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Forest products, income and its livelihood implication with gender difference at Masha district, southwest Ethiopia

Amanuel Afeto[1]* and Yemiru Tesfaye[2]

[1]*Bonga Agricultural Research Center, Bonga Ethiopia*

[2]*Wondo Genet College of Forestry and Natural Resources, Hawassa University, Ethiopia*

Abstract

Forest is one of the most essential types of resources providing beneficial material and environmental services. The Sheka forest is threatened by unsustainable use and conversion to alternative land use. This study was conducted to identify the major collected and marketed forest products, quantify the total and relative forest product income generated by the gender of household head in Masha district, southwest Ethiopia. Quantitative and qualitative data were collected from primary and secondary data sources. Primary data were collected through focus group discussion, key informant interview and survey consisting of 156 household samples that were selected using multi-stage sampling techniques. Secondary data were collected from published and unpublished materials and annual reports of relevant government offices. Data were analyzed using SPSS and Stata software programs. Descriptive statistics like mean, frequency and percentage were determined. The result indicates that 17 major forest products are collected by households in the area. Forest product collection is one of the livelihood activity contributing an average of $1887.16 (44% of their total annual income) and $867.3 (32% of their total annual income) to male and female headed households, respectively. This proves that, in the study area, male headed households generate more income from forest products than female headed households. Households in the study area depend to a greater degree on income from forest product collection. Alternatives should be found to minimize extraction of woody forest products and dependency of household on forest income. Government should assess the impact of licensed investment project on environment and local community and take corrective action.

Key words: Dependence, forest product, income, female, male, Masha

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***Corresponding author's address:** Amanuel Afeto, Email: *amanyaster@gmail.com*

Author: Yemiru Tesfaye: *yemirutesfaye@gmail.com*

INTRODUCTION

Forests are one of the most essential types of resources for the existence of life on earth by regulating environmental and ecological systems and providing environmental services and economically valuable products to human being. The main provisions of forest include timber and non-timber forest products (NTFPs), amenity and recreational service, watershed protection, climate buffering and biodiversity conservation (FAO, 2018). The socioeconomic, cultural and ecological importance of forests is reflected in their contribution to national economy, livelihood diversification of rural and urban communities, food security, animal feed, human and animal health and environmental conservation (UNFF, 2019; Gonfa, 2019). Many people around the world depend on forest resources and the forest industry contributed to over 1.1 percent of gross domestic product (GDP) and 1.2 percent of total employment opportunities to the global economy in 2014 (FAO, 2014).

Forests provide material and monetary benefits to both men and women living around the forest, who often have different roles, knowledge and access to forest resources. Forest product collection and use require some skills and knowledge that depend on the gender, where some forest products are collected by both male and female, some collected by female only and some others by male only. Within households, men and women often do have differing roles and responsibilities with respect to the collection, processing and marketing of forest products (Amenu and Mamo, 2020). Women often have substantial knowledge about the identification

and preparation of nutritious forest foods to enhance the nutrition and health of their households and there is a positive and significant relationship between level of household food security and level of women involvement in the gathering of NTFPs (Olaniyi *et al.*, 2013; Kimanzu et al., 2021). Gathering of NFTPs are of great potentials for increased income and expanding livelihood opportunities among rural women (FAO, 2018).

Forest products are playing a key role in generating income and improving the livelihood of rural women in Ethiopia. Study in Dawuro zone, Ethiopia indicates that income generated from the collection of forest products by females was four times greater than that generated by males (Amenu and Mamo, 2020). A study in the northwestern and southern lowlands of Ethiopia, indicated that male-headed households generate 15.4% of their annual income, whereas female-headed households generated 22.4% of their annual income from forest product collection (Teshome *et al.*, 2015), indicating that female-headed households are more dependent on forest income than male-headed ones. A study in southwest Ethiopia, Gimbo district revealed that most forest products used for cash income generation are collected by women and NTFPs production was the main source of income (53.76%) for women in the study area (Kassa and Yigezu, 2015).

