



Assessing the Potentials of Non-timber Forest Production for Sustainable Management and Conservation of Forest Resources of Addiyo Woreda, Kaffa Zone SNNPs

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Abstract

Non-Timber Forest Products (NTFPs) play an important role both forest conservation and improving livelihood of forest dwellers. Thus, the purpose of this study was to assess the potentials of NTFPs for sustainable managements and conservation of forest resource in the case of Addiyo woreda, Kaffa zone. Among 28 kebeles in Addiyo woreda, Mera, Angio Kolla and Yecha were selected using purposive sampling. Data were collected from 284 households which were selected using simple random sampling. The questionnaire survey was supplemented with key informant interviews, focus group discussions, informal interaction, and direct field observation. Data were analyzed using descriptive and inferential statistical techniques. The study reveals that forest has decreased in last 10 years in both area and quality due to the constantly increasing demands of the people for the forest products. As NTFPs is the products derived from the forest, its status is clearly determined by the state of the forest. The most detrimental factor for resource depletion is being increasing population followed by land clearing for shifting cultivation and lack of awareness in the second and third place respectively. Finally to ensure Forest conservation local people's awareness regarding the extracted part, the harvest method and the volume of product harvested should be the promising option. In addition the study recommended that Cultivation of NTFPs in the marginal land could play a vital role in conserving the natural resource.

Keywords: Non-timber forest products; forest income; forest conservation; palm; Addiyo woreda.

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1. Introduction

1.1 Background

Non timber forest products (NTFPs) are, in broadest sense, Any biological resources collected from wild by rural people for direct consumption/income generation on a small scale [1]. They include wild edible foods, medicinal plants, floral greenery, horticultural stock, fiber of plants, fungi, resins, fuel wood, small diameter wood used for poles, carvings etc [2]. Interests in NTFPs was predicated upon a few assumptions these include: commercial exploitation of NTFPs is less ecologically destructive than timber harvesting, and thus has greater potential for sustainable forest management; local forest users exploit forest resources wisely and sustainably and NTFPs will more directly benefit people living near forest compared to timber harvesting [3] These products include foods, medicines, nuts, vegetables, spices, exudates (gums, resins, latex, etc), condiments, ornamental plants, fuel-wood and raw materials notably bamboo, broom grass, rattan and small wood and fibers, wild life products (bones and skin), tannins, dyes, fatty oils, essential oils, shrubs, herbs and vines [4].

NTFPs play an important role both forest conservation and improving livelihood of forest dwellers. They can provide an incentive for participatory forest management [5] in a comparative analysis of the literature. They found that: 1) NTFPs are widely accessible and crucial to the rural poor, 2) harvesting NTFPs is less ecologically harmful than timber harvesting.

There is considerable global interest in recent years on NTFP, due to the increasing recognition that NTFP can contribute to the conservation of biological diversity via sustainable harvest techniques or agro-forestry arrangements. The interest in NTFP has grown with increasing awareness of tropical forest deforestation and rising acknowledgment of the need to add value to forest resources, in order to compete with other land uses. Under a holistic management view of NTFP, efforts have been made to: preserve and sustain the resource and its users; conserve forests and biological diversity; and promote non-traditional enterprises to improve local economies and diversify the economic base of the rural poor [6].

1.2 Statement of Problem

The role of Non-timber Forest Products (NTFPs) for sustainable forest management and poverty reduction has received increased attention for many past years [7]. They play an important part in supporting household livelihoods and therefore can be used to raise the perceived value of forest resources [8]. In many developing countries, including Tanzania, majority of rural household and a large proportion of urban household depend on NTFPs to meet some parts of their nutritional, health, construction material and income from selling these products. FAO's experience in community forest management in developing countries has documented important roles of NTFPs which include: income generation for rural development; more equitable sharing of the benefits of forest; and local participation in forest management [9]. NTFPs which have significant economic importance in Ethiopia include: Natural Gums and incenses; Wild coffee; Bamboo; Herbal medicine; Fuel wood; Small-diameter wood used for poles, posts and carvings; Honey/bee wax; Ecotourism; Spices and condiments; Civet musk; Forest food; Forest grazing, etc. [10].

