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Review Article

Review on Socio Economic and Ecological Role of Non Timber Forest Products in South Western Ethiopia

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Abstract: This review paper focuses mainly on the socio-economic and ecological role of NTFPs contributes to the rural household economy and the types NTFPs. NTFPs are defined to encompass all biological material that may be extracted from natural ecosystems, managed plantations, wood lands, etc., and be utilized within the household, be marketed, or have social, cultural or religious significance. NTFPs Ethiopia covers wide range of products namely wild coffee, honey, gum and resin, spice and wild food, fodder, fuel wood, medicinal plants, construction materials, farm implements, handcrafts, household equipment, and among others. Most NTFPs covered in the review are found to be plant origin except honey and represent an important element in the livelihood of the rural people. These NTFPs are used either for subsistence to be consumed at household level or sold to generate income or both. Based on the existing literature NTFPs are essential components of livelihood activities for the rural people living in and around the forest. In quantitative terms, the level of input the NTFPs contribute to rural people is comparable with the other major livelihood activities like livestock and crop production. On top of this its share to the poor category is found to be major and highest than the richer and this shows the product is more important for the poor. This has an implication that the role NTFPs plays in a rural poor is an immense (broad). The importance of NTFPs is not limited to the improvement of livelihood of the rural people. But goes beyond the economy and it has environmental implication (forest development). Through commercialization of some selected NTFPs such as wild coffee and honey it is possible to protect and sustainably manage the forests. Commercializing these products increases the incomes the rural people generate from the forest without causing adverse effect and in turn contribute to Forest management.

Keywords: NTFPs; types of NTFPs; Socio-Economic and ecological Role; NTFPs contribute to Forest management.

1. INTRODUCTION

There is no single common definitions well as standard definition of NTFPs found in literatures (Gray and kristin, 2005; Ahenkan and Boon, 2011).NTFPS can be defined in broadest sense as "Any biological resources collected from wild by people for direct consumption or income generation on a small scale" (shackleton and shackleton, 2004).This definition is applied for this study. NTFPS can classified into different categories (Jeannette, 2000; Aramde, 2006). The common NTFPS type of categorization listed by the International Economic Botany Data Collection Standard (IEBDCS) is based on use categories namely: food, fuel, feed, medicine, construction materials and animal products (Andel, 2006).The categories By IEBDCS Were adopted for this study.

For centuries, people of the tropical rainforest have been collecting NTFPs for subsistence and income generation (pfund and Robinson, 2005). For example, an estimate done by WHO showed that 80% of the people living in developing countries use wild plants to meet some of their health and nutritional needs (Agbogid, 2010). Similarly, in Ethiopia NTFPS are used to supplement diet and household income, especially during particular season in a given year (EARO and IPGRI, 2004).However, little effort has been made to study the ecology, use and management of money NTFPS (Martinez, 2004), except for a few

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species and product of commercial importance (FAO, 2004b). Consequently, NTFPS are given less weight in policy and decision-making processes of natural resource management (Bishop, 1998; Berhanu, 2004).

IN connection with this fact, there is little documented information regarding the contribution of NTFPS to the livelihood of the study area. Meanwhile, agriculture is given the highest attention for development of rural livelihoods and national economy by the government. However, Agricultural expansion and practices are some of the plausible (possible) factors for deforestation and subsequent consequences such as soil erosion and degradation. Therefore, to avoid or minimize deforestation related negative result and to diversify the livelihoods of rural households, NTFPs can be a right alternative that deserve investigation at the study area. Hence, this review has explored socio economic role of NTFPS to livelihoods of the study area.

1.1 ROLE OF NTFPs IN GLOBAL LEVEL

The term 'forest product' almost immediately brings to mind timber and wood-based forest products FAO (1995). Forests are multi-functional which are providing wide range of products to people living in both developed and developing countries Campbell B, *et al*. (2012). However, forest products have typically been divided into two major categories: Timber and equally important are the non-timber forest products (NTFPs here in after) collected from the forest. At times various terms have been used to describe NTFPs like secondary, minor, special, specialty non wood and nontraditional Shanley P (2011).

Utilization of NTFPs to create win-win options for forest conservation and improvement of local livelihood depends up on how they are managed and governed in respect to both access to recourses and access to the market, Laird *et al*. (2010). Effective governance of NTFPs is important throughout the management harvesting trade and use phases the most NTFPs however, the governance of NTFPs was over looked and poorly regulated in past years Laird *et al*. (2010).

This is due to the increasing recognition that NTFPs can contribute significantly to the livelihood forest dependent communities (clendon, 2001; FAO 1995), CLARK AND SUNDERLAND, 2004 generate additional employment and income and offer opportunities for NTFPs based enterprises, moreover, NTFPs are more accessible to the poor contribute to foreign exchange earnings and support biodiversity and other conservation objectives, Adel, 2000, Arnold and Ruiz perez1998; Marshall *et al*., 2005.

Globally; international trade in NTFPs is estimated at USD 11billion annually (Ndoye and Ruiz Perez 1998;shiva and verma, 2002).NTFPs are harvested for both subsistence and commercial use either regularly or as a fall back during times of need. They add to people's livelihood security, especially for rural dwellers. NTFPs may also have marketed cultural significance and value NTFPs are conventionally veiled as the product of the poor lend like that of the timber for the rich (Ahenkan and Boon.2010).

However, evidence indicates that developing countries forest product is also integral component of livelihood of sizeable proportions of urban households. In several studies on the role of NTFPs in rural livelihoods, various strategies for incorporating these products in the livelihood practices to the economic characteristics of species and to accesses to markets, (Belcher and Schrekenberg 2007. Rostonen and kuters, 2011).

The use of NTFPs is as old as human existence (Aiyeloja and Ajewole, 2006). In subsistence and rural economies the role and contributions of in the daily life and welfare of people all over the world are crucial because of their richness of variety, as sources of food for example fruits, nuts, honey, insects, animals etc. fodder, fiber, fertilizers, medicinal extracts, construction materials, cosmetic and cultural prouducts, natural dyes, tannin, gums, resins, latex and other exudates, essential oils, spices, edible oils, decorative articles, horns, tusks, bones, pelts, plumes, hides and skins, non-wood lignocellulosic products, photochemical and aroma chemicals. Therefore, this study seeks to identify the various NTFPs and their importance as they contribute to house hold economies.

1.2 OBJECTIVE

1.2.1 General Objective

- To review socio-economic and ecological role of NTFPs in South Western Ethiopia.

1.2.2 Specific Objectives

- To determine the types of NTFPs.
- To assess socio-economic role of NTFPs.
- To assess ecological role of NTFPs.