The southwest part of Ethiopia is physically diverse with high natural forest cover that contains gene pools of some important food plants of global interest, including coffee arabica. The Afro-montane forest of southwest highlands is a scarce resource for Ethiopia, but has importance in climatic stabilization, hydrological moderation, continuous river water flow and genetic resource conservation (Mulatu *et al.*, 2015; NTFP-PFM, 2012). The forest of southwest Ethiopia contributes 24 to 30% of the household's annual income and particularly 52%, 41% and 23% of annual cash income of households in Bench Maji, Sheka and Gore area, respectively (Chilalo and Wiersum, 2011). Sheka forest as part of southwest highland forest, is one of a UNESCO's designated biosphere reserves that covers 238,750 hectares or 47% of the total land area of Sheka zone (Woldemariam and Getaneh, 2011; Seifu et al., 2017). The forest of sheka has existed for centuries by traditional management practices due to the relationship of livelihood of Sheka people with the forest (Alemayehu *et al.*, 2015; De Beenhouwe *et al.*, 2016).

Currently the forest of Sheka is facing serious deforestation by smallholder farmers wanting land expansion for agricultural practices and private and state owned investment projects for tea and coffee plantation (De Beenhouwe et al., 2016; Alemayehu *et al.*, 2015). The other fundamental causes of deforestation are that the forests of Sheka are under-valued among local government, and communities due to likely awareness gaps regarding scarce resources in the area. Many studies in the area and other parts of the country lacked gender dimensions of forest income and the roles played by females and males are not separately indicated. The roles females played in the forest product value chain are poorly recognized due to gender orientated issues (Shackleton *et al.*, 2011). In most developing countries meeting household food and fuel needs, including generating the income needed to provide these necessities, has been seen as the responsibility of women. Men, on the other hand, are the primary harvesters of high value products such as timber that are procured deep in the forest or require hard physical labor (Amenu and Mamo, 2020). Thus, the estimation of benefits from Sheka forest by its products to the local community is very helpful to understand the true value of the forest and minimize deforestation in the area for ensuring sustainable management and future use. The study also intended to indicate the participation of females and males in collection and marketing of forest products. The study was also designed to estimate total income, cash income and income from major forest products by the gender of household heads in the study area.

MATERIALS AND METHODS

Description of the Study Area

Masha woreda is one of the three Woredas in Sheka zone and has 19 rural Kebeles. Geographically, it lies between 7°24'_7°52' N latitude and 35°31'_35°35'E longitude and covers a total land area of 763.73 km^2. Its altitude lies between 1600-2400 m above sea level and receives 900 -2000 mm rainfall annually. Agro climatically, the area is largely mid-highland (Woynadega) type covering about 75% of the total area, 22% are in highland (Dega) and 3% are in the lowland (Kola) zones, respectively. According to reports of Masha Woreda finance and economy office of 2011 E.C. (2018/2019 G.C.), the total population was 48,735, out of which 24,801 were female and 23,934 are male. The total number of households in the district was 9747. The livelihood of the district's population depends mainly on mixed agriculture (crop-livestock production) characterized by subsistence and commercial production. Annual

crops are dominantly produced by rain-fed agriculture. Enset, maize, barley, potato, Tef, beans, peas, coffee are produced in the area and the livestock include cattle, goats, sheeps and horses (Alemayehu *et al.,* 2015). Bee keeping is another dominant economic activity practiced in the area in home garden and within forest for honey production.

Design and Sample Size Determination

To select the study area and the respondents, multi-stage sampling technique was employed. In the first stage, Masha district was selected purposely out of the three districts in Sheka zone due to availability of natural forest cover, the high rate of deforestation in the area, and better knowledge of researcher about the community and the type of forest products collected. In the second stage, three Kebeles namely Welo, Beto and Yina were selected from 19 Kebeles of Masha district using stratified random sampling method. Stratification was made based on their agro-ecologies as Weyinadega (mid-highland) and Dega (highland) as well as the distance of each Kebele from Masha town as those Kebeles close to Masha located within 7 km and those far from Masha located outside a 7 km radius.. One kebele was randomly selected from four strata (Weyinadega close to Masha, Weyinadega far from Masha, Dega close to Masha and Dega far from Masha). Due to the unavailability of Dega kebele close to Masha, only three kebeles were selected from three strata. In the third stage, 156 households were randomly selected from 1583 households of the three kebeles selected above using stratified random sampling and the sample size were determined by using formula of Yamane, (1967). The numbers of sample households from each kebele were taken proportional to the total number of households in each kebele.

$$n = \frac{N}{1 + N(e)^2} = \frac{1583}{1 + 1583(0.08)^2} = 156$$

Where 'n' is the sample size; 'N' is the number of households of the three kebeles and 'e' is level of precision (error level).