According to [11]. Study in South West Ethiopia more than 65 percent of the households who were involved in NTFPs did earn more than one thousand Birr in a year from the production of NTFPs alone, while around half of the people use the forest to generate cash income. NTFPs in Addiyo Woreda are used for food demands, medicinal purpose and also for earning cash income. But the variety of uses of plants is under threat of extinction due to the increasing population and settlement. The arrival of settlers, combined with the expansion of coffee plantations, uncontrolled timber harvesting and regular forest fires, is endangering the natural forest and reducing the number of wildlife. There are many kebeles in Addiyo woreda, where primary health centers or modern health facilities are not available and local healers are curing the diseases from the use of their indigenous knowledge of medicinal plants. As the community saying that Addiyo Woreda has one of economically marginalized communities (Menja), living on a marginal resource base, and in isolated condition. The living conditions of Addiyo woreda community are aggravated by food deficit, poor health, and malnutrition. They have been living in or nearby the forests since ages and exploit plant resources to fulfill their most of the basic needs. Deforestation and forest degradation not only threaten the livelihoods of local communities but also Moreover, the ecological functions of the forests and its sustainability, the extent of people dependence on forest resources and the types of forest products extracted from forest and market for these products have great influence on the forest resources of the area. These stated factors are causing forest fragmentation, decrease in forest cover, and depletion of some forest products of the area. Finally, this will result in loss of ecological benefits of the forests. To counter this problem, use of the available forest resource for non-timber forest products production is the most promising option. Contribution of NTFPs in ecological mgt and conservation of forests of selected Kebeles of Addiyo woreda. Therefore, this study attempts to assess the types of non-timber forest products contribution on sustainable management and conservation of forest resources in the area.

2. Research methodology

2.1 Description of the Study Area

This study was carried out in three selected *kebeles in Addiyo woreda*, namely *Yecha, Angiyo Kolla and Mera*. Therefore, it is important to describe briefly about *Addiyo woreda*.

2.1.1 Astronomical & Relative Location of Addiyo woreda

Astronomically Addiyo woreda lies between $7^{\circ} 8' - 7^{\circ} 26' N$ latitude and $36^{\circ} 15' - 36^{\circ} 50' E$ longitude (Fig.1) and which is located at the eastern part of Kaffa Zone with the distance of 64 km from capital of Kaffa Zone Bonga; 524 km from Addis Ababa and 801 km from the capital of SNNPRS, Hawassa. It shares boundaries with Decha Woreda in the West, Gimbo Woreda in North West, Tello Woreda in the South, Konta special Woreda in the South East and in the North and North Eastern part with Oromia region Jimma [12].

