

Full Length Research Paper

Evaluation of socio-economic factors influencing exploitation of non-timber forest products in Tanzania

Mhuji Kilonzo^{1*}, Barakaeli Abdiel Ndossi², Dickson Mauki¹ and Paulo Okumu Ochanga³

¹School of Biological Sciences, University of Dodoma, P. O. Box 259, Dodoma, Tanzania.

²Ministry of Natural Resources and Tourism, P. O. Box 15472, Dar es Salaam, Tanzania.

³Tanzania Livestock Research Institute, P. O. Box 147, West Kilimanjaro, Tanzania.

Received 5 May, 2018; Accepted 18 June, 2018

Non-Timber Forest Products (NTFPs) constitute an important source of livelihood for millions of people from forest fringe communities across the world. This study was conducted to identify main NTFPs used by local communities around Nyanganje Forest Reserve (NFR) which is within the Eastern Arc Mountains in Kilombero district, Tanzania. Furthermore, the study aimed at determining socio-economic factors influencing extraction of NTFPs in the study area. The study involved questionnaire survey in Signali, Sagamaganga and Lungongole villages which surround NFR. Data was analysed using Statistical Package for Social Sciences (SPSS) whereby inferential analysis was applied to show the relationship between NTFPs collected and socio-economic factors while Chi square test (χ^2) was used to determine the significance in dependency of certain socio-economic factors on extraction and use of NTFPs in the study area. It was observed that, socio-economic factors such as income level, education level, age distribution, household size, occupation, distance, and residence duration influenced the extraction and use of NTFPs by local communities in the study area. It was however recommended that, for sustainability of the NTFPs in NFR, the government has to initiate and emphasize the extraction and utilization of NTFPs resources in a sustainable and environmentally friendly manner.

Key words: Extraction, Nyanganje Forest Reserve, socio-economic factors.

INTRODUCTION

Non-timber Forest Products (NTFPs) are defined as all biological materials other than timber that may be extracted from the natural ecosystems, managed plantations, agroforestry systems and be utilized within the household, marketed or have social cultural and religious significance (Wickens, 1991). NTFPs constitute an important source of livelihood for millions of people

from forest fringe communities across the world (Asfaw et al., 2013). It is estimated that about 300 million people living close to tropical forests earn part or their entire livelihood through NTFPs use (Mulenga et al., 2011). In Africa, a continent with a forest cover of 21% NTFPs from forests and other tree systems continue to be an important component of household nutrition, health and

*Corresponding author. E-mail: m_kilonzo@yahoo.com. Tel: +255 763757560.

as source of income (FAO, 2011). The NTFPs are therefore important forest products especially in dry land areas where they form alternative sources of livelihood (Suleiman et al., 2017; Elikana, 2013; Wollenberg and Nawir, 1998). They also contribute to poverty alleviation through generation of income, providing food and improved nutrition, medicines and foreign exchange earnings (Wollenberg and Nawir, 1998; Ahenkan and Boon, 2011; Islam and Quli, 2016).

In the Eastern Arc mountains, especially the Nyanganje Forest Reserve (NFR) in Morogoro Region, Tanzania, NTFPs are well known by the local communities (Schaafsma et al., 2014). They provide supplementary foods such as roots, tubers, vegetables, fruits and grains for families (Dubey, 2007). The increasing values of such NTFPs in this area have hastened their collection even beyond the rules and regulations guiding their management and utilization. Firewood is the most collected NTFPs from NFR. These activities are undertaken by local populations surrounding these areas. Collection of medicinal plants also results in substantial negative impact on the forest (WWF, 2004). Non-residents and people with clinics in areas which are far from NFR, collect the products in larger quantities so as to minimize travelling costs and time spent. In addition to the examples of NTFPs mentioned earlier, in Udzungwa mountains, more NTFPs including wildlife, poles, wild mushrooms, wild vegetables, wild fruits, ropes and honey are also collected (Melese, 2016; Balama et al., 2017). Taking into consideration the prominence of NTFPs, it is important and desirable to assess the socio-economic factors that influence extraction of these products from NFR. This study hypothesizes that NTFPs has influence on the socio-economic factors since it has been exploited by many communities in Africa to constitute an important source of livelihood. The aim of this paper therefore was to determine the socio-economic factors influencing local communities to collect and utilize NTFPs in a study area.