Data Type, Source and Collection Technique

Quantitative and qualitative data were collected for this study from primary and secondary sources. Primary data were collected from 156 sample households through a household survey, key informant interview and focus group discussion. Household survey was conducted from October to December 2020 and focus group discussions were conducted in each kebele with a member of 10 people from different social group including female. Key informant interviews were conducted with different individuals at Kebele, district and zonal level that have sufficient knowledge about the area and types of forest product most commonly extracted. This primary data includes information the type and amount of forest products they collect, socio-economic characteristics of household, price of specific forest products and the income of households from different sources. The developed questionnaire was tested before conducting the survey, in order to have a clear understanding about the issue among respondents. Prior to the household survey, FGDs and KIIs were conducted to gather complementary data thereby enhancing the understanding of the context of the study. Secondary data were collected from published and unpublished material, annual reports of relevant government offices, journals, websites and books relevant to the research.

Data Analysis

The collected data were checked, coded and encoded in to a computer, and analyzed by using SPSS version 23 and Stata software. Descriptive statistics like mean, percentage, frequency and standard deviation were employed to analyze and indicate the results of the study.

Estimating the Monetary Value of Forest Products

The monetary values of specific forest products were estimated according to Cavendish (2002) by quantifying those forest products used for own consumption and cash income generation in 2019/2020 and multiplying with its average market prices in 2019/2020 and converting to US dollar by dividing with average exchange rate 37.93 birr at time of data collection.

$V_i = Q_i \times P_i$

Where;

V_i = monetary value of particular forest product (US$),

Q_i = Quantity of particular forest product collected

P_i = market price of particular forest product

The incomes of households from forest products (FORINC) collection was estimated by summing the monetary value of each forest product that particular household collected for home consumption and cash income generation.

$\text{FORINC} = \sum_{i=1}^{n} Vi$

Estimation of the Dependency Level of Households on Forest Products

The dependency level of households on forest products or share income from forest products to total annual household income are computed according to Vedeld *et al.*, (2004), by dividing income from forest product collection to total annual household income and multiplying by 100.

The forest dependency level computed by formula below

$$FRDEP = \frac{FORINC}{TOTINC} \times 100$$

Where;

FORINC= monetary value of forest product that particular household collected in 2019/20 (US$)

TOTINC= the sum of household incomes gained from different sources in monetary term (US$)

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Households

The majority (67.3%) of the households were male headed and the rest 32.7% were female headed. About 89.1% were married, 7.1% were divorced and 3.8% were widowed. The age of the household head ranged from 20 – 70 years with a mean age of 47 years. About 91% of the households head were in productive working age, with only 9% being older than 65 years. The households have a minimum of 2 and a maximum of 11 family members with a mean of 6. About 18.6% of the total household head had not attended any formal education, while 70.4% completed some primary school and 11% completed secondary school education. The households in the study area were found to have a land holding ranging from 0.5 to 9.0 hectares with a mean of 2.96 hectares. The livestock population of the households in terms of tropical livestock units (TLU) (Storck and Doppler, 1991) ranged between 0.9 and 30.85 with a mean of 7.48 TLU (Ttable-6 in the appendix).

