participation in NTFP collection positively. This may be because married households shoulder more responsibilities (family or social) encouraging them to exploit forest resources for financial requirements to meet the responsibilities.

It was hypothesized that the likelihood of household participation in NTFP collection decreases with increases in the distance from homestead to market town and vice versa. The longer it takes to reach markets, the larger the transportation/marketing costs and the smaller the resource rent will be or vice versa. Hence, the likelihood of household participation in NTFP collection should decrease with increases in the distance from homestead to market town (Ndoye et al, 1998). Distance to market or town in this study was positively associated with share of NTFP income though its association with participation in NTFP collection is statistically weak. This may be because many NTFPs are used for subsistence, in which case marketing of NTFPs is no longer a burden, and longer distances also increase the opportunity cost for non-farm employment in urban areas encouraging NTFP collection. These results are comparable to Babulo et al (2008) according to which households with better access to markets are less likely to choose forest collection as a dominant means of livelihood.

Whereas, distance to forest in this study affected participation in NTFP collection negatively as expected though its association with share of NTFP income was statistically weak. In line with the finding in this study, Coulibaly-Lingani et al (2009) identified that households closer to forests had a higher relative forest income. With longer distances from homestead to forests, the transportation costs and the opportunity costs for collection of NTFPs will increase and, thus, the lower the interest to collect NTFPs will be (ibid).

Total number of household members and number of working age household members showed a negative and positive relationship to share of NTFP income, respectively, but both showed statistically weak relationship to participation in NTFP collection in this study. The effect of the total number of household members was not hypothesized ex ante as the literatures forecast mixed relationships. Larger households have more mouth to feed that they may exploit more NTFPs to meet subsistence requirements. But, larger households may also have lower per capita wealth/income and face subsistence constraints that they could fail to fulfill the capital requirements for collection of NTFPs and, hence, collect smaller quantity of NTFPs (Coulibaly-Lingani et al, 2009; Mohamed, 2007).

Number of working age household members showed positive relation to the share of NTFP income as expected in this study. This can be because larger households have more workers and more relaxed constraint with respect to total work time available that they may collect more quantity of NTFPs (Coulibaly-Lingani et al, 2009). In line with this finding, Fisher (2004) showed a positive association between number of men and the share of earnings from high return forest activities but the association is, though positive, statistically weak for low return forest activities.

Education of household head as expected affected participation in NTFP collection negatively but showed statistically weak relation to the share of NTFP income. Higher level of education is associated with increased social status and better economic opportunities making opportunity costs for NTFP collection higher and time allocated for NTFP collection more expensive (Kiplagat et al, 2010; Coulibaly-Lingani et al, 2009). Hence, the likelihood of household participation in NTFP collection should decrease with higher educational level. In line with the current study, Fisher (2004) identified a negative association of education with forest reliance and the author stated that this may be because education signals one's potential productivity and increase the likelihood of being hired into attractive labor markets. Similarly**,** Babulo et al (2008) confirmed that better educated households are less likely to choose forest collection as a dominant means of livelihood.

Duration of residence showed positive association to participation in NTFP collection but statistically weak association to the share of NTFP income. It was hypothesized that the longer the period of time a household lives in the study area, the more the accumulated forest knowledge and the higher the likelihood of household participation in NTFP collection. As hypothesized, number of years of household residence in the study area showed a positive relationship to likelihood of household participation in NTFP collection. In line with the finding in this study, Mohammed (2007) identified that the more the household accumulated forest knowledge is, the more the likelihood of allocating labor to honey production.

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REFERENCES

[1] Abebe H. et al, Integrating forest conservation and livelihood improvement in South-West Ethiopia. NTFP Research & Development in South-West Ethiopia project, Policy Briefing Note 2, 2007.

[2] Arnold J.E.M. & Perez M.R., The Role of Non-timber Forest Products in Conservation and Development. Incomes from the Forest: Methods for the development and conservation of forest products for local communities, Indonesia: Center for International Forestry Research, 1998, pp. 17 – 42.

[3] Babulo B. et al., Household livelihood strategies and forest dependence in the highlands of Tigray, Northern Ethiopia, Agricultural Systems 98, 2008, pp. 147–155.

[4] Belcher B. & Kusters K, Non-Timber Forest Product Commercialization: Development and conservation lessons, no date.

[5] Belcher B. and Schreckenberg K., Commercialization of Non-timber Forest Products: A Reality Check, Development Policy Review, 2007, vol. 25 (3), pp. 355-377.

