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Contribution of forest products to rural household's income and factor determining forest income in Masha district of Sheka zone, SWEPR, Ethiopia

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A B S T R A C T

Rural people living around forests in Ethiopia depend on income from forest product collection as one of their livelihood activities. The forests of Sheka are threatened by unsustainable use and conversion to alternative land uses. This study was conducted to identify and quantify income from major forest products collected from the Sheka forest and examine factors that determine income from forest product collection. Quantitative and qualitative data were collected from primary and secondary sources. By stratified random sampling method, three kebeles were selected from the Masha district and 156 households were randomly selected from those kebeles and interviewed with a structured questionnaire. Descriptive and inferential statistics were determined by SPSS and STATA software. Multiple linear regression models were employed to determine the relationship between socio-economic factors and forest income. The result indicates 17 major forest product were collected and contributes an average of $1553.75 or 41.17% of their total annual income and was the highest contributor to total income. Forest income varies with agro-ecology and distance from the nearby markets in the study area. Households in the study area utilize more forest products for home consumption. Incomes from forest product collection are significantly related to the level of education of the household head, family size, and distance of home from the forest and market. Households in the study area depend to a higher degree on income from forest product collection and have an implication of sustainable management of forests in the long term.

Keywords: Forest product, Collection, Income, Dependence, Masha

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Introduction

Forest is one of the most essential types of resources for the existence of life on earth. 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). Forest product provides economic functions to household by sustaining consumption, generating cash income, providing agricultural inputs, providing input for small-scale enterprises and underpinning capital formation (Cavendish, 2002; Sultan, 2009). In Ethiopia an estimated 57 million rural populations were engaged in the extraction of one or more of the forest products and is considered as one of their livelihood activity to reduce their vulnerability from risk (UNDP, 2017).

Southwest part of Ethiopia is physically diverse and covered by natural vegetation with Afro-montane highland forest. Sheka natural forest is one of UNESCO's designated biosphere reserves in southwest Ethiopia that covers 47% of Sheka zone land area and is about 238,750 hectares; composed of Afro-montane vegetation and bamboo tickets (Mahiber, 2007). Sheka biosphere reserves are supported by REDD+ project by participating local community on forest conservation, rehabilitate degraded forest, improve the livelihood of local community by supporting and minimize their negative impact on forest. Local communities have developed traditional management practices based on religious taboos and customary tenure rights that have sustained the forests for centuries and contributed to the better condition of the forests

in the area (Mahiber, 2007). Honey, wild coffee, climbers, fuel wood, household utensils, farm implement and spices are the major forest product they acquire from the forest for household consumption and for markets (Mahiber, 2007; Mullatu, 2010).

A pressing issue currently being addressed in environmental and ecological economics is the reduction of world tropical forests. Forest degradation not only diminishes the forest cover and forest product being extracted, it also has an impact on the country's other natural resources and biodiversity, natural ecology and the welfare of its population. The forest of Sheka are now diminishing and facing high deforestation by smallholder farmers for agriculture due to population growth, in-migration and illegal logging due to the presence of valuable trees for timber production (Mahiber, 2007; NTFP-PFM, 2012).

Private investment projects are also clearing forest lands for commercial perennial crop production like tea and coffee plantation which is currently becoming an important threat to the ecosystem (Mahiber, 2007; Woldemariam and Getaneh, 2011; NTFP-PFM, 2012). The local government is transferring the forest-land to private investor for the need of revenue without assessment of impact of investment project on environment, local community economy and culture, biodiversity and natural ecology. The other fundamental problem in the area is the fact that forests of Sheka are under-valued by official decision maker and local community and are not considered as scarce resources. Thus estimating the benefit from the forest product at household level is very helpful to understand the true value of the forest and make informed decision regarding the allocation of forestlands for different purposes. The particular interest of this study is to identify and estimate the monetary value of timber and NTFPs and examine those factor determining the households income from forest product collection in the case of Masha district, south west Ethiopia.