Livelihood Strategies and the Implication of Forest Income on Gender

Like other many Ethiopian rural Woredas, the livelihood of local communities of Masha district depend on diversified activities including crop production, livestock rearing, forest product collection and other off-farm activities (Adanech and Lemma, 2017; Mulatie and Tesfaye, 2018; Abebe *et al.*, 2019). The result of the present study indicated that forest product collection, crop production and livestock rearing ranked 1 to 3 of the main source of livelihood for sampled households with the shares of 41.17%, 31.20% and 25.53% of the total income, respectively. The total average annual income of the sample household was about $3,774.16, which is higher than other findings in Yayo district, western Ethiopia and Liben and Afdher Zoal administrations of southeastern Ethiopia (Asfaw and Etefa, 2017; Chanie and Tesfaye, 2018; Damte *et al*., 2019). The observed higher income might be due to the current high market price of agricultural and forest products and the presence of some valuable forest products. There is a significant variation of total annual income from crop production, livestock rearing and forest product collection with the gender of household head. Male headed households generated a total mean annual income of $4291.7, while female headed households gained a total mean annual income of $2708.65.

Table 1. Means of livelihood strategies and contribution of forest income

Income sources	Mean income						Sig
	Total samples	%	Female headed	%	male headed	%	
Crop income	1177.50	31.20	1028.70	38.00	1249.80	29.10	0.007
Livestock income	963.60	25.53	732.00	27.00	1076.10	25.10	0.0001
Off-farm income	79.29	2.10	80.64	3.00	78.60	1.80	0.940
Forest income	1553.75	41.17	867.30	32.00	1887.16	44.00	0.0001
Total income	3,774.16	100.00	2,708.65	100.00	4,291.70	100.00	0.000

The results show that 17 types of forest products are collected by the households in the study area. The products included firewood, coffee, honey, fencing wood, tree fern (*Seseno*), charcoal, split wood (*Gejo*), stringer (*Mager*), Cardamom (*Aframomum corrorima*), climber, timber (*Tawula*), split wood for house wall construction (*Filt*), mortar, plough, yoke, pestle and bamboo. All of the forest products are collected by households in Weyinadega (mid-highland) and Dega (highland) except bamboo that is found only in Dega (highland) areas. Moreover, the finding showed that the average income of the

sample households from forest product collection varies with the sex of household heads and the variation is statistically significant ($p < 0.01$). Male headed household generate a higher mean income ($1887.16) per year or 44% of their total annual income from forest product collection, compared to female headed households ($867.3) which make 32% of their total annual income from forest product collection (Table-1). This proves that income generated by male headed households from forest products were more than double of that made by female headed households. The reason for this variation in income are likely to be associated to the fact that some forest product collection are labor intensive require physical strength that females may not possess, some valuable forest product like honey produced by hanging beehive and coffee are managed in the forest mainly by male headed households and other forest products that exist in remote forest are also collected by only male family members.

The results from the present work agree with earlier reports that female headed households generate less income from dry forest products compared to male headed ones in Liben and Afdher zone, southeastern Ethiopia, (Adefires et al., 2014). The result is contrary to the finding in northwestern and southern lowlands of Ethiopia, which, indicates that male headed household generate less income from forest products compared to female headed households (Teshome et al., 2015), which may be due to cultural differences, forest type, and forest product types.

Gender Based Difference in the Major Types of Forest Products and its Share in Forest Income

As shown in Table-2, of the total income generated from forest products by households ($1553.75), the three major forest products: firewood, honey and coffee together, contributes to 84.1% of forest income. The contribution by the three forest product varies with the sex of the household head and the variations are statistically significant ($p < 0.01$), where the mean income for female headed households was lower ($610.4) taking 70.4% of the total forest income compared to that of male headed households ($878.6) contributing 46.56% of the forest income. The mean income of male headed households is more than that of female headed households but female headed households depend more on income from firewood collection.