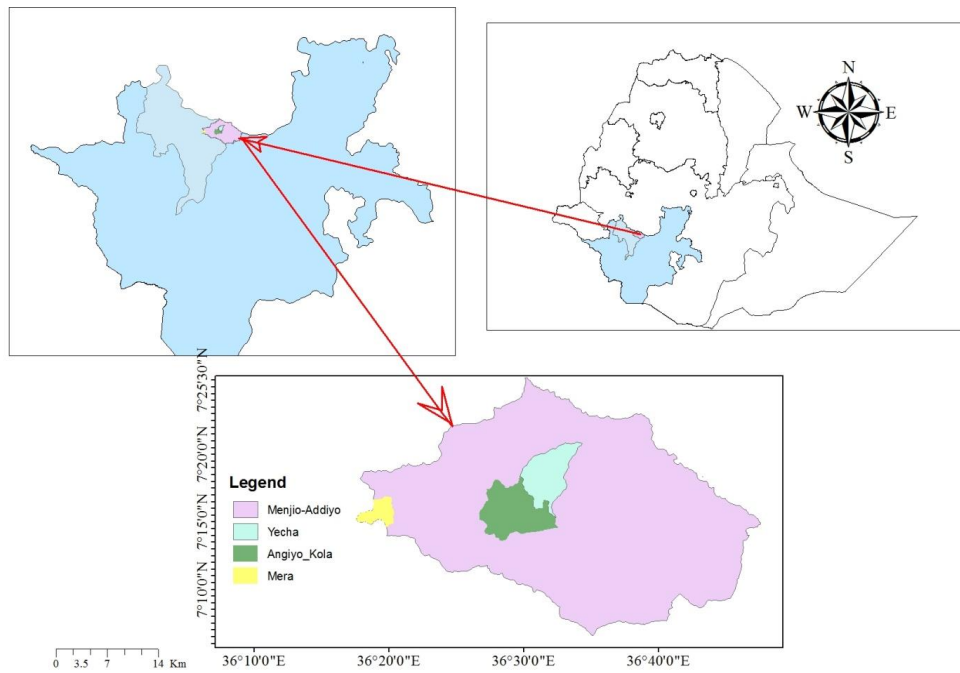


Figure 1: Location Map of the study area made from Arc GIS by researcher, 2018

2.1.2 Climatic Condition

It is characterized by relatively moderate air condition with mean annual rainfall ranging between 1400 and 2000 mm and average annual temperature varying from 12 °C to 26 °C [12].

2.1.3 Vegetation

As AWARDO (2018), about one third of Addiyo and the surrounding area is covered by forest comprising a rich mixture of species such as indigenous tree species like Kosso (*Hygenia Abyssinica*), Shola (*Ficus Sychmorise*), Geteme(*Schefflera Abyssinica*), Tikur inchet, wolkif (shawuko), Dokima(Yino), Birbira(bibero), Qato, Komo Dido, Bissana (*Croton Macrostochys*), Kontir (*Petrolobium Stellatum*), Korch (*Erythrina Abyssinica*), Endod(*Phytolacca dodecader*), Grawa (*Vernonia specious*), Timiz, Zigba (*Podocarpus talacta*), Wanza (*Cordials Africana*), Weira (*Olean Africana*), Bamboo (*Arundineria*), Cactus and Kerero(*Aningeria*) are common tree species and shrubs are also common around kola. Out of which kosso and Woyira locally have medicinal value [12].

2.2 Sampling techniques

Addiyo woreda has 28 kebeles of which all the kebeles have forest coverage and use NTFPs for their livelihood. Due to financial and time constraints, it is difficult to cover all the kebeles, there for three kebeles were selected purposefully based on dependency of people on forest i.e. the rural depend more on forest than urban, forest cover(kebeles which have high forest cover) and population number (kebeles which have high population number).

The sample size was determined using [13]. formula as follows

$$n = \frac{N}{1 + N(e)^2} = \frac{972}{1 + 972(0.05)^2} = 284$$

Where: n = the sample size

N = total number of households in 4 kebeles.

e = maximum variability or confidence=95% in margin of error 5% (0.05);

2.4 Data analysis

The data collected from primary and secondary sources were analyzed using both qualitative and quantitative methods depending on the nature of the field data and were interpreted through statistical tools. The descriptive statistics such as simple means, standard deviation including the frequencies and percentage were considered for the analysis of quantitative data whereas forest policy, rules and regulations, problems of community forest were analyzed and reviewed qualitatively. The SPSS software version 20 was used to process the data.

3. Result and Discussion

3.1 NTFPs and forest conservation

3.1.1 Status of forest over the past 10 years

Respondents were asked about the status of forests and the causes of forest degradation 10 years before and now during household survey. Majority of responses indicated that forest is decreasing in status. Three point rating scale was used to determine the status of forest before 10 years and now, 65.1 percent of the respondents expressed the decreasing in the forest comparing the situations of past 10 years. On the other hand, 5.6 percent of the respondents said the same as before and 29.2 percent expressed in increasing of forest resource since the start of participatory forest management (table 1).

Table 1: Status of forest over the past 10 years

Status of forest	Frequency of response
Decreasing	185(65.1%)
Increasing	83(29.2%)
The same as before	16(5.6%)
Total	284(100 %)

Source: Field Survey 2018

3.1.2 The main causes of forest Degradation

The main causes for the forest degradation identified were increasing population(30.3%), followed by land clearing for shifting cultivation(27.8%) lack of awareness (20.8%) forest fire(14.8%) and over exploitation(6.3%), respectively. (table 2).