Methodology

Description of 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 total land area of 763.73 km2. It altitude lies between 1600m-2400m above sea level and receives 900mm-2000mm rainfall annually. Agro climatically, the area is largely mid-highland (Woynadega) type covering about 75% of the total area, 22% and 3% are in highland (Dega) and lowland (Kola) zones, respectively. 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, teff, beans, peas, coffee are produced in the area and the livestock include cattle, goat, sheep and horses (Mullatu, 2010). Bee keeping is another dominant economic activity practiced in the area in home garden and within forest for honey production.

Sampling design and sample size determination

To select the study area and the respondents, multi-stage sampling techniques was employed. In the first stage, Masha district is the selected purposely out of the three districts in Sheka zone for this study due to availability of natural forest cover, high deforestation rate in the area, better knowledge of researcher about the community and type of forest product 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 mid-highland (Weyinadega) and highland (Dega) and distance each Kebeles found from Masha town, as those Kebeles close to Masha are that found within 7 km and far from Masha those out of 7 km radius. One kebele were randomly selected from four strata (mid-highland close to Masha, mid-highland far from Masha, highland close to Masha and highland far from Masha). Due to unavailability of highland 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 and taken proportional to the number of total households of that kebele. The sample size were determined by using formula of Yamane (1967):

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

Where 'n' is the sample size; 'N' is the total number of households of the three kebeles and 'e' is level of precision (error level) and a total of 156 households were selected randomly from three kebeles.

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 household survey,

key informant interview, focus group discussion and market survey using structured questionnaire. This primary data is about the type and amount of forest products they collect, socio-economic characteristics of household, price of specific forest products and all incomes of households from different sources. The developed questionnaire was tested before conducting the survey, in order to have a clear understanding about the issue and respondents. Prior to the household survey, FGDs and KIIs were done 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, that were then analyzed by using SPSS version 23 and Stata software. Descriptive statistics like mean, percentage, frequency and standard deviation was employed to analyze and indicate the results of the study.

Estimation of the monetary value of forest product

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 by direct market price method. Incomes of households from forest product (FORINC) collection are estimated by summing the monetary value of each forest product that particular household collected and change to US dollar by dividing with average exchange rate 37.93 birr during data collection.

Estimation of the dependency level of household on forest product income

The dependency level or share of forest product income 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.

Econometric model

Multiple linear regression model is selected to estimate the effect of those socio-economic and physical factors on household forest income. The selected model can best estimate and fit the collected data because the dependent variable income from forest product collection are continuous variable. Therefore, income from forest product collection was regressed on those socio-economic and other variables in order to estimate their effects on the forest product collection and use (Gujirat, 2004). The OLS regression is specified as equation as:

$$Y=\beta_0 + \beta_1X_1 + \beta_2X_2+ \beta_3X_3+\ldots+ \beta_nX_n+U_i$$

Where,

Y = income of households from forest product collection in 2019/2020 in US$
β_0= intercept
β_i = Vector of estimated coefficient of the explanatory variables
X_i = Vector of explanatory variables or factor determining household forest income and
U_i = disturbance term or other factor that not included in the regression.

Table 1. Hypothesized factor that affect income from forest.

Variable	Description	Type of variable	Measurement	Expected effect
FORINC	Income from Forest product	Continuous	US$	
SEX	Sex of household head	Dummy	1=Male, 0=female	Negative
AGE	Age of household head	Continuous	Year	Negative
EDU	Level of education of household head	Continuous	Year	Negative
FASI	Family size	Continuous	Number	Positive
LASIZ	Land size	Continuous	Hectare	Negative
LVU	Livestock unit	Continuous	Number	Negative
FORHOM	Distance between forest and home	Continuous	Kilometre	Negative
HOMAR	Distance between home and market	Continuous	Kilometre	Negative
ACCRE	Access to credit	Dummy	1=yes, 0= no	Negative