Table 2. Gender based difference on contribution of different types of forest products

Forest product	Mean income						Sig
	Total sample	%	Female headed	%	Male headed	%	
Firewood	790.93	50.90	610.40	70.40	878.60	46.56	0.00
Coffee	358.76	23.10	67.60	7.70	500.62	26.50	0.00
Honey	157.50	10.10	93.90	10.80	188.37	10.00	0.00
Other forest products	246.55	15.90	96.20	11.10	319.56	16.90	0.00
Total	1553.75	100.00	868.10	100.00	1887.16	100.00	

The mean income from coffee is about $67.6 or 7.7% of forest income for the female headed households and $500.62 or 26.5 % of forest income for their male headed counterparts, showing that the mean and relative incomes from coffee for male headed households are higher than female headed. The result also indicated that majority of the coffee resources in the forest are managed by male headed households. The average income from honey was about $93.90 for female-headed households and $188.37 for male-headed households, respectively, making only about10% of their total forest income (Table 2). Male headed households generate double the income of female headed households due to the fact that forest honey are labor intensive and volume varies by the sex of producers. Hanging beehives in the forest are mainly practiced by head of households. The other forest products such as fencing wood, tree fern *(Seseno)*, charcoal, split wood (*Gejo*), stringer (*Mager*), Cardamom *(Aframomum corrorima)*, climber, timber *(Tawula)*, split wood for house wall construction *(Filt)*, mortar, plough, yoke, pestle and bamboo together contribute about 15.9% of the total income from forest of the households. There is also a significant variation in income from those forest product with the sex of household heads ($p < 0.01$), where female headed households generate lower ($96.2 or 11.1%) of their forest income than male headed households ($319.56 or 16.9% of their forest income from those forest

products). The lower contribution of these forest products is due to lower market price, low frequency of collection and their small amount needed.

Types and Quantity of Collected Forest Products

The results showed that all households collect forest products as also indicated in earlier reports by Alemayehu et al (2015) and Gadisa (2019) regarding the Chilimo forest, Ethiopia. Although the entire family members participate in the collection of forest products, which is similar to the reports from Falgore game reserve in Kano, Nigeria (Muhammad et al., 2017), the quantity and type of products collected varied with the gender of the collectors. Accordingly, only 4 types of forest products (firewood, charcoal, coffee and cardamom) were collected by females, while the products that mostly request processing and value addition activities timber, Seseno (tree fern), Gejo, fencing wood, Filt, climber, mortar, pestle, honey, bamboo, Stringer (*Mager*), plough and yoke were collected by male (Table 3). Moreover, males collected more types of forest product than females did which was similar to the result from a global comparative study that concluded male dominates the collection and marketing of forest product (Sunderland et al., 2014). Most forest products require physical strength and their collection is considered as the responsibility of males in many cultures where females are not allowed to go far away from home and they are responsible for activities at home.

The average quantities of forest products collected annually by male headed households are more than the amount collected female headed households (Table-3). Annually an average of 750 human load of firewood are collected by the sample households, out of which 1.3% were collected by female, 46.2% by male and 52.5% by both male and female. An average of 12.9 quintals of charcoal was produced annually per household, with female headed households taking 77.8% with the rest being co-produced by male and female. Coffee was another forest product collected by both male and female, an annual average of 226.8 kg collected per household with 15.5% , 5.8% and 78.6% were collected by, female, male and both males and females, respectively. Annually an average of 6.35 kg of cardamom was collected per household, out of which 14.7% were collected by female, 5.9% by male, and 79.4% by both female and male (Table-3).

Table 3. Types and quantity of collected forest products by sample households with gender perspective

Forest product	Unit of measurement	Average quantity collected per household per year			Collector of forest product					
					Female		Male		Both	
		Total sample	Female headed	Male headed	N	%	N	%	N	%
Firewood	Human load	750.00	578.82	833.14	2	1.30	72	46.20	82	52.50
Timber	Number	2.40	0.40	3.36			23	100		
Charcoal	Quintal	12.90	0.60	18.90	14	77.80			4	22.20
Tree fern (*Seseno*)	Number	149.40	85.90	180.20			115	100		
Gejo	Number	41.40	20.00	51.70			97	100		
Fencing wood	meter	82.95	26.50	110.38			133	100		
Filt	Number	25.00	14.30	31.30			45	100		
Climber	Bundle	24.50	8.20	32.40			144	100		
Mortar	Number	1.30	0.40	1.70			98	100		
Pestle	Number	5.00	1.00	6.90			123	100		
Honey	Kilogram	91.90	54.8.	109.90			135	100		
Coffee	Kilogram	226.80	42.20	316.50	16	15.50	6	5.80	81	78.60
Plough	Number	1.20	0.94	1.40			135	100		
Yoke	Number	1.40	0.70	1.70			112	100		
Cardamom	Kilogram	6.35	2.50	8.20	15	14.70	6	5.90	81	79.40
Bamboo	Number	9.70	2.57	13.10			66	100		
Stringer (*Mager)*	Number	86.50	48.60	104.90			155	100		