[6] Belchere B., Ruiz-Pe´rez M. and Achdiawan R., Global Patterns and Trends in the Use and Management of Commercial NTFPs: Implications for Livelihoods and Conservation, UK: Elsevier Ltd., World Development, 2005, Vol. 33 (9), pp. 1435–1452.

[7] Bognetteau E. & Wirtu O., Certification and market development for NTFPs: an option for sustainability, NTFP Research & Development in South-West Ethiopia project, 2007, Policy Briefing Note 3.

[8] Coulibaly-Lingani P. et al, Determinants of access to forest products in southern Burkina Faso, Forest Policy and Economics, 2009, vol. 11, pp. 516–524, www.elsevier.com/locate/forpol.

[9] Ermiyas M., Contribution and Determinants of Non-Timber Forest Products Use in the Household Economy: The Case of Bonga Forest Area, South West Ethiopia, 2011, Ethiopia: Hawassa University, Wondo Genet College of Forestry and Natural Resources.

[10] FA & SOSSE, Strengthening Sustainable Livelihoods and Forest Management Programme (SSLFM), Ethiopia: Participatory Forest Management Baseline Survey, 2011.

[11] Fikadu T., Overview of natural resources in SNNPR, Policies to increase forest cover in Ethiopia, Ethiopia: Environmental Economics Policy Forum for Ethiopia (EEPFE) & Ethiopian Development Research Institute (EDRI), Proceedings of a Policy Workshop, 2008.

[12] Fisher M.,. Household welfare and forest dependence in Southern Malawi, UK: Cambridge University Press, Environment and Development Economics, 2004, vol. 9, pp. 135–154. DOI: 10.1017/S1355770X03001219.

[13] Gubbi S. & MacMillan D.C., Can non-timber forest products solve livelihood problems? A case study from Periyar Tiger Reserve, India, UK: Fauna and Flora International, Oryx, 2008, vol. 42 (2), pp. 222–228, doi:10.1017/S0030605308071111.

[14] Gudoy R. et al, The Effect of Income on the Extraction of Non Timber Tropical Forest Products: Model Hypothesis and Preliminary Findings from the Sumu Indians of Nicaragua, Human Ecology, 1995, Vol. 23 (1).

[15] Kiplagat A.K. et al, What influences household demand for non-timber forest products? Linking econometric and participatory methods in Kakamega Forest, Kenya, Germany: International Society of Ecological Economics (ISEE), 2010.

[16] Löfgren H. & Robinson S., TO TRADE OR NOT TO TRADE: NON-SEPARABLE FARM HOUSEHOLD MODELS IN PARTIAL AND GENERAL EQUILIBRIUM, Washington D.C.: International Food Policy Research Institute, Trade and Macroeconomics Division, 1999, Discussion Paper No. 37.

[17] Mbuvi D. & Boon E., The livelihood potential of non-wood forest products: The case of Mbooni Division in Makueni District, Kenya, Springer Science+Business Media B.V., Environ Dev Sustain, 2009, vol. 11, pp. 989–1004, DOI 10.1007/s10668-008-9163-2.

[18] Mcelwee P., Forest environmental income in Vietnam: household socioeconomic factors influencing forest use, Foundation for Environmental Conservation, Environmental Conservation, 2008, vol. 35 (2), pp. 147–159, doi:10.1017/S0376892908004736.

[19] Mitchell, A. W. et al, Forests First in the Fight Against Climate Change, UK: Global Canopy Programme, John Krebs Field Station, 2007.

[20] Mohamed A.,. The contribution of non-timber forest products to rural livelihood in southwest Ethiopia, Wageningen University and Research Center, Department of Environmental Sciences, Forest and Nature Conservation Policy Group, 2007.

[21] Mohammed et al.,. COUNTING ON FORESTS: NON-TIMBER FOREST PRODUCTS AND THEIR ROLE IN THE HOUSEHOLDS AND NATIONAL ECONOMY IN ETHIOPIA, Addis Ababa: Agricultural Economics Society of Ethiopia (AESE), 8th Annual Conference Proceedings, 2006, pp. 179-196.

[22] Muzayen S., The Role of Non Timber Forest Products to Rural Livelihoods and Forest Conservation: A Case Study at Harana Bulluk District Oromia Region, Ethiopia: unpublished work.

[23] Nasi R. et al, FOREST ECOSYSTEM SERVICES: CAN THEY PAY OUR WAY OUT OF DEFORESTATION? New York: A discussion paper prepared for the GEF for the Forestry Roundtable to be held in conjunction with the UNFF II, 2002.