Results and Discussion

Socio-economic characteristics of the sample household

The majorities (88.5%) of the sample households were male headed and only 11.5% were female headed. About 89.1% are married, no one is single, 7.1% are divorced and 3.8% are widowed. The age of the sample household head ranged from 20-70 years with a mean age of 47.17 years. About 91% of the sample households head were in productive working age, only 9% were older than 65 years. The sample households have a minimum of 2 and a maximum of 11 family members with a mean of 6. About 18.6% of the

total sample household head were not attended any formal education, while 70.4% were primary school and 11.0% were secondary school with a mean of 3.089 years schooling. All of the sample household have a land and the area ranges from 0.5 hectare to 9.0 hectare with a mean of 2.96 hectare. The livestock population of the sample household in terms of tropical livestock units (TLU) ranges between 0.90 and 30.85 with a mean of 7.48 TLU.

Livelihood strategies and contribution to household income

The livelihood of local communities depend on diversified activities includes crop production, livestock rearing, forest product collection and off-farm activities, which is similar with communities in other part of Ethiopia (Asfaw and Etefa, 2017; Fikir *et al.*, 2016; Chanie and Tesfaye, 2018; Damte *et al.*, 2019). Forest product collection, crop production and livestock rearing were ranked 1 to 3 respectively, as the main source of livelihood income in the study area. The total average annual income of the sample households is about $3774.16, which is very large compared to finding in Hammer and Yayo district of Ethiopia (Asfaw and Etefa, 2017; Fikir *et al.*, 2016). It is due to the current high market price of agricultural products and forest products and high frequency of forest product collection in the area. The contribution of each of the livelihood activities to annual household income are 31.20% from crop production, 25.53% from livestock rearing, 2.10% from off-farm activities and 41.17% are from forest product extraction to the total sample households (Table 2).

Table 2. Livelihood income sources.

No	Livelihood activities	Total sample		Mid-highland close to market		Mid-highland far from market		Highland far from market		Sig
		Mean [std. dev]	(%)	Mean [std. dev]	%	Mean [std. dev]	%	Mean [std. dev]	%	
1	Crop production	1,177.50 [484.90]	31.20	1,134.67 [574.86]	32.8	1,013.36 [335.23]	26.9	1,293.60 [445.36]	32.1	0.016**
2	Livestock rearing	963.60 [449.75]	25.53	931.20 [515.60]	26.9	997.03 [458.30]	26.5	972.65 [390.80]	24.2	0.783
3	Forest product extraction	1,553.75 [692.97]	41.17	1,286.38 [675.55]	37.1	1,710.27 [671.40]	45.5	1,687.80 [667.85]	41.9	0.002***
4	Off-farm activities	79.30 [155.80]	2.10	111.30 [210.80]	3.2	42.80 [96.60]	1.1	72.10 [121.84]	1.8	0.117
	Total annual average income	3,774.16 [1268.50]	100	3,463.57 [1545.20]		3,763.47 [1122.90]		4,026.16 [984.58]		0.047**

,,*** indicates the mean difference are statistically significant at 10%, 5% and 1%, respectively.*

Forest product and its contribution

Major forest product collected in the area

Results from analysis of data show that 17 major types of forest product are collected in the study area. These are 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 *(Filit),* mortar, plough, yoke, pestle and bamboo. All of the sample households are engaged in collection of forest products and it is similar to the earlier finding in the study area and Chilimo forest, Ethiopia (Mullatu, 2010; Demie, 2019). This engagement of communities in forest product collection is more than the findings of studies in Bench Maji zone and Yayo district of Ethiopia (Chanie and Yirsaw, 2018, Asfaw and Etefa, 2017). In addition, households in the area are engaged in collection of diversified forest products as; 93% of the sample households collect 6 and more types of forest products.

Contribution of forest product to household income

The mean income contribution of forest products are about $1553.75 with maximum of $3,176.90 ETB and minimum of $388.90 per year (Table 2). Forest products collection contributes the highest income to household total annual income than other livelihood activities. This higher mean income is due to the existence of high valued forest product (coffee, honey and cardamom), high frequency of collection, presence of diversified forest products in the area and current high market price of forest products. From the total forest product income, 61.25% are used for household consumption purpose and 38.75% are used for cash income generation by marketing forest product. The finding are similar to the findings of Melese *et al.* (2016) and Damte *et al.* (2019) and contradicts with the finding of Tesfaye *et al.*, (2010) in southern Ethiopia and Soe and Yeo-Chang (2019) in Myanmar.