2 ROLES OF NTFPs IN AFRICA

According to [1](2003) many millions of forest dwelling people depend on NTFPs both for own consumption at household level and sale to generate income. Although NTFPs play major role in the rural economy of Africa information on their overall contribution is patchy (unreliable) and incomplete at best, except flora few species and products of commercial importance. (FAO, 2003).

The lack of systematic efforts to conserve and manage resources is a major concern and it is in only a few cases that efforts have been made to cultivate species that yield NTFPs. African forest are source of variety of NTFPs such as fruits, nuts, honey, insects, animals etc. fodder, fiber, fertilizers, medicinal extracts,

construction materials, bamboo, cosmetic and cultural prouducts, natural dyes, tannin, gums, resins, latex and other exudates, essential oils, spices, edible oils, decorative articles, horns, tusks, bones, pelts, plumes, hides and skins, on-wood lingo cellulosic products, photochemical and aroma chemicals. Those products are of a crucial importance to the livelihoods of a rural communities and, in some situation, account for a significant share of house hold income. (FOA, 2003).

As a source of food increased demand has not necessarily led to improved management including domestication, and a substantial proportion of products are collected from the wild, hence resource depilation is a major problem (FAO, 2003). Further. Africa has not been able to take advantage of its wealth of raw material and traditional knowledge and income generation concluded that the main effect of harvesting whole individuals would be via generic different and indirect selection. Throughout Africa, numerous medicinal plant species are becoming increasingly scarce due to arise in trade to meet the demand from growing urban population (marshall, 1998).

For example favored species such as dalbergiamelanoxylon have declined in Kenya and South Africa. Though harvesting to supply the wood carving trade, bark extraction has caused serious damage to wild populations of prunes Africana, including trees inside forests of high conservation value. Cunningham et al, 2002.Warburgiaugandensis is another tree species threatened by exploitation of its roots, barks and shoots for medicinal purpose in East Africa, bosewellia is one the threatened species in Ethiopia due to over exploitation or improper tapping species in incense and lack of regeneration Abeje, 2002,

Unless harvesting is controlled, some species will therefore become generally impoverished (depleted) more rapidly than others, exploitation of NTFPs form the wild in many respects and depending on the plant part harvested can help for sustainable utilization of the species. However, this requires understanding growth and reproductive characteristics of the plant and the application of harvesting of the individual organism. (Arnold and Perez, 2001).

2.1 Types and Contribution of specific NTFPs in Ethiopia

In Ethiopia. Type of non-wood forest products covers wide range. They are naturally produced by certain forest species of the genera .Such as coffee, boswellia, acacia, eucalyptus, commiphora, pinsaswellas, palms, residues, liquidating, lumber, fruits, nuts, honey, insects, animals, fdder, fiber, fertilizers, medicinal extract, construction materials, bamboo, cosmetic and cultural products, natural dyes, tannin, gums, resins, latx and other exudates, essentialoils, spices, edibleoils, decorative articles, horns, tusks, bones, pelt, hides and skins, lingocellulosic, products, photochemical and aroma chemicals (FAO, 2007).

Generate income not from a single source rather depend on wide varieties of livelihood activities; both cash and in kind, to meet their daily needs. Multiple sources of income are common including crop production, livestock, NTFPs and engagement in off- and non-farm activities and income from aid and remittance. About involvement it ranges from 58% to 100% which means large proportion of forest adjacent people are taking part in and depend on NTFPs activity to make living Berhanu (2003). Contribution of NTFPs In developing countries, NTFPs are used by many millions of people. As indicated by Shackleton S *et al*. (2011). The most widespread use of NTFPs is subsistence gathering for direct household includes health care, nutrition, shelter and energy. NTFPs can also be used to generate income for the rural people by selling.

Shackleton S *et al*. (2011). Forwarded four reasons as to why people trade NTFPs: in response to emergency, livelihood diversification, as a regular source of income and lack of alternatives.

Shanley *et al*. (2002) pointed out that NTFPs are critical to rural subsistence livelihoods in tropical forested areas and they provide communities with key subsistence resources and with a valuable means of generating cash income. Forests are a home to wide variety of NTFPs. Resource poor households depend on a broad diversity of both plant- and animal based NTFPs. There is important difference in the way in which NTFPs contributes to local people's livelihoods.

For communities living in and/or around the forest, NTFPs play an important role in provision of three major function such as fulfilling households subsistence and consumption needs, serving as a safety nets or emergencies and risk minimization in terms of crisis when usual food stores run out in times of hard ships or crop failure and lastly providing regular cash income Arnold JEM, Ruiz Perez M (1995).

Nowadays, there is a growing recognition of the importance of NTFPs to the livelihoods, income generation and local economies Shanley P (2011). Of the people living in and around the forest. People who live in and around forest areas are dependent on forest produce to meet domestic needs of fuel, fodder, small wood, and a variety of fruits, flowers and leaves for different purposes. Ethiopia is one of the tropical countries in which NTFPs play an important role in rural livelihoods Mohamed Chilo (2011). NTFPs collection is an integral component of diversified livelihood strategies. Many rural communities have for centuries lived in and around forest and they make use of forest resource among which, NTFPs played important role to the local economy of the local

community living in and around the forest. Communities living in or near forests tend to depend in important ways on a wide variety of NTFPs. A range of studies indicated that large number of the local people depends.

Ethiopia is endowed with a wealth of plant species with high potential to produce herbal and plant derived drugs. There are numerous forest products with potential edible that can be either directly consumed or processed in food industries. The most important non wood forest products in Ethiopia includes honey and wax, bamboo, reed, gum Arabic, resin from soft wooded species. Edible plant products. Fibers, essential oils, tannins and days, resins, ornamental plants, long grass as the rooting cover for local construction, edible and non-edible animal products, medicine, mush rooms, various extractives and etc. Bamboo can be used as substitutes of wood; as a building materials poles, fences, water pipes, bags, tools, musical instruments, waking sticks, furniture, pulp and paper, fishing rods, etc. some of the above NTFPs are being changed in to house hold furniture, tools and equipment while coffee, gum arabic, spices, and incense are marketed commercially all over the country and exported international trade too (FAO, 1990).

Coffee: Coffee arabica is an endemic shrub plant and still grows wild and found in its original birth place in southwest Ethiopian remnant forest. According to Petit (2007) Ethiopia is the largest coffee producer and exporter country in Africa and being a cash crop, it plays crucial role in sustaining an estimated of 7-8 million people associated with coffee growing Petit (2007).