Table 2: reasons for forest degradation

Reason	Frequency of response
Forest fire	42(14.8%)
Lack of awareness	59(20.8%)
Increasing population	86(30.3%)
Over exploitation	18(6.3%)
Land clearing for shifting cultivation	79(27.8%)

Source own survey, 2018

These stated factors are causing forest fragmentation, decrease in forest cover, and depletion of some forest products of the area. Finally, this will result in loss of ecological, social and economic benefits of the forests on which local people’s livelihood is tied with survival.

3.2 Household income contributions from sale of different sources of NTFPs

And under a participatory forest management project in the Bale highlands forest products in the form of non-timber forest products contributed 34% to overall household income [14]. Collection of NTFPs from private land and forests is one of the major economic activities of the community that contribute a lot to their income. All household are involved in NTFPs collection directly or indirectly either for domestic purpose or economic purpose.

Table 3: contribution of NTFPs to cash income

NTFPs	No of HH involved/ year	Quantity collected (Kg/ No /HH/year)		Home consumption (Kg/HH/year)		Quantity sold (Kg/HH/year)		Income generated (Birr/HH/year)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Honey	52(18.3)	57.83	15.56	4.87	5.96	53.94	15.57	3182.38	855.87
Bamboo	45(15.8)	48.29	36.97	-	-	48.29	36.97	970.8	735.13
Coffee	22(7.7)	85.99	23.77	3.10	.83	82.9	23.75	3943.55	1099.75
Lianas	83(29.2)	513.84	243.4	-	-	513.84	243.4	2054.75	973.67
palm	51(18)	44.41	41.52	3.12	1.03	37.39	31.95	1122.57	957.51
Fuel W	69(24.3)	2843.28	1337.14	-	-	2843.28	1337.14	2843.28	1337.14
Tools	25(8.8)	46.3	12.2	-	-	46.3	12.2	1857.8	500.57
Total								15975.13	

Source: own field survey 2018

Honey

As indicated on table 3 and house hold interview; Natural honey is available in the study area and people collect it during summer (September- October). There will be more than 5 to 6 colonies of honey bees in a tree. Each harvest in a tree may takes about one and half hour. Honey collection is done by adult male, as it requires skill to handle the bees. One household can collect about 57.83 kg on average per season, which can fetch average price of 55 birr per kg. In line with these [15] reported a contribution of honey for local livelihood in forest lands of southwest highlands in Ethiopia. And also in the Bonga region coffee and honey contributed 18.5% to household income [16]. Honey is locally used to make local beverages like “Tej”. It is a good source of income for the people who prepare tej. It is also source of food and it is also used to treat some illnesses like cold, stomach discomforts and wounds. It in-turns reduce burden on forest product dependency by deforestation and leads forest sustainability.

Fire wood

Fuel wood is the most important source of energy and income in most kebeles of the Addiyo woreda. Firewood is obtained from the natural forest. Fuel woods in the study area obtained from deadwood in the fallow, from woods cut in clearing the fallow for the new farm, and from branches lopped and pruned from large trees. Most of the people, majority of which are women and children from the study area are engaged in collection and selling of firewood. Study also reveals that, one can earn approximately 125-145 birr per day from selling firewood in local market. However to earn this amount of money it needs 125 to 145kg wood per day must be collected and the price varies with the season, quality and sometimes gender of the firewood collector. During summer the prices raise and in winter it falls because it is difficult to move in the forest freely. It leads forest deforestation. According to [16] fuel wood and charcoal contributes 60% of house hold income.

Lianas

Lianas are considered as a nail in house construction specially while constructing traditional huts. The stems of vines are used to hold the different parts of the house in similar manner that a nail does. *Tiliacora troupinii* is the most preferred vine for the purpose of house construction since it is very strong.

Coffee

The coffee species found in the forests of Addiyo woreda is Coffee Arabica. Coffee Arabica has several uses in Addiyo. The main use is for drinking. The beans of *C. Arabica* are used to make coffee drink. The leaves are also used to make a drinking coffee. The dried branches and leaves are also used as firewood. Apart from the above uses Coffee Arabica beans are good source of income to local farmers. It was found that Households can collect on average 86kg per year and earn 3943.55 birr.