The dependency levels of household on forest income are about 41.17% with a minimum of 15.90% and a maximum of 82.40%, which indicate communities in the study area depend more on income from forest product collection than income from other sources. The current result is less than earlier finding in the area that indicate, forest product contributes 49% of annual household income (Mullatu, 2010) but is more than the finding of Chilalo and Wiersum (2011). In addition, a study by Mahiber (2007) on Sheka forest indicates in 2004/05, forest products contribute 44% of household annual income.

Many studies revealed that forest product collection contributes the highest share to household annual income similar to the current finding. Aliyi (2008) stated NTFPs contribute 54% of total income, Asfaw and Etefa (2017) reported 44.7% of annual household incomes were generated from collection of forest product. A study in many African countries including Ethiopia revealed forest-related activities account for 35-39% of average income of households (UNFF, 2019). A study in Myanmar revealed forest product contributes 38.82% of annual household income (Htun *et al.,* 2017). The finding indicate that the contribution of forest product are higher than the finding in Hammar district, Bench Maji, northwestern and southern lowland of Ethiopia (Fikir *et al*, 2016; Chanie and Yirsaw, 2018; Teshome *et al.,* 2015). Income of households from forest product collection significantly varies with agro-ecology and distance of kebeles from nearby market at Masha at $p<0.01$. Households in mid-highland agro-ecology far from market generate and depend more on forest income compared to others (Table 2). This might be due to more availability of high valued forest product there.

Income contribution of major forest products

From the total of 17 products collected, 3 types of forest products contribute 10 or more percent of the total forest income and collected by the majority of the sample households. The three major forest products firewood, honey and coffee contribute 84.1% of forest income together to the sample households.

Firewood

Firewood is an important forest product collected by all of the sample households in the area for cooking and heating due to unavailability of alternative energy sources. Firewood's contribute an average of $790.93 per year, which is 50.9% of forest income and 20.95% of the total annual income to the sample households. This finding is similar to many studies; firewood is commonly and majorly collected forest product in many areas (Asfaw and Etefa, 2017; Damte *et al.*, 2019; Fikir *et al.*, 2016). Majorities (97.80%) of firewood are utilized for consumption and only 2.20% are collected for cash income generation by marketing.

Coffee

Forest coffee and coffee managed in the forest are widely collected forest products in the area and collected by 66% of the total sample households. Majority (91.50%) of forest coffee income are generated by marketing and 8.50% of coffee is consumed at home. Forest coffee contributes an average of $358.76 per year to the sample households, which are 23.10% of forest income and 9.50% of total annual household income. Coffee are one of higher contributor to forest income and similar with studies of Chilalo and Wiersum, (2011); Chanie and Yirsaw (2018) and Asfaw and Etefa (2017).

Honey

Beehives hanging in the forest are widely practiced in the area for honey production by 86.50% of the total sample households. The mean income contribution of forest honey is about $157.50 per year, 10.14% of forest income and 4.10% of the total annual income. This result is similar to many studies in southwest Ethiopia (Chilalo and Wiersum, 2011; Mullatu, 2010). Honey is one of the most commercialized forest products as 97% of honey incomes are accounted from marketed honey and only 3% are consumed at home. The rest 14 types of forest product contribute 15.90% of forest income. This indicates they are collected by small amount and low frequency but are collected by the majority of households.

Factors determining income from forest products

The results of linear multiple regression indicates that the level of education of household head, family size, distance from home to forest and distance from home to market significantly affect the amount of income from forest product collection (Table 3). The R-square of the model indicates that the explanatory variables explained 85.2% of the variation in forest product income. Tests for multicollinearity and heteroskedasticity indicate that there is no multicollinearity and heteroskedasticity problem in the model.