According to Fissaha Asmalesh (2008) about 25% of people in Ethiopia depend on coffee for their livelihood. Various studies Berhanu (2003).indicated that coffee beans and leaves are mainly used for drinking and the dried branches and leaves are also used as firewood. Further it is demonstrated by these authors that coffee has medicinal and socio-cultural value. According to Petit (2007) 40% of total coffee produced is consumed at household level. Moreover, coffee is also a good source of income to local farmers. According to the study in Yayo forest reserve by Adanech & Lema *et al*. (2017) forest coffee accounts for 74.9% of NTFPs income. According to studies done by USAID in three zones of south western Ethiopia income from coffee sale ranges from 750-10, 000 ETB Nicolas Petit (2007). The study finding indicates that poor and very poor groups' gets less from coffee sale while the better of gets more. Coffee harvesting and processing involves labor intensive activity and provides source of income for large number of rural poor Nicolas Petit (2007).

Honey: It is mentioned that Ethiopia has long tradition of beekeeping and it is stated to be a deep-rooted household activity Ajabush Dafar (2018). Honey is one of the main NTFPs used as a cash crop for most rural people (especially in forested and wood land areas). Forest beekeeping entirely depends on forest and woodlands consisting of enormous number of species of plant that produce surplus pollen and nectar year-round to foraging bees Adilo M (2005) Feyera *et al*. (2013). Documented 32 different plant species that are used as a source of honeybee flora.

Berhanu (2003) reported the forest provides three main functions for beekeeping whereas Fisseha (2008) reported two of them, namely forests as the main sources of pollen and nectar, beekeeping site or placement of hives and lastly, provision of raw materials for the construction of beehive.

In addition to the above Freerk Wiersum & Tefera Belay (2005) mentioned more functions like source of vegetative material for smoking and fumigation of hives, provision of shelter and by so doing protect bees from adverse climatic conditions. Therefore, the practice is totally dependent on the forest and wood lands regardless of the time and labor invested; the raw materials for this activity are obtained from the forest directly. According to Mohammed Adil *et al*. (2005) out of the total honey produced more than half of (50-60%) is used in the production of local beverage or tej (honey wine), 20% is consumed at household level and only a small portion of the product is marketed. Cash generated from the sale of honey provides an opportunity of supplementing income earning for the farmers.

Nuru (2003) indicated that honeybee and their products provide direct cash income for beekeepers. Findings show that Forest beekeeping is the most important NTFPs in the southwest bio-diverse forest in Ethiopia. Teklu Gebretsadik & Dinku Negash (2016) reported beekeeping accounts for 15% of total household income in Gedio area of south Ethiopia. Awraris Getachew *et al*.(2012) reported forest beekeeping contributed 50% of household income of the people involved in the activity where Mohammed Adil *et al*.(2005) reported that in the south western parts of Ethiopia on average households own 2030 beehives where from a single hive 5-6kg can be harvested and annually households get 100-200kg of honey. Study conducted in dry afro-montane forest found in the central part of Ethiopia.

Vedeld P (2006) found that forest resource constitutes about 39% of the total income and out of this proportion 2% is contributed by honey. Finding from dry forests Abdella Gure (2016) indicated honey accounts for 49% of NTFPs contribution to total household income which is unusually reported as compared with forest from southwest and southern areas endowed with high natural forests. Fenet Belay Daba & Alemayehu Oljirra Wolde *et al.*, (2010) stated

Beekeeping is believed to play a significant role and one of the possible options to the smallholder farmers in order to sustain their livelihood. It does not only provide input to the economy of the rural people as a source of additional income, but it plays diverse roles through contributing to health as a medicine to cure different disease such as cold, stomach discomfort and wounds Fisseha Asmelash (2008), nutrition and social issues through reinforcing local institutions through sharing of brood during harvesting of honey Berhanu (2003).

Gum and resin

According to Teshale Woldeamanuel (2012) most forest resources in Ethiopia are found in dry wood lands in the lowlands. Dry lands cover about 75% of Ethiopia and these forests hosts valuable fauna and flora species these dry forests are reported to be rich in ABC species Tarekegn Abebew (2003).

Teshale Woldeamanuel (2012) reported that about 35 ABC species has been identified as potential gum and resin producing species. Even though dry forests provide wide diversity of NTFPs such as wood for construction, firewood, charcoal, farm tools, household furniture and utensils, fodder and shade for their animals, wild fruit, wild meat from hunting, medicines, recreation, bee forage for honey production accounting system considered only the most commercially important and popular NTFPs collected from dry forest: gum and resin.

These economically important products are naturally produced by various forest species of Acacia, Boswellia, and Commiphora (ABC species). Gum and resin bearing tree species are found in almost all regions: Tigray, Amhara, oromia, Gambella, Somali, Benshengul gumuz, SNNP and Afar. Gum and resin are among widely used and the most economically valuable NTFPs obtained from dry forests of Ethiopia that contributes to livelihoods of local communities living in and near it Baye Belay (2015).

Adefires Worku *et al*. (2014) reported that gum and resin collection is mainly to get cash income. This means the local people obtain considerable amount of income from these resources. In quantitative terms, the level of input the gum and resin alone contribute to rural people is comparable with the other major livelihood activities like livestock and crop production. In most studies the input of gum and resin comes next to livestock. Therefore, based on the existing literatures gum and resin is an essential component of livelihood activities for the rural kers.

Construction materials, farm implements, furniture and hand crafts

With regard to construction, NTFPs play paramount role in rural areas to construct and maintain house or hut, fence, storage materials (made up of bamboo, lianas and small sticks) and among others. Fisseha Asmelash (2008) reported lianas, climbers, vines and small poles are very important NTFPs used for house and fence construction. Lianas substitutes and perform the purpose of a nail in house construction specially while constructing traditional huts. Thatches are used to cover the roof of traditional hut.

According to Berhanu (2003)and Fissaha Asmalesh (2008) natural fibers produced from forest plants are reported to be forest ropes, basketry, carpets, bags and woven mats. Forest ropes play an important role to construct houses (hut) of the rural people and make traditional beehives. Amount or quantity of ropes needed varies depending on the size of 'hut to be constructed. The wealthier groups of the community constructs big house with quality tree species while the poor small ones. Depending on the types of tree species used and quality of hut constructed, maintenance take place either in short or longer interval of time. If termite resistant tree species are used and well-constructed in the very beginning, maintenance is carried out on average after four years which otherwise take place less than the time stated. The quantity of forest ropes used will become quarter of the amount used at the beginning. The weight of single bundle was estimated or weighed to be five kilograms when it is freshly cut. This is the usual amount a person can cut and bring from forest. Moreover, forest ropes and climbers are also used in making fence, cover to the beehives, tying beehives to the tree during placement and tying domestic animals. Reports on sale of construction materials, handicrafts, farm implements and household equipments are rare. This doesn't mean these NTFPs are not used. The products are utilized, remained un-estimated.