N-frequency of households; %-percentage

Types and Quantity of Marketed Forest Products

Although the quantity and type of marketed forest products vary with gender (Table-4), all family members have roles of supplying and selling the forest products. The result from the household survey indicated that all the collected types of forest products were not supplied to the market and that timber and split-wood are collected for home construction. Further, the study revealed that from the collected forest products, honey and firewood are the highest and lowest types of products supplied to the market by the households. Females have the role of supplying and marketing only one type of forest product (i.e., charcoal); whereas males sell many forest products with higher values. This implies that male household members have more dominant power in the collection and marketing of forest product than female. The results of the present study are similar to those results in the literature (Sunderland *et al.,* 2014).

Over 90% the total collected charcoal, coffee and honey are provided to the market, providing income sources for the households. Although from total of collected cardamom and climber, 75.6% and 65.3%, respectively are sold and almost half of the collected bamboo, mortar and fencing wood are supplied to the market. Other forest products collected in small quantity are also provided to the market. There is also a variation in quantity and type of forest products supplied to market with gender, where male headed households supplied large amount and many types of product than female headed counterparts. The forest products supplied by female headed households to the market are limited to fire wood, charcoal, coffee and cardamom.

Table 4. Types and quantity of marketing forest products by sample households with gender perspectives

Forest product	Unit of measurement	Average quantity marketed of forest product per household per year			Forest product marketed by					
					Female		Male		Both	
		Total sample	Female headed	Male headed	N	%	N	%	N	%
Firewood	Human load	16.15	14.11	17.14					6	100
Charcoal	Quintal	12.50		18.60	12	100.00				
Tree fern *(Seseno)*	Number	28.20		41.90			12	100.00		
Split wood *(Gejo)*	Number	10.60		15.84			10	100.00		
Fencing wood	meter	36.90		54.85			12	100.00		
Climber	Bundle	16.00		23.77			11	100.00		
Mortar	Number	0.70		1.10			10	100.00		
Pestle	Number	2.60		3.84			12	100.00		
Honey	Kilogram	89.14	53.10	106.6			135	100.00		
Coffee	Kilogram	207.40	36.90	290.3	13	13.70	1	1.10.00	81	85.20
Plough	Number	0.37		0.55			12	100.00		
Yoke	Number	0.40		0.65			12	100.00		
Cardamom	Kilogram	4.80	1.57	6.35					53	100.00
Bamboo	Number	4.80		7.20			8	100.00		
Stringer *(Mager)*	Number	28.20		41.90			12	100.00		

N-frequency of households; %-percentage

Gender Based Difference in Cash Income from Forest Products

There is a significant variation in the annual cash income ($p < 0.01$) from forest products based on the sex of household heads. The sale of forest product contributes $169.43 per year to female headed households and $812.14 per year to male headed households. The reason for the variation in cash income from forest product by gender might be due to the provision of diversified products to market and availability and efficient use of family labor for collection of forest products by the male headed households.

There is a statistically significant variation in cash income from marketing of coffee, honey and cardamom ($p < 0.01$). The marketing of coffee contributes a cash income of $58.31 and $459.2 to female and male headed households per year, respectively. Managing coffee in forest is labor intensive and protecting from wild life and human destruction are beyond females control and are mostly managed by male resulting in higher income. Annually honey contributes a cash income of $91.06 and $182.74 to female and male headed households, respectively. Female headed households generate $5.17 and male headed households generate $20.93 from marketing of cardamom. Generally, male headed households generate higher cash income by providing diverse and more quantities of forest products to market than female headed households do.