Level of education of household head (EDU) are statistically significant at $p<0.01$ and negatively affects households income from forest product collection. A one-year increase in schooling of household head decreases forest product income of households by $32.362 per year. The finding agrees with studies in Bench Maji and Myanmar, there is negative relationship between schooling of household head and forest income (Chanie and Yirsaw, 2018; Htun *et al.,* 2017).

Table 3. Result of linear multiple regression of forest income on socio-economic factors.

Model	Coefficients	Std. Error	t-value	Sig.
(Constant)	1430.778	232.210	6.162	0.000
SEX	66.091	70.867	0.933	0.353
AGE	-0.240	2.523	-0.095	0.924
EDU	-32.362	9.851	-3.285	0.001
FASI	172.990	19.511	8.866	0.000
LASIZ	-21.399	18.943	-1.13	0.260
TLVU	5.379	5.573	0.965	0.336
FORHOM	-1040.102	108.548	-9.582	0.000
HOMAR	-9.134	5.350	-1.707	0.090
ACCRE	15.926	56.413	0.282	0.778

,,*** indicates significant at 10%, 5% and 1%, respectively.*
Dependent Variable: household income from forest product

Family size (FASI) of the household are statistically significant at p<0.01 and positively affects households income from forest product collection. An increase of family member by one person increases income from forest products by $172.99 per year. Households with large family member generate more income from forest product and the finding agree with finding in Hammar, northwestern and southern lowland of Ethiopia and Myanmar (Fikir *et al.*, 2016; Teshome *et al.*, 2015; Htun *et al.*, 2017).

Distance of forest from home (FORHOM) are statistically significant at p<0.01 and negatively affects households income from forest product collection. If the distance between home and forest increase by one kilometer, incomes from forest product collection decrease by $1,040.1 per year. Households close to forest generate more income from forest product and the finding is similar to the finding in Hammar district and northwestern and southern lowland of Ethiopia (Fikir *et al.*, 2016; Teshome *et al.*, 2015).

Distance from home to market (HOMAR) are statistically significant at p<0.1 and negatively affects households income from forest product collection. Household income from forest product collection decreases by $9.13 per year, when the distance between home and market increase by one kilometer. The result agree with the finding in Hammar district, Ethiopia that tells the negative relation of forest income and distance of market is due to high transportation, energy and time cost to provide forest product to market (Fikir *et al.*, 2016).

Conclusion

Household in the study area generate the highest share of annual income from forest product collection. Income from forest product collection varies with agro-ecology and distance from market and households in mid-highland close to market generate lower income compared to others. The major forest products contributing the largest share of forest income are firewood, forest coffee and forest honey. The amount of income from forest product collection are significantly affected by level of education of household head, family size, distance from home to forest and distance from home to market.

The forest of Sheka has an important contribution to the livelihood communities; it is in danger due to high deforestation. Hence, government and NGOs should intervene with different alternative livelihood activities to local community to minimize their dependency on the forest and for the existence of this scarce resource to future generation. Investment projects that are environmental friendly and socially acceptable should be given priority and government take an action like assessing the impact of licensed investment projects on environment, culture of a community, livelihood of community, biodiversity and natural ecology and take corrective measure.

References

Aliyi, N. 2008. An analysis of socio-economic importance of Non-timber forest products for rural households: A case study of Bale Mountain National Park. MSc thesis, Copenhagen University, Copenhagen, Denmark. 227p.

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. *Int. J. Appl. Agril. Res.* 12(2): 157-169.

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. B. Campbell & M. Luckert. Routledge, London. 49p. https://doi.org/10.4324/9781849773614-10

Chanie, M. and Yirsaw, T. 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. https://doi.org/10.21474/ijar01/7180

Chilalo, M. and Wiersum, K.F. 2011. The role of non-timber forest products for livelihood diversification in Southwest Ethiopia. *Ethiopian e-J. Res. Innov. Foresight–Agric. Forest.* 3(1): 44-59.