But Dagim *et al*. (2016) found that 6% of the forest income was represented to be contributed by construction materials and handicrafts while Mamo *et al*. (2006) reported 21% of forest income contributed by construction materials for houses, storage facilities, fences, furniture, and farm implements. For Ethiopia farm implements are basic elements and play an important role in crop production.

As reported by Fisseha Asmelash (2008) various types of wood are used to make farm implements. A set of traditional farm implements used in Ethiopia and produced from certain species of trees consists of Mofer, Erf, Degri, Qechil, Qetert and yolk.

Energy

In terms of energy, the roles of NTFPs as a source of energy occupy a central part for large majority of people in Ethiopia. Since more than 85% of the country residents live in the rural areas where there is absence of other alternatives energy sources for cooking the last option they have is to entirely depend on biomass energy (firewood, dung and crop residue).

Wood collected from nearby forest plays an important role in filling the energy gap. Fuel wood still remains the most dominant domestic sources of energy needs and continues to be important for the foreseeable future and is one of the most important NTFPs mainly used for cooking, heating and boiling water. Finding of study conducted at Bale eco-region Beyene (2015) indicated that large majority (81.1%) of people depend on firewood, charcoal and leaf for cooking. Not only for rural people is it also key sources of energy for accounting system.

Medicinal plant

In Ethiopia the collection and use of medicinal plants both for humans and livestock is a common practice among people in the rural areas especially in the remote and forested areas where modern medication is quite un accessible because of cost and lack of infrastructure and facility. The forests are endowed with very rich plant species from which traditional medicine are used to be derived. Again, even though, there is no accessibility problem because of cost and effectiveness the rural people prefer to use plant parts Berhanu (2005). The author further pointed out that forest serve as good source of medicinal value plant parts such as bark, leaves and roots. Varieties of plant species and its parts are used to cure different disease.

Medicine is one of the NTFPs, and traditional medicine has an important place in the health care of Ethiopian population. It is estimated 80% of the people rely on some form of traditional medicine for their primary (Desalegn and Pierre, 2002).

Feyera Senbeta *et al*. (2013) reported a total of about 50 plant species those have medicinal uses. Endalew Amenu (2007) identified eighty-nine plant species used as a source of medicine. The source further noted that traditional medicinal plants provide 40% of human health service and more than 50% of livestock health service. In a biodiversity hotspot, Bale Mountains National Park in the South East Ethiopia and south western Ethiopia 337 medicinal species were identified and turned out to be a medicinal plant hotspot National Herbarium (2004).

Food

Forest and woodlands supply considerable amount of edible plant materials and plays a significant role in the livelihoods of rural people. variety of foods obtained from the forest and wood lands include fruits, seeds, leaves, bulbs, mushrooms, honey, beverages, bush meat, fish and among others. Forest foods give relief to the rural poor and children during shortage. Feyera *et al*. (2013) identified over 35 wild plant species that are considered by local people as source of food.

Berhanu (2005) demonstrated that some plant species from forests are used as food especially during hard times. It is also stated that children most commonly use these edible plant species. Traditional uses of wild edible plants are especially during hunger periods because of drought when crops fail and shortages. Study in southwestern by Tariku & Eyayu (2017) documented about 77 wild edible plant species and indicated the most plant parts used are fruits, leaves, roots and tubers and rhizomes (decreasing order).

Ermias *et al*. (2011) on their review of wild edible plants in Ethiopia documented about 413 wild edible plant species which only covered 5% of districts in the country. The study of this review summarized that wild edible plants of Ethiopia are used as supplementary, seasonal or survival food sources. Potential of NTFPs for Sustainable Forest Management NTFPs provision is not only for livelihoods of the rural people near forest but also have environmental importance.

Ros-Tonen *et al.*, (2005) pointed out that the extractive reserves were proposed as a combined strategy both to secure forest peoples' rights to forest resources and to promote environmental protection simultaneously. Although various studies earlier has shown the importance of NTFPs for the local communities, Ros-Tonen & Wiersum KF (2003).

2.2 Socio-Economic Role of NTFPs.

All most all livelihoods of the country people are depended on rain fed agriculture in which agroforestry practice is foot print. Income earned from tree products is calculated from both non-timber forest product (NTFP) and timber forest products (TFP) such as fruit, firewood, honey, spices, timber, pole and charcoal kebebew Z, Urgesa (2011). Even if the amount of income obtained is varying from place to place, that extra income is playing a great role for improving the livelihoods of farmers', particularly during some risks occurred related to crop production due to climate changes. Furthermore, the farmer obtains 47% income from NTFPs in Kaffa Zone Gebre egziabher Z, Mekonin *et al*., (2010) 800 to 1500 ETB in Wolaita Zone Agize M, Chaa E, shonga (2016) and 1683 ETB an annual average income from home garden agroforestry practice in Jimma Zone, southwest, Ethiopia kebebew Z, Urgesa (2011).

However, the amount of income derived from tree product is influenced by various factors. According to some literature experiences of tree planting, age of farmer, household wealth status, land size and education level are positively influencing the income of households. Agize M, Chaa E, shonga (2016).

The World Health Organization estimated that at least 80%of the populations of most developing countries rely on traditional medicine for their primary health care (WHO, 2001)as cited by Gidey M, Beyene

T *et al*. (2010). There are various works of literature, which shows the benefits of tree or shrubs for traditional medicine in different parts of the Ethiopia Fisseha M (2007). For instance, Croton macrostachyus for malaria, diarrhea, epilepsy, ringworm and skin rush,

Cordia africana to cure evil eyes, Euphorbia candela brum for ringworm, Millettia ferruginea for fungal infection, Vernonia amygdalina for diarrhea and stomachache. Thus, around 52 medicinal plant species was identified in Boost district central Eastern and western Ethiopia and also 39 medicinal plants used for the treatment of various diseases were differentiated in Jimma zone, Southwestern Ethiopia Abera B (2014).Argued that it is not an easy task to serve simultaneously ecological, economic and social objectives through a sustainable extraction of NTFPs which lead to doubt about potential of NTFPs harvesting from natural forest to contribute to forest conservation. This is due to the reason pointed by the same author that any livelihood gains from NTFPs to forest communities are not without certain ecological cost.

That is why the idea of conservation through commercialization has triggered criticism since any commercial harvesting of NTFPs does have a number of ecological impacts, including gradual reduction in the vigor of harvested plants, decreasing rates of seedling establishment of harvested species, potential disruption of local animal populations and nutrient loss from harvested material Parratt NT (1996).