MATERIALS AND METHODS

Data collection

Both primary and secondary data were collected. Primary data involved household questionnaire survey. Secondary data was acquired from relevant reports in Kilombero district office, Forest Headquarters, Tanzania Forest Research Institute and Non-Government Organizations (NGOs). Other secondary informations were obtained from published manuscripts and text books.

Household questionnaire survey

Structured questionnaires with both closed and open-ended questions were used to collect household data. The questionnaires were designed to focus on key issues including main types of NTFPs available in the study area, species extracted and parts of the plants used by the population. The questionnaires were pre-tested in 10 households prior to the actual survey. The pre-testing

assisted to check for redundancy, meaningfulness, comprehensiveness and clarity of the required information from the respondents to ensure applicability of the questionnaires.

Sampling for household survey

The actual data collection was preceded by a preliminary survey to determine the total number of sample villages and households required. A sample of three villages namely Sagamaganga, Signali and Lungongole was purposively selected on the fact that they all lie in the Eastern Arc Mountains and share border with the NFR which is located between latitude 7°56' to 8°4' South and longitude 36°39' to 36°50' East, 15 km North East of Ifakara town. Climate of the area is governed by oceanic rainfall with continental temperature.

Estimated rainfall is 2000 mm per year with mist effect at high altitude. The dry season is from June to October and the temperature range from 19°C to a maximum of 27°C. In this study, a simple random sampling technique was used to select 40 households in each village as described by Mbeyale (2007) who argued that a sample size of at least 30 units was sufficient irrespective of the population size. In this study however, the household heads were the key respondents during household survey as they are the decision makers for the households in the utilization of medicinal plants as recommended by Kajembe (1994).

Focused group discussion

A total of 5 focused group discussions from each village were employed to encourage collective responses and different opinions about collection and use of NTFPs. The focused group discussions comprised of 10 to 15 men and women with experiences on the utilization of NTFPs. Key informants including village leaders and elders were also involved to provide information in relation to the different types of NTFPs utilized.

Plant identification

Plant species were identified by Mr. Gabriel Laizer, a botanist from Tropical Pesticides Research Institute (TPRI), Arusha and voucher specimens were deposited at the University of Dodoma (UDOM).

Data analysis

Data collected were analysed using Statistical Package for Social Sciences (SPSS). Inferential analysis was applied to show the relationship between NTFPs collected and socio-economic factors while Chi square test (χ^2) was used to determine the significance in dependency of certain socio-economic factors on extraction and use of NTFPs in the study area.

RESULTS AND DISCUSSION

The interviews in the study villages yielded a wide range of information on NTFPs that are widely used. According to the interviews, extraction of NTFPs for household consumption, primary health care and income generation is to some extent influenced by a number of socio-economic factors such as income level, age distribution,

Table 1. The role of income level of respondents on collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Yearly household income (TZS)					Total (%)	χ^2 -value	Significance
	10 000-50 000	50 001-100 000	100 001-150 000	150 001-200 000	>200 000			
Wild fruits	10.5 (6)	35 (20)	22.8(13)	14.2 (8)	8.8 (5)	91.2 (52)	37.21	0.001***
Wild vegetables	13.7 (8)	32.7 (19)	22.4(13)	10.3(6)	8.5 (5)	87.6 (51)	38.369	0.001***
Wild mushrooms	6 (11.3)	16 (27.5)	14 (24.1)	5 (8.5)	5 (8.5)	46 (80)	29.37	0.022**
Bush meat	8.6 (5)	30.9 (18)	22.4 (13)	15.5(9)	6.8 (4)	84.2 (49)	32.573	0.008***
Firewood	13.7 (8)	31 (18)	24.1 (14)	17.3 (10)	10.2 (6)	96.3 (56)	9.943	0.870 ^{Ns}
Honey	0 (0)	22.3 (13)	18.9 (11)	8.6 (5)	6.8 (4)	56.6 (33)	27.150	0.04**
Medicinal plants	3.4 (2)	6.8 (8)	15.5 (9)	3.4 (2)	6.8 (4)	35.9 (25)	28.166	0.030**
Poles	13.7 (8)	24 (14)	24.1 (14)	17.3 (10)	10.2 (6)	89.3 (52)	19.185	0.259 ^{Ns}

Ns: Non significant, **Significant at $P < 0.05$, ***Significant at $P < 0.01$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

education level, household size, residence duration, distance and occupation.