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. *J. Environ. Plann. Manage.* 63(9): 1633-1654. https://doi.org/10.1080/09640568.2019.1679615

Demie, G. 2019. Contribution of non-timber forest product in rural communities livelihoods around Chilimo forest, west Shewa, Ethiopia. Department of forestry, college of agriculture and veterinary science, Ambo University, Ambo, Ethiopia. *J. Nat. Sci. Res.* 9 (22): 25-37. https://doi.org/10.7176/jnsr/9-22-04

Fikir, D., Tadesse, W. and Gure, A. 2016. Economic Contribution to Local Livelihoods and Households Dependency on Dry Land Forest Products in Hammer District, Southeastern Ethiopia, University of Gondar, Gondar, Ethiopia. *Int. J. Forest. Res.* 2016: 5474680. https://doi.org/10.1155/2016/5474680

Gujarat, D.N. 2004. Basic Econometrics. Fourth edition. New York. The Mc Graw-Hill Companies. pp. 202-296.

Htun, T.T., Wen, Y. and Ko, A.C. 2017. Assessment of Forest Resources Dependency for local livelihood around Protected Area: A case study in Popa mountain park, central Myanmar. *Int. J. Sci.* 6(1): 34-43. https://doi.org/10.18483/ijSci.1176

Mahiber, M. 2007. Forest of Sheka: Multidisciplinary case studies on land use/land cover changes, Southwest Ethiopia, Addis Ababa, Ethiopia. 231p.

Melese, B., Bekele, T. and Tades, S. 2016. Role of NTFPs to livelihoods of rural households; in sitit humera, western tigray Ethiopia. Gambella university college of agriculture and natural resource, Gambella, Ethiopia. *World J. Pharma. Life Sci.* 2(4): 33-48.

Mullatu, A. 2010. Contribution of Forest Products Extraction to Livelihood Support and Forest Conservation in Masha and Andracha Woredas in Southwestern Ethiopia. Addis Abeba University, Addis Abeba, Ethiopia. 67p.

NTFP-PFM. 2012. Challenges and opportunities for sustainable forest management in south-west Ethiopia. 65p.

Soe, K.T. and Yeo-Chang, Y. 2019. Livelihood dependency on non-timber forest products; implication for REDD+. Department of forest science, college of agriculture and life science, Seoul national university, Korea. *Forests* 10: 427. https://doi.org/10.3390/f10050427

Sultan, M. 2009. The Role of Non Timber Forest Products to Rural Livelihoods and Forest Conservation: A Case Study at Harana Bulluk District, Oromia National Regional State, Ethiopia. MSc Thesis in Farm Forestry, Wondo Genet College of Forestry and Natural Resources, Wondo Genet, Ethiopia. pp. 44-45.

Tesfaye, Y., Roos, J.A., Campbell, B.M. and Bohlin, F. 2010. Forest income and poverty alleviation under participatory forest management in the bale highlands, southern Ethiopia. *Int. Forest. Rev.* 12(1): 66-77. https://doi.org/10.1505/ifor.12.1.66

Teshome, B., Kassa, H., Padoch, C. and Mohammed, Z. 2016. Contribution of dry forest products to household income and Determinants of forest income levels in Northwestern and Southern lowland of Ethiopia. *Nat. Resour.* 6: 331-338. https://doi.org/10.4236/nr.2015.65030

UNDP. 2017. Assessment of socio-economic value of forest products for rural communities in Ethiopia. United Nation Development Program, New York, USA.16p.

UNFF. 2019. Forests, inclusive and sustainable economic growth and employment. Background study prepared for the fourteenth session of the United Nations Forum on Forests, UNFF, New York, USA. 58p.

Vedeld, A., Angelsen, A., Sjaastad, E. and Berg, K. 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. 95p.

Woldemariam, and Getaneh, F. 2011. Sheka forest biosphere reserve nomination form. UNESCO-MAB national committee, federal democratic republic of Ethiopia. Addis Ababa, Ethiopia. 159p.

Yamane, T. 1967. Statistics: An Introductory Analysis, 2nd Ed., New York: Harper and Row. 886p.