2.2.1 Importance of NTFPs

- NTFPs extraction, which is largely family engagement, is the most important sub-sector with considerable cash provision to households.
- More than 80% of the Ethiopian population depends on traditional medicine from NTFPs for its health practices.
- Ethiopia also exports natural honey and bees wax (World's 4th and 10th exporter respectively).
- Harvesting and cultivation of wild spices is wide spread in many areas of southern Ethiopia.
- E.g**.** Sheka, Keffa, Bench-Maji, South Omo, Gamo Gofa; In 1999 the total supply ofspices from Shekicho-Keficho zone alone to the regional and national markets was about 1, 208 metric tons.
- Ethiopia also has about **2, 855, 000** ha of woodland that can yield natural gum and resin. In the period 1992-2001, for instance natural gum processing and marketing enterprise has produced about 14, 675 tons of different natural gum products. This sector can be among the top employment opportunities in remote part of Ethiopia.
- In Ethiopia there is also a potential for sustainable supply of about 3 million tons of over dried biomass of bamboo ever year.
- The study of Andargatchew (2008) show 47% of annual cash income of households in Shedem Peasant Association (PA) in Goba district is derived from bamboo sale.
- Framers of the PA provide about 17, 000 – 23, 000 bamboo culms each market day to Goba town to earn cash income (Andargatchew, 2008).
- Ali (2008) in the same region reports that various NTFPs extracted from vegetation of the region contribute on average to 54% of household total annual income.
- Goba town alone annual firewood turnover worth US$* =887, 790, and 70 % of the firewood is Supplied by women.
- In Bench Maji, 52% of annual cash income of households is obtained from NTFPs, while in Sheka it contributes to about 41% of household income (Adilo, 2007).
- In Gore district 88 % of households collect NTFPs, and generate 23 % of their average annual income of 1, 895 Birr (Debela, 2004).
- NTFPs also contribute a similar figure of 27.4 % to the average annual income of households around Menagesha Forest (Fetene, 2006).
- The mean annual income from beekeeping among households in Walmara district was between 450 and 3, 300 Birr (US$ 47 – 347) or 11.6 and 81.9% of total household income depending on wealth status of the households (Lemessa, 2006).
- Fuel wood, fodder, honey and construction material productions from Chilimo forests Contribute significantly to the livelihoods of households in Dendi district, contributing an Average to 39 % of the annual household income (Mamo *et al.*, 2007).(NB) Rate calculation at the time of reporting was 1 USD ≈9.5 Eth Birr.

Table: Summary of contribution of NTFPs incomes to total household's income by wealth categories

Author/s	Location	Rich	Medium	Poor
Berhanu(2004)	South west	15%	23%	28%
Adanech and Lema (2017)	South west	35%	55.5%	57.50%
Dagim *et al*.(2016)	South western	16%	24.8%	32.4%
Muktar *et al*.(2017)	South western	4%	9%	36%
Busha *et al*.(2016)	North western and South western	9.90%	15.5%	31.8%

Contrary to the above, other findings Beyene (2017) showed that both absolute value and income share for poor increased as compared to the other wealth category. This indicate that the poor gets more than the rich which implies the depends more on the forest recourses. This can be explained probably because of lack of access to alternative resources of income such as livestock, land and the like.

2.3 Ecological Role of NTFPs.

Arnold JEM, Ruiz Perez M (1995) also argued that the exploitation of NTFPs has a differentiated effect, depending on the types of species and the parts being harvested. However, as compared with logging or conversion of forest to other land uses, these impacts are viewed as minimal. This same author further indicated that though most NTFPs are locally used, NTFPs even contribute to a country's export earning, because some of them find their way in to international markets which indicates that this economic importance of NTFPs has important implications for natural tropical forest management and the planning of land use in tropical rain forest areas. One of the peculiar characteristics of NTFPs is that its ability to serve as income opportunities from forest that do not involve cutting down trees for wood products Plotkin M (1992). Even though there is a dilemma on potential of NTFPs as a conservation tool, it is important to mention that in forest performing important environmental functions it is important to consider NTFPs as a part of participatory forest management strategy Wiersum KF (2003).

In the context of Ethiopia, the concept of conservation through commercialization may effectively work on few selected NTFPs exploitation (especially honey and wild coffee). For instance, traditional honey production is mostly done in the forest in non-destructive manner so that the forest keeps on providing substantial amounts of income benefits to the local communities which the income obtained serve as an incentive in conserving the forest. Beekeeping in Ethiopia has recently getting attention because of its potential conserve forests (Gtachew Abreham(2018).

According to ITO (2014) beekeeping can be considered as a potential product that involves no clearing of forests as usually done to produce crops, rather the rural people need to protect forests to maintain the continuity of honey production. Because the forest is endowed with a variety of plant species that serve as source of honey bee flora and it is relatively intact and forms different vertical layers, viz. grasses, herbs, shrubs and trees that merge in to one another and in combination with its suitable climate makes it potentially convenient for honey production. The forests serve as the main sources of pollen and nectar. Beekeeping can be potential NTFPs that provide the rural people an incentive to conserve the forest Gidey & Mekonen (2010) cited in this source also indicated that beekeeping is an environmentally friendly activity that can be used in forest conservation.

Moreover, Ajabush Dafar (2018) suggested that beekeeping provides an economic incentive for the local people and be an ideal activity to conserve forest. Furthermore, experiences from southwestern Ethiopia are documented by Lowore et al. (2015) shows that forest beekeeping provides protection of forest from being over exploited which means if the forests are there; there will be abundant bee forage which in turn implies much honeybee production. The authors concluded and put that the income generated from forest honey by forest beekeeper motivated the local communities to act to maintain the forest.

Hartmann (2006) cited in Awraris Getachew *et al*. (2012) and Mohammed Adilo *et al*. (205). Suggested that bee keeping activity is a conservational system as income is generated through honey bee flora which in turn helps to maintain the forests. Commercial honey, according to Lowore & Wood (2014) reduces forest conversion to other land uses and forest degradation. CIFOR (2008) cited in Lowore &Wickens GE (1991) also mentioned that there is a strong link between traditional bee keeping and forest management that if rural people get enough amount of money from the business it serves as incentive for forest management. When bee keeping commercialized, it becomes economically valuable NTFPs leaving the forest intact without affecting its structure and function and addressing conflicting objectives of forest management Nepstad DC (1992) cited in Lowore & Wood (2014).