Bamboo

The major use of bamboo in the study area is for construction of houses, especially the structure of the roofs. Because of the freely grazing cattle, bamboo is used for making fences in order to protect crops. Bamboo is the principal raw material for making beehives that are hanged in the particular trees for honey production. Bamboos were available in minor quantities because of the destructive harvesting for the need of money when it is required in large quantity before its maturity. The study reveals that a matured one bamboo costs 20 birr on average.

Palm

Phoenix reclinata is one of palm species that is found in Addiyo and it has several uses; its leaves are used to make carpets, bags, and are also used to cover the roof of a hut. Its trunk is used widely for making culverts and even bridges, for house construction and gate making. It was found that households can make different materials and earn 2122.7 birr per year.

Tools

Some households are involved in construction of farming implements or ploughing tools and household tools like plates, vessels, horn, barrel, axe handle, grinders (mukecha & zenezena), for earning money. It was found that households can make different materials and earn 1857.8 birr per year.

3.3 Potentials of NTFPs extraction for sustainable management and conservation of forest resources

It has now increasingly recognized that the collection and use of NTFPs is ecologically less destructive than timber harvesting and have encouraged the belief that more intensive management of forests for such products could contribute to both development and conservation objectives [17].

Average household income in local market of the study area from NTFPs implies huge with limited quantity as indicated in Figure 2 very limited quantity (nearly 86kg) of coffee generates 3943.55 birr the study conducted by Mohammed Chilalo and K. Freerk Wiersum in Southwest Ethiopia coffee demonstrates that as a result of high NTFPs values, farmers may be stimulated to gradually domesticate those NTFPs and cultivate them in garden or plantation systems [18] followed by honey 57.83kg generates 3182.38 birr, tools 46.3kg 1857.8, Palm 44.41 generates 1122.57 birr bamboo 48.29kg produces 970.8 birr lianas 513.87kg generates 2054.75birr and lastly 2843.28kg firewood generates 2843.28birr which means 1kg costs 1birr in comparisons it is the least cost of all NTFPs; therefore non-timber forest production is attractive and profitable way of production even it compared to other forest deforestation based economic activity that leads in turn sustainable forest management. According to [19] in Tigray the more intensive management of the commercial NTFPs in both forest and agroforestry systems in the well-accessible mid hill area as compared to the less intensive management in the less accessible uplands resulted in a greater contribution to local livelihoods that in turn helps forest sustainability.