Table 5. Gender based difference in cash income from forest product marketing

Forest product	Mean cash income		Sig
	Female headed	Male headed	
Firewood	14.89	18.08	0.836
Coffee	58.31	459.20	0.000
Honey	91.06	182.74	0.000
Cardamom	5.17	20.93	0.005
Other forest products	0.00	131.20	0.000
Total	169.43	812.14	0.000

CONCLUSIONS

It was generally indicated that 17 types of forest products are collected from Sheka forest by male and female members of the community and 15 of these products are supplied to the market for the sake of generating income as livelihood options. Generally male members of the community collect a more diverse and amount of the forest products with high market value and demands further value addition activities. Male headed households generate more income from forest products. The forest of Sheka makes an important contribution to the livelihood of the local communities but it is in danger due to heavy deforestation. It is important to note that there is an urgent need for intervention by the government and NGOs in devising alternative livelihood activities for the local community. Moreover, investment projects that are environmentally friendly and socially acceptable should be given priority with evidence based assessments.

CONFLICTS OF INTEREST

Authors declare that they have no conflicts of interest regarding the publication of this paper with the Journal of Science and Development.

REFERENCES

Amenu B. T. and Mamo G. S. 2020. Importance, determinants and gender dimension of forest for communities, Dawuro zone south-west Ethiopia a case study of Essera Woreda. Wolaita Sodo University, P.O.Box, 01, Tarcha, Ethiopia doi:10.20944/preprints202005.0375.v1. [Scholar Google]

Asfaw A. and Etefa L. 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. [Scholar Google]

Cavendish, W. 2002. Quantitative methods for estimating the economic value of resource use to rural households. In uncovering the Hidden Harvest: Valuation Methods for Woodland and Forest Resources. People and Plants. eds. In: B. Campbell & M. Luckert. [Scholar Google]

Chilalo, C., and K.F. Wiersum. 2011. The role of non-timber forest products for livelihood diversification in Southwest Ethiopia. Ethiopian e-Journal Research and innovation Foresight– Agriculture and Forestry, 3(1): 44-59. [Scholar Google]

Damte A., Mekonnen, A., Hirons, M., Robinson, Z., Gonfa, T., Woldemariam, T. and Demissie, S. 2019. Contribution of non-timber forest products to the livelihood of farmers in coffee growing areas: evidence from Yayu Coffee Forest Biosphere Reserve. Journal of Environmental Planning and Management. https://doi.org/10.1080/09640568.2019.1679615. [Scholar Google]

De Beenhouwer, M., Geeraert, L., Mertens, J., Van Geel, M., Aerts, R., Vanderhaegen, K. and Honnay, O. 2016. Biodiversity and carbon storage co-benefits of coffee agroforestry across a gradient of increasing management intensity in the SW Ethiopian highlands. Agriculture, Ecosystems & Environment, 222, pp.193-199. [Scholar Google]

Demie, G.2019. Contribution of non-timber forest product in rural communities livelihoods around Chilimo forest, west Shewa, Ethiopia. Ambo University, Ambo, Ethiopia. Journal of

natural sciences research, 9(22). [Scholar Google]

FAO. 2014. Forestry department of food and agriculture organization of United Nations.

FAO. 2018. The State of the World's Forests 2018 - Forest Pathways to sustainable development. Rome. Licence: CC BY-NC-SA 3.0 IGO.

Gonfa B. D. 2019. Review of Economic Contribution of Non-Timber Forest Products (NTFPs) for Rural Livelihoods and its Potential for Sustainable Forest Management in Ethiopia, Debre Tabor University, Ethiopia. Agricultural Research & Technology, 21(5). [Scholar Google]

Kassa, G., and Yigezu E. 2015. Women economic empowerment through NTFPs in Gimbo district, southwest Ethiopia. Department of agricultural economics, Mizan-Tepi University, MizanTeferi, Ethiopia. American Journal of Agriculture and Forestry. [Scholar Google]

Kimanzu, N., B. Schulte-Herbrüggen , J. Clendenning, L. Chiwona-Karltun, K. Krogseng 1 and G. Petrokofsky. 2021. What Is the Evidence Base Linking Gender with Access to Forests and Use of Forest Resources for Food Security in Low and Middle-Income Countries? A Systematic Evidence Map. Systematic review https://www.mdpi.com/journal/forests. [Scholar Google]