According to Mengistu (2011) cited in Ajabush Dafar (2018) beekeeping reduces pressure on land. Therefore, the local people will not encroach into forest in search of acquiring new land for agricultural activity. Mohammed Adilo *et al*. (2005). Suggested that forest honey obtains the name organic honey and commercialized have the potential to be used as an incentive for forest management. Provided that forest beekeeping is supported with strong market the livelihood of the rural people can be sustainable while protecting the forest. Therefore, the activity is environmentally friendly and economically sustainable.

According to Tefera Belay (2005) the rural people involved in beekeeping are involved in various forest management and forest protection activity such as protecting and preserving big trees, tending and protection of young trees and planting activities. It is reported by this author that 97% of beekeepers in southwestern Ethiopia were involved in one or other above-mentioned forest management practices. Moreover, this source indicated that 34% rural people reported as willingly worked for the conservation of the entire forest through Other NTFPs which fits with forest management is coffee. Even though the scholars in the field agrees on the negative effects of coffee on forests,

studies also showed that traditional coffee production in Ethiopia maintained high biodiversity in the system Woldemariam *et al*. (2005).

The authors further stated that coffee being produced in the forest can get the brand name of organic coffee which will help in the commercialization of the product which in turn leads to sustainable management and utilization of the forest coffee ecosystem. The promotion and commercialization of NTFPs (specifically honey and coffee) improves the livelihood of the people living inside and near the forest through creating more income opportunities which proves to provide major incentive for the local people to sustainably manage the forest resources. When these NTFPs are commercialized the rural households gets more income from the sale of coffee and honey production. This leads to protection of the forest from being further degraded and lost through reduction of pressure by the local people.

2.3.1. Sustainable management of NTFP resources

Sustainable NTFPs entail: wise utilization; strategic manipulation or development of the resource to meet basic need of communities (locals); and enhance critical ecosystem functions.

Hence, NTFP management comprises: Ecological, Technical, Economic, and Legal and political aspects

- **Ecological aspect of NTFP management**

Although many NTFPs can be harvested successfully in the short term, the long-term sustainability of the NTFP industry depends on a thorough understanding of NTFP biology and ecology for three reasons. First, it is essential to understand how NTFPs grow in order to promote their conservation through sustainable harvesting and cultural techniques. Second, gatherers and entrepreneurs need to understand the biology of NTFPs in order to optimize harvesting operations in both the short and long terms. And third, some NTFPs will eventually require domestication; to achieve this, a complete understanding of their genetics, biology, and ecology will be needed to grow a product that is as attractive as the naturally grown product. This understanding can be acquired through traditional knowledge gleaned from multiple generations of experience, through scientific research, or through a combination of these types of knowledge. So understanding the ecological knowledge of NTFPs are crucial to be used, maintained and monitored the resources wisely.

Technical aspect of NTFP management deals with: the choice between different methods

- And techniques and development of appropriate harvesting and processing technologies.
- The social aspect of the NTFP management looks in to: the cultures, belief system, aspirations, and social values, it also deals with competing/conflicting interests of local people.
- The economic aspect of NTFP management focus on: maximizing benefits from the resource and increasing resource use efficiency (minimizing input costs and wastes). Furthermore, resource management is also subjected to politics: it involves exercise of power and control over users of resource.

3. CONCLUSION AND RECOMMENDATION

3.1 Conclusion

In south western Ethiopia, NTFPs is an integral part of livelihood activity and play a central role to the rural people living in and around the forest. The contribution of NTFPs to the total household economy would have been more than what is appeared. The local communities are engaged in NTFP mainly either for household consumption or subsistence to directly meet household needs for food, medicine, energy, construction materials etc., or income generation from products like coffee, honey, spice and gum and resin or both. In quantitative terms, the level of input the NTFPs contribute to rural people is comparable with the other major livelihood activities like livestock and crop production. Commercialization of NTFPs (specifically honey and coffee) improves the livelihood of the people living inside and near the forest through creating more income opportunities which proves to provide major incentive for the local people to sustainably manage the forest resources. When these NTFPs are commercialized the rural households gets more income from the sale of those products. This leads to protection of the forest from being further degraded and lost through reduction of pressure by the local people. These two products: honey and coffee must be worked on and promoted as organic food so that they be treated as a specialty product. The non-commercial non-timber forest products such as medicinal plants, construction materials, hand crafts, fuel wood, forest grazing and forest foods not included in the accounting system but indirectly they play a crucial role to forest peoples.

3.2. RECOMMENDATION

- Provide the local value addition for NTFPs by adopting appropriate method.
- Provide appropriate technical support to manage wild collection of NTFPs and domestication processes.
- To their sustainability concerning body have to put out rule

ABBREVIATIONS

- (IEBDCs) = International Economic Botany Data Collection Standard
- WHO = World Health Organization
- NTFPs = Non Timber Forest Products
- FAO = Food and Agriculture Organization