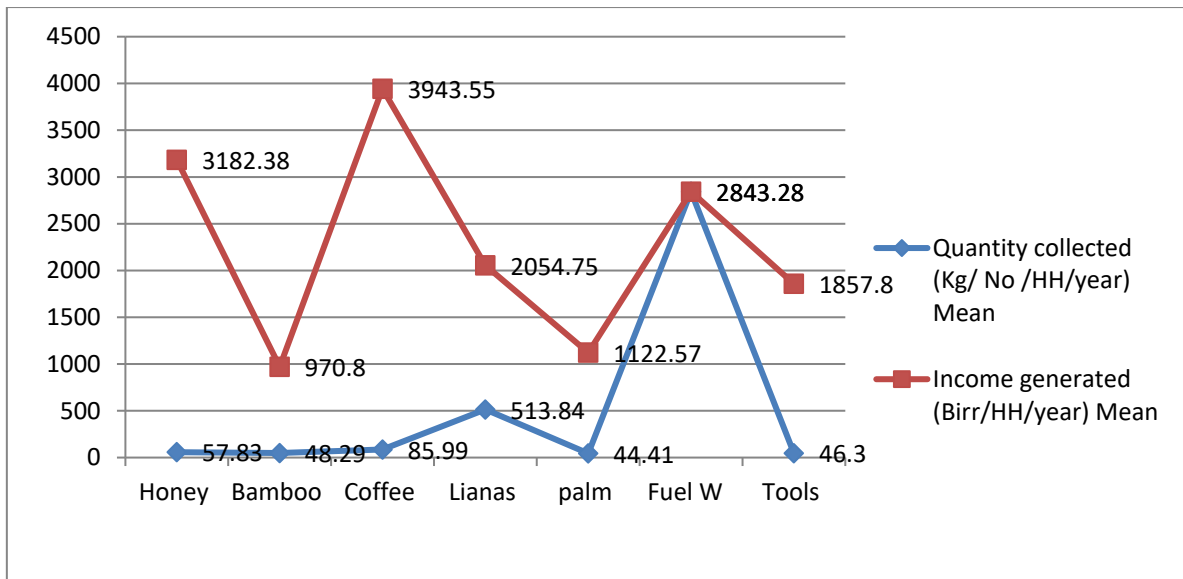


Figure 2: income generation vs quantity collected of NTFPs

3.4 Awareness on harvesting methods

The knowledge and awareness of proper harvesting techniques is linked with sustainable use of resources without decreasing its natural resource base. The house hold interview shows that farmers were very much aware of harvesting methods. Majority of the respondents (65%) said that they were aware of the destructive and non-destructive methods of harvesting. Although most of the NTFP collector were found illiterate and without any concept of sustainable harvesting but their indigenous conceptions were amazingly scientific and somehow similar to the predictions of experts in this regard while the main drawback of the households were limitation of awareness regarding to deforestation and its consequence.

Table 4: respondents’ Reaction on “Are you aware of Destructive and Nondestructive Methods of Harvesting”?

Response	No households
Yes	187(65.8%)
No	97(34.2%)

Source: Field Survey, 2018

It is sometimes considered that such cultivation will displace the natural forests or the forest extraction systems, but this was not found to be the case for forest coffee. Notwithstanding its domestication, forest coffee still plays an important production role in Ethiopia, and recently this form of coffee production is being stimulated as a contribution towards forest and biodiversity conservation [20,21]. Forest coffee can relatively easily be taken up by the well-establishing coffee marketing structure, and hence forest coffee production seems to profit from rather than to compete with the marketing of domesticated coffee. The marketing structure for honey is much less developed than for coffee. In the case of the spices, the marketing of local spices is even negatively affected by the existing marketing of exotic spices. The 57 combination of agriculture and production of high-value

NTFPs provide higher incomes than agricultural production only. It illustrates the good scope for NTFPs production within a livelihood diversification strategy. The income derived in case those households are engaged in coffee extraction or honey production only is also relatively high, but this specialization strategy concerns few households only. However, in case that household collects low value NTFPs such as spices and bamboo, the household income equals the incomes of households engaged in agriculture only. In this case, the NTFPs production forms part of a coping strategy and serves to earn some cash to compliment subsistence agricultural production. The diversification strategy predominates in the high-potential mid-hill areas and the coping strategies in lower potential upland areas.

4. Conclusion

Human activities essential to the conservation and sustainable development of forest resource; helping this resources to become ecological and environmental buffers that tone down the customarily harsh weather and their impacts. NTFPs are increasingly recognized for his or her contribution to economic development and sustainable forestry management. The link between NTFPs and forest sustainability could even be understood by taking some cases into consideration (for example, properly managed vegetation forgum and resin can store carbon and conserve biodiversity) this might led to sustainable forest resource management; since extraction of NTFPs are often conducted without significantly changing forest stands. However, sustainability in NTFPs resources management is questionable without giving considerable attention to ecological, social, and economic aspects. **On the choice** hand, there are some obstacles that restrain sustainable management of NTFPs **associated**. Eventually, some suggestions regarding sustainable management of NTFPs were provided. These were linked to impact of NTFPs extraction on species and ecology; management approaches; knowledge of collectors, integration of NTFPs in national strategies **and wish** of continuous research on NTFPs for forest sustainably.

5. Recommendation

Thus, based on the conclusion; management approaches and practices of NTFPs in sustainable forest managements should be adapted to local ecological, economic and social political circumstances. Responsibility of NTFPs management for forest sustainability mustn't be only to an expert (forester) but also inclusion of content through involvement of stakeholders in management of forest resource **is very important**. Finally, further research on possibilities of NTFPs management for forest sustainability and its related services is required.

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