Local community income level

Results in Table 1 show the role of income level of a household on extraction of NTFPs. It can be noted that, there was a significant decrease in extraction of wild fruits, wild vegetables, wild mushrooms, bush meat, honey and medicinal plants as household income increases from TZS 150 000 which is equivalent to USD 60 at an exchange rate of TZS 2,500. On the other hand, increase in the levels of household income from TZS 50,000 (USD 20) results in the decrease of extraction of firewood and poles. However, decrease in extraction of these products is not significant. This can be interpreted to suggest that wild fruits, wild vegetables, wild mushrooms, honey, bush meat and medicinal plants were considered as inferior products and hence families with substantial economic status had minimal need to mount efforts to demand these products.

However, counteracting this tendency through mass education is desirable as nutritive values of such products are generally higher than their domesticated counterparts. Nevertheless, these findings conform to those reported by Saxena (2003) who observed that in areas where rural populations have achieved high incomes, use of forest products is likely to be very little.

Age distribution

The role of age of respondents on collection of NTFPs in the study area is shown in Table 2. It can be noted that, an increase and decrease in the age of respondents from age class 30 to 60 results in the decrease of extraction of wild fruits, wild vegetables, bush meat, firewood and medicinal plants, but the decrease in extraction of these products is not significant. In this regard, the decrease in age of respondents from age class 30 to 60 imply that young people are active and can walk long distances to extract most of NTFPs to secure household food security, primary health

care, cash income and other needs. Similarly, the observed increase in the age of respondents of the same age group suggests that older people have a lot of experience in varieties of NTFPs to be utilized at households. The results conform to those reported by Basnayake and Gunaratne (2011) who observed that the age of a person usually influences level of production, efficiency and experience. Paulo (2007) observed that, in Kilwa district increase in age increases extraction of wild vegetables, wild mushrooms, medicinal plants and poles but decreases extraction of wild fruits significantly. Similarly, in Mbozi district, Nyingili (2003) observed that increase in age increases extraction of wild vegetables and wild mushrooms but decreases extraction of wild fruits significantly.

Education level

Table 3 shows the results of the role of education level on collection of NTFPs in the study area. It can be noted that increase in education level

Table 2. The role of age of respondents on collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Age group (Years)			Total (%)	χ^2 -value	Significance
	18-30	30 - 60	>60			
Wild fruits	12.5 (11)	54.5 (48)	18.2 (16)	85.2 (75)	2.060	0.357 ^{Ns}
Wild vegetables	11.1 (10)	52.2 (47)	20.0 (17)	83.3 (74)	6.632	0.036**
Wild mushrooms	11.1 (10)	41.1 (37)	13.3 (12)	65.5 (59)	0.028	0.986 ^{Ns}
Bush meat	14.4 (13)	43.3 (39)	11.1 (10)	68.8 (62)	3.711	0.156 ^{Ns}
Firewood	16.7 (15)	62.2 (56)	17.8 (16)	96.7 (87)	4.338	0.114 ^{Ns}
Honey	10 (9)	27.8 (25)	3.3 (3)	41.1 (37)	6.831	0.033**
Medicinal plants	6.7 (6)	25.4 (23)	6.7 (6)	38.8 (35)	0.293	0.864 ^{Ns}
Poles	14.4 (13)	61.1 (55)	15.6 (14)	91.1 (82)	6.354	0.042**

Ns: Non significant, **Significant at $P < 0.05$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