4. REFERENCES

- FAO. (1995). Non-wood forest products for rural income and sustainable forestry. FAO Non wood forest products No. 7. FAO, Rome.
- Ros-Tonen, M.A.F., Wiersum, K.F. (2003). The importance of Non-timber forest products for forest based rural livelihoods: an evolving research agenda: Paper presented at the GTZ/CIFOR international conference on livelihoods and Biodiversity, Germany. p. 25.
- Emery, M. R., Rebecca J Mc Lain. (2001). Non - timber forest products: Medicinal herbs, Fungi, Edible fruits and nuts, and other natural products from the forest. Binghamton: The Haworth press, Inc., p. 176.
- FAO. (1995). Non-wood forest products for rural income and sustainable forestry. FAO Non wood forest products No. 7. FAO, Rome, Italy, p. 135.
- FAO. (1996). Domestication and commercialization of Non-timber Forest Products in Agroforestry systems. FOA Technical Report
- Arnold, J.E.M., Ruiz, Perez, M. (1995). Framing the issues relating to non – timber forest products research. Current issues in non-timber forest product research. CIFOR/ODA, Bogor, Indonesia, 275.
- Wilkinson, M.K., Elevitch, C.R. (2000). Non-timber forest products for Pacific islands: An introductory Guide for producers, 29.
- Shanley, P., Pierce, A.R., Laird, S.A., Guillen, A. (2002). Tapping the green market: Certification and management of non-timber forest products. Earths can, London, UK, p. 456.
- Arnold, J.E.M., Ruiz, Perez, M. (2001). Can non-timber forest products match tropical forest conservation and development objective? *Ecological economics*, *39*(3); 437-447.
- UNEP. (2016). The contribution of forests to national income in Ethiopia and linkages with REDD+. United Nations Environment Programme: Nairobi, p. 81.
- Berhanu, D. (2004). 'Contribution of non-timber forest products to the rural household economy: Gore District
- Abebaw, D., Habtemariam, K., Kassie, G.T., Lemenih, M., Campbell, B. (2012). Dry forest-based livelihoods in resettlement areas of Northwestern Ethiopia. Forest Policy and Economics, 20; 72-77.
- Agricultural Economics Society of Ethiopia (AESE). (2006). Commercialization of Ethiopian Agriculture. Proceedings of the 8th Annual Conference of Agricultural Economics Society of Ethiopia, February 24-26, 2005, Addis Ababa, Ethiopia. pp. 179-196.
- Mohammed, C., Wiersum, K.F. (2011). The role of non-timber forest products for livelihood diversification in Southwest Ethiopia. Ethiopian e-Journal for Research and Innovation Foresight, *3*(1); 44-59.
- Adanech, A., Lema, E. (2017). The contribution of Non-Timber Forest Products to the Rural Livelihood: The case of Yayo district, Illuababora zone, Oromia regional state, western Ethiopia. *International Journal of Applied Agricultural Research*, *12*(2); 157-169.
- Adilo, M., Woldemariam. T., Yadessa, A. (2005). Counting on forests: non-timber forest products and their role in the households and national economy in Ethiopia. Proceedings of the 8th Annual Conference of Agricultural Economics Society of Ethiopia, Addis Ababa. pp. 179196.
- Getachew, A. (2018). Assessment on the Constraints & Practices of Beekeeping, and Post-Harvest Honey Handling in Gesha District, Keffa Zone, South-West Ethiopia. *Agri Res & Tech: Open Access J*, *16*(1), 555974.
- Teshome, B., Kassa, H., Padoch, C., & Mohammed, Z. (2016). Determinants Level of Income of Gums and Resins in the Dry Forest Areas and the Contribution to Different Socio Economic in Northwestern and Southern Ethiopia. *Methodology*, *25*.
- Reshad, M., Mohammed, M., Mohammed, A., & Beyene, A. (2017). Socio-economic importance of non-timber forest products and its implication on natural forest conservation: The case of Jello-Muktar forest, south eastern Ethiopia. *Journal of Economics and Sustainable Development*, *8*(17), 45-52.
- Fikir, D., Tadesse, W., & Gure, A. (2016). Economic contribution to local livelihoods and households dependency on dry land forest products in Hammer District, Southeastern Ethiopia. *International Journal of Forestry Research*, *2016*.
- Mekonnen, Z., Worku, A., Yohannes, T., Bahru, T., Mebratu, T., & Teketay, D. (2013). Economic contribution of gum and resin resources to household livelihoods in selected regions and the national economy of Ethiopia. *Ethnobotany Research and Applications*, *11*, 273-288.
- Teshale, W. (2011). Dryland resources, livelihoods and institutions: Diversity and dynamics in use and management of gum and resin trees in Ethiopia, PhD Thesis Wageningen University, Netherlands, 169.
- Chamberlain, J., Bush, R., Hammett, A.L. (1998). Non-Timber Forest Products. The other forest products, 10.
- Mullatu, A. (2010). *Contribution of Forest Products Extraction to Livelihood Support and Forest Conservation in Masha and Andracha Woredas in SouthWestern Ethiopia* (Doctoral dissertation, Addis Ababa University).
- Worku, A., Pretzsch, J., Kassa, H., & Auch, E. (2014). The significance of dry forest income for

livelihood resilience: The case of the pastoralists and agro-pastoralists in the drylands of southeastern Ethiopia. *Forest Policy and Economics*, *41*, 51-59.

- Falconer, J. (1996). Developing research frames for Non-timber forest products. Experience from Ghana.
- Wirtu, D. (2002). Forests and forestry role in food security: the forgotten food security efforts.
- Lacuna-Richman, C. (2002). The socio-economic significance of subsistence non-wood forest product in Leyte, Philippines. *Environmental conservation*, *29*(2); 252-263.
- Nicolas, P. (2007). Ethiopia's Coffee Sector: A Bitter or Better Future? Journal of Agrarian Change, *7*(2); 225-263.
- LMC. (2000). International Coffee Organization/Common Fund for Commodities Study of Marketing and Trading Policies and Systems in Selected Coffee Producing Countries. p. 32.
- Fisseha, A. (2008). A Survey of Nontimber Forest Products and their Conservation Status in the Gimbo District, SNNPR, Southwest Ethiopia. MSc Thesis, Addis Ababa University School of Graduate Studies, Ethiopia.
- USAID. (2005). Southern Nations, Nationalities and Peoples' Regional State Livelihood Profiles.
- Ajabush, D. (2018). Review of Economic and Ecological Importance of Bee and Bee Products in Ethiopia. *Journal of Animal Husbandry and Dairy Science*, *2*(2): 18-26.
- Shackleton, C., Shackleton, S., & Shanley, P. (2011). Building a holistic picture: An integrative analysis of current and future prospects for non-timber forest products in a changing world. In *Non-timber forest products in the global context* (pp. 255-280). Springer, Berlin, Heidelberg.
- FAO. (2009). Non wood forest products: Bees and their roles in forest livelihoods. A guide to the services provided bees and sustainable harvesting, processing and marketing of their products. Rome, Italy, 192.
- Senbeta, F., Gole, T. W., Denich, M., & Kellbessa, E. (2013). Diversity of useful plants in the coffee forests of Ethiopia. *Ethnobotany Research and Applications*, *11*, 049-069.
- Tefera, B. (2005). Dynamics in the Management of Honey Production in the Forest Environment of Southwest Ethiopia: Interactions between Forests and Bee Management. MSc Thesis, Wageningen University, the Netherlands, pp. 1-65.
- Ito, Y. (2014). Local honey production activities and their significance for local people: A case of mountain forest area of Southwestern Ethiopia. African Study Monographs 48: 77-97.
- Nuru Adgaba, M. (2003). Geographical races of the Honeybees (Apis mellifera L.) of the Northern Regions of Ethiopia. PhD dissertation. Rhodes University, South Africa.
- Gebretsadik, T., & Negash, D. (2016). Honeybee production system, challenges and opportunities in selected districts of Gedeo zone, Southern Nation, Nationalities and Peoples Regional State, Ethiopia. *International Journal of Research Granthaalayah*, *4*(4), 49-63.
- Shenkute, A., Getachew, Y., Assefa, D., Adgaba, N., Ganga, G., & Abebe, W. (2012). Honey production systems (Apis mellifera L.) in Kaffa, Sheka and Bench-Maji zones of Ethiopia. *Shenkute, AG, Getachew, Y., Assefa, D., Adgaba, N., Ganga, G., and Abebe, W.(2012). Honey production systems (Apis mellifera L.) in Kaffa, Sheka and Bench-Maji zones of Ethiopia. Journal of Agricultural Extension and Rural Development*, *4*(19), 528-541.
- Mamo, G., Sjaastad, E., & Vedeld, P. (2007). Economic dependence on forest resources: A case from Dendi District, Ethiopia. *Forest policy and Economics*, *9*(8), 916-927.
- Fenet, B., & Alemayehu, O. (2016). The significance of honey production for livelihood in Ethiopia. *Journal of Environment and Earth Science*, *6*(4), 46-53.
- Woldeamanuel, T. (2012). Gum and resin-producing species in the drylands of Ethiopia: productive bricolage footprints on the landscape. In *Forest-people interfaces* (pp. 49-68). Wageningen Academic Publishers, Wageningen.
- Belcher, B.M. (2003). COMMENT: What isn't a NTFPs? International forestry review *5*(2); 161-167.
- Lemenih, M., Abebe, T., & Olsson, M. (2003). Gum and resin resources from some Acacia, Boswellia and Commiphora species and their economic contributions in Liban, south-east Ethiopia. *Journal of Arid Environments*, *55*(3), 465-482.
- Baye, B. (2015). Status and trends of major non-timber forest products trade in Ethiopia. *Research Journal of Agriculture and Environmental Management*, *4*(4), 197-201.
- Haile, A., & Getahun, D. (2018). Formulation of Nutritionally Improved Mashed Food from Orange-fleshed Sweet Potato (Ipomea batatus) and Haricot Bean (Phaseolus vulgaris) for Pre-School Children: The Case of Dale Woreda, Southern Ethiopia. *J Food Process Technol*, *9*(740), 2.
- Jansen, P. C. M. (1981). *Spices, condiments and medicinal plants in Ethiopia, their taxonomy and agricultural significance*. Wageningen University and Research.
- Menbere, I. P., Admasu, F., & Menbere, S. P. (2019). Socio-economic and environmental values of korarima (Aframomum corrorima (Braun) PCM Jansen). *International Journal of Agriculture Innovations and Research*, *7*(4), 405-408.