Muhammad, S.S., O.W. Vivian, S.M. Judith, S.Aminu, & A.E.Yazan. 2017. NTFPs and their contribution to household income in Falgore game reserve in Kano, Nigeria. Ecological processes, 6(23) DOI 10.1186/s13717-017-0090-8. [Scholar Google]

Mulatie, C., and Y. Tesfaye. 2018. Economic contribution of forest resources to sustainable livelihood in Bench Maji zone, south west Ethiopia. Department of Economics, Mizan-Tepi University, Mizan Aman, Ethiopia. Int. J. Adv. Res., 6(6): 1-10.

Mulatu, A., Mulugeta S., and Mekuria A. 2015. Forest resource extraction and rural livelihood a case study in southwestern Ethiopia. IJR 2(9): 302-313. http://internationaljournalofresearch.org/.

MWFE. 2019. Annual socio-economic report of Masha Woreda finance and economy of 2011 E.C.

NTFP-PFM. 2012. Challenges and opportunities for sustainable forest management in south-west Ethiopia.

Olaniyi, O.A., J.O. Akintonde, and S.I. Adetumbi. 2013. Contribution of Non-Timber Forest Products to Household Food Security among Rural Women in Iseyin Local Government Area of Oyo State, Nigeria. Research on Humanities and Social Sciences, 3(7). [Scholar Google]

Seifu T., Muhdin M & Alemu A. 2017. Economic Valuation Natural Forest: The Case of Sheka Forest, South West Ethiopia. Journal of Resources Development and Management, 37: 2017. [Scholar Google]

Shackleton, S., F. Paumgarten, H. Kassa, M. Husselman, and M. Zida. 2011. Opportunities for enhancing poor women's socioeconomic empowerment in the value chains of three African non-timber forest products (NTFPs). International forestry Review 13(2). [Scholar Google]

Storck, H. and Doppler, W. 1991. Farming systems and farm management practices of smallholders in the Hararghe Highlands. Wissenschaftsverlag Vauk Kiel. [Scholar Google]

Sunderland, T., R. Achdiawan, A. Angelsen, R. Babigumira, A. Ickowitz, F. Paumgarten, V. Reyes-García, & G. Shively. 2014. Challenging perceptions about men, women, and forest product use: a global comparative study. World Development, 64: 56–66. [Scholar Google]

Teshome B., T., K. Habtemariam, C. Padoch, and M. Zerihun. 2016. Contribution of dry forest products to household income and Determinants of forest income levels in Northwestern and Southern lowland of Ethiopia. Forestry research center & CIFOR, Ethiopia. Natural Resources, 6: 331-338. [Scholar Google]

UNFF (United Nations Forum on Forests). 2019. Forests, inclusive and sustainable economic growth and employment. Background study prepared for the fourteenth session of the United Nations Forum on Forests. Forests and SDG/ March 2019.

Vedeld, A., A. Angelsen, E. Sjaastad & K. Berg. 2004. Counting on the Environment: Forest Incomes and the Rural Poor. The World Bank Environment Department. Environmental

Economics Series, Paper No. 98. Washington D.C. USA. [Scholar Google]

Woldemariam, T and Getaneh, F. 2011. Sheka forest biosphere reserve nomination form. UNESCO-MAB national committee, federal democratic republic of Ethiopia. Addis Ababa, Ethiopia.

Worku, A., J. Pretzsch, K. Habtemariam, and E. Auch. 2014. The significance of dry forest income for livelihood resilience: The case of the pastoralists and agro-pastoralists in the dry land of southeastern Ethiopia. Forest Policy and Economics, 41: 51-59. [Scholar Google]

APPENDIX

Appendix-1 Socio-economic characteristics of sample households

No.	Socio-economic characteristics	Total sample	Male headed	Female headed
1	Age	47.17	48	45
3	Family size	6	7	4
4	Land size	2.96	3.2	2.5
5	Livestock owning (TLU)	7.48	8.1	6.2