[24] Ndoye O. et al, The Markets of Non-timber Forest Products in the Humid Forest Zone of Cameroon, RURAL DEVELOPMENT FORESTRY NETWORK, 1998, Network Paper 22c.

[25] Neumann R.P. and Hirsch E., Commercialisation of Non-Timber Forest Products: Review and Analysis of Research, Bogor, Indonesia: Center for International Forestry Research, 2000, http://www.cifor.cgiar.org.

[26] NTFP - PFM SWEP, CARBON OFFSETS PLAN VIVO PROJECT CONCEPT NOTE, Mizen Teferi, Ethiopia: unpublished work.

[27] Ogle B., Peoples Dependency on Forests for Food Security: Some Lessons Learnt from a Programme of Case Studies, Bogor, Indonesia: Center for International Forestry Research, Proceedings of the Workshop ÒResearch on NTFPÓ, 1996, pp. 219-242.

[28] Paumgarten F. & Shackleton C.M., Wealth differentiation in household use and trade in non-timber forest products in South Africa, Elsevier B.V., Ecological Economics, 2009, vol. 68, pp. 2950–2959, www.elsevier.com/locate/ecolecon.

[29] PCS, DEFINITION OF NON-TIMBER FOREST PRODUCTS. CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA, Geneva, Switzerland: Seventeenth meeting of the Plants Committee, 15-19 April 2008, PC17 Doc. 18 (Rev. 1).

[30] Pearce D.W. & Pearce C.G.T., The Value of Forest Ecosystems, A Report to The Secretariat Convention on Biological Diversity, 2001.

[31] Sadulete E. & Janvry A., Quantitative Development Policy Analysis, Baltimore and London: the Johnshopkins University Press, 1995.

[32] Schravesande-Gardei J., Local valuation of forests in South West Ethiopia, NTFP Research & Development Project SW Ethiopia, 2006, Student Research Series No. 6.

[33] SFC, The Scottish Government's Policy on Non-Timber Forest Products, Edinburgh: Scotland Forestry Commission, 2005.

[34] Shackleton C. & Shackleton S., The importance of non- timber forest products in rural livelihood security and as safety nets: a review of evidence from South Africa, South African Journal of Science 100, 2004.

[35] Shariff A.A. et al, The Comparison Logit and Probit Regression Analyses in Estimating the Strength of Gear Teeth, EuroJournals Publishing, European Journal of Scientific Research, 2009, Vol.27 (4), pp. 548-553., http://www.eurojournals.com/ejsr.htm.

[36] Shone B.M. & Caviglia-Harris J.L., Quantifying and comparing the value of non-timber forest products in the Amazon, Ecological Economics, 2005, vol. 58, pp. 249– 267, WWW.elsevier.com/locate/ecolecon.

[37] Sisay N. et al, Policies to Increase Forest Cover in Ethiopia, Addis Ababa: proceedings of a Policy Workshop organized by Environmental Economics Policy Forum for Ethiopia (EEPFE) and Ethiopian Development Research Institute (EDRI), 2008.

[38] Sutcliffe J.P., THE EXTENT AND ECONOMIC COSTS OF DEFORESTATION IN SOUTH-WEST ETHIOPIA: A PRELIMINARY ANALYSIS, NTFP Research & Development Southwest Ethiopia Project & the University of Huddersfield Centre for Wetlands, Environment and Livelihoods, 2009.

[39] Tadesse T., The Values of Some Forest Ecosystem Services in Ethiopia, A Discussion paper presented at the workshop on "Ethiopian Forestry at Crossroads: Proposal on New Direction for Sustainable Development", 2008.

[40] Taylor J.E. & Adelman I., Agricultural Household Models: Genesis, Evolution, and Extensions, Forthcoming in Review of Economics of the Household, 2003, Vol. 1, (1).

[41] USAID, Ethiopia Biodiversity and Tropical Forests, 2008.

[42] Vedeld P. et al, Counting on the Environment: Forest Incomes and the Rural Poor, Washington, D.C.: THE WORLD BANK, ENVIRONMENTAL ECONOMICS SERIES, 2004, Paper N0. 98.

[43] Vedeld P. et al., Forest environmental incomes and the rural poor, Forest Policy and Economics, 2006, vol. 9, pp. 869 – 879, www.elsevier.com/locate/forpol.

[44] Wong J.L.G., The biometrics of non-timber forest product resource assessment: A review of current methodology, UK: the UK Department for International Development, Forest Research Programme, 2000.

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