- Fissiha, G., Gebreazgaabher. (2016). Determination of Important Factors Affecting Production and Marketing of Korarima (Aframomum corrorima (Braun) P.C.M. Jansen) in Western Ethiopia. *IJEDR*, *4*(2): 1956-1961.
- Beyene, A. (2015) Fuelwood consumption and its environmental impacts: the case of Bale Eco-Region, Oromia Regional State, South Eastern Ethiopia. School of graduate Studies. Wondo Genet College of Forestry and Natural Resources, Hawassa University, Ethiopia.
- Endalew, A. (2007). Use and Management of Medicinal Plants by Indigenous People of Ejaji Area (Chelya Woreda) West Shoa, Ethiopia: An Ethnobotanical Approach, MSc Thesis. Addis Ababa, Ethiopia.
- National, H. (2004). Biodiversity assessment of the Bale Mountains National Park and surrounding areas. Conservation and Sustainable Use of Medicinal Plants Project.
- Tariku, B., Eyayu, M. (2017). Study on the Diversity and Use of Wild Edible Plants in Bullen District Northwest Ethiopia. Journal of Botany; 10.
- Wickens, G.E. (1991). Management Issues for Development of Non-timber Forest Products. *Unasylva*, *42*; 3-8.
- Lulekal, E., Asfaw, Z., Kelbessa, E., & Van Damme, P. (2011). Wild edible plants in Ethiopia: a review on their potential to combat food insecurity. *Afrika focus*, *24*(2), 71-122.
- Pancel, L. (1993). Non timber forest products. Tropical forestry handbook, 2. Germany.
- Ros-Tonen, M.A.F. (2000). The role of non-timber forest products in sustainable tropical forest management. *Holz als Roh- und Werkstoff*, *58*(3); 196-201.
- Plotkin, M., Famolare, L. (1992). Sustainable Harvest and Marketing of Rain forest Products. Island Press, Washington, D.C. USA.
- Gidey, Y., Mekonen, T. (2010). Participatory Technology and Constraints Assessment to Improve the Livelihood of Beekeepers in Tigray Region, northern Ethiopia. *Momona Ethiopian Journal of Science*, *2*(1); 76-92.
- Lowore, J., Wood, Adrian, P. (2015). Conservation logic in the forests of south-west Ethiopia: Linking honey producers to markets and the implications for sustainable forest management. In: 14th World Forestry Congress 2015, 7th - 11th September 2015, Durban, South Africa.
- Hartmann, M., Fliessbach, A., Oberholzer, H.R, Widmer, F. (2006). Ranking the magnitude of crop and farming system effects on soil microbial biomass and genetic structure of bacterial communities. *FEMS Microbiology Ecology*, *57*(3); 378-388.
- Lowore, J. (2014). Report on honey value chain development. Wild Coffee Conservation by Participatory Forest Management Project. University of Hudders field project report.
- CIFOR. (2008). Thinking beyond the Canopy. CIFOR Annual Report.
- Nepstad, D.C., Schwartzman, S. (1992). Non-timber products from tropical forests: Evaluation of a conservation and development strategy. Advances in Economic Botany, Volume. 9.
- Neumann, R.P., Hirsh, E. (2000). Commercialisation of non-timber forest products: review and analysis of research. CIFOR, Bogor, Indonesia, 187.
- Mengistu, A. (2011). Pro-poor value chains to make market more inclusive for the rural poor: Lessons from the Ethiopian honey value chain (paper presented at Global Value Chains and Sustainable Development, Danish Institute for International Studies, Copenhagen.
- DeBeer, J.H., McDermott, M.J. (1996). The Economic Value of Non-Timber Forest Products in Southeast Asia; Second Revised ed.; Netherlands Committee for IUCN: Amsterdam, The Netherlands.
- FAO. (1991). Non-Wood Forest Products: The Way Ahead. FAO Forestry Paper 97. Rome, Italy, 48.
- Lemenih, M., Feleke, S., Tadesse, W. (2007). Constraints to small holders' production of frankincense in
- Wiersum, K.F., Endalamaw, T.B. (2013). Governing forests for provisioning services: the example of honey production in SW Ethiopia.
- Peters, C.M. (1996). The ecology and Management of non - timber forest resources. World Bank Technical Paper 322. Washington DC: The World Bank, 172.
- Parratt, N.T. (1996). The potential of NTFPs of Botswana. Botswana Notes and Records 28: 203-218.
- Metema district, North-western Ethiopia. *Journal of Arid Environments*, *71*(4); 393-403.

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