Table 3. The role of education level of respondents on collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Level of education of a household head				Total (%)	χ^2 -value	Significance
	Non education	Adult education	Primary education	Secondary education			
Wild fruits	11.4 (10)	2.3 (2)	69.3 (61)	2.3 (2)	85.3 (75)	4.598	0.204 ^{Ns}
Wild vegetables	11.1 (10)	4.4 (4)	66.7 (60)	1.1 (1)	83.3 (75)	2.923	0.404 ^{Ns}
Wild mushrooms	10 (9)	2.2 (2)	53.3 (48)	0 (0)	65.5 (59)	5.525	0.137 ^{Ns}
Bush meat	8.9 (8)	0 (0)	58.9 (53)	1.1 (1)	68.9 (62)	9.736	0.021**
Firewood	12.2 (11)	4.4 (4)	77.8 (70)	2.2 (2)	96.6 (87)	0.723	0.868 ^{Ns}
Honey	6.7 (6)	0 (0)	34.4 (31)	0 (0)	41.1 (37)	5.064	0.167 ^{Ns}
Medicinal plants	6.7 (6)	2.2 (2)	30 (27)	0 (0)	38.9 (35)	2.726	0.436 ^{Ns}
Poles	10 (9)	4.4 (4)	75.6 (68)	1.1 (1)	91.1 (82)	6.112	0.106 ^{Ns}

Ns: Non significant, **Significant at $P < 0.05$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

especially that of secondary education, decreases significantly extraction of bush meat. It was further observed that there was a decrease in collection of wild fruits, wild vegetables, honey, poles, wild mushrooms, firewood and medicinal plants at secondary level of education. However, the decrease in collection of these products was not significant. The observed decrease in collection of wild fruits, wild vegetables, honey, poles, wild mushrooms, firewood and medicinal plants at secondary level of education would perhaps mean that literates had great chance of having other sources of livelihood and substitutes for such products.

Household size

Number of family members per household in the study area ranged between 1 and 12 people, with an average of 6 members. This is relatively high as compared to the regional household size, whose estimated average is 5 people per household (NBS, 2004). According to Abdallah (2001), large family size is attributed by the characteristics of most African societies living with their

relatives as part of their families. In this study, the influence of respondent's household size on collection of NTFPs is shown in Table 4. It can be noted from the Table that, an increase in household size from 1 to 6 members, increases collection of bush meat, wild fruits, wild mushrooms, poles and medicinal plants. These results indicate that, an increase in household size reflects the gradual population growing. A rapidly increasing population has a direct correlation with the exploitation of forest products for subsistence use, primary health care as well as for income generation. Results from this study are similar to those reported by Mhinte (2000) who observed that, in Kilosa district an increase in numbers of members in the household implies more mouths to feed, but on the other hand it implies more availability of labour force. The study by Nyingili (2003) reported similar findings that increase in household size significantly increases collection of wild fruits in Mbozi district.

Residence duration

Results in Table 5 show that an increase in years of

Table 4. The influence of respondent's household size on the collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Household size			Total (%)	χ^2 -value	Significance
	1 - 3	4 - 6	≥ 7			
Wild fruits	32.9 (29)	47.7 (42)	4.5 (4)	85.1 (75)	11.884	0.220 ^{Ns}
Wild vegetables	32.9 (29)	47(42)	4.5 (4)	84.5 (75)	14.628	0.018**
Wild mushrooms	24.4 (22)	37.8 (34)	3.3 (3)	65.5 (59)	9.369	0.404 ^{Ns}
Bush meat	26.7 (24)	37.7 (34)	4.5 (4)	68.9 (62)	10.656	0.300 ^{Ns}
Firewood	38.9 (35)	50 (45)	6.7 (6)	95.6 (86)	13.207	0.002**
Honey	10 (9)	28.8 (26)	2.2 (2)	41 (37)	19.298	0.023**
Medicinal plants	13.3 (12)	22.2 (20)	3.3 (3)	38.8 (35)	15.407	0.080 ^{Ns}
Poles	38.8 (35)	46.7 (42)	5.5 (5)	91.1 (82)	3.807	0.924 ^{Ns}

Ns: Non significant, **Significant at $P < 0.05$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

Table 5. The influence of respondent's tenancy on the collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Residence duration (Years)				Total (%)	χ^2 -value	Significance
	2-5	5-10	10-20	>20			
Wild fruits	5.7(5)	15.9 (14)	25 (22)	38.6 (34)	85.2 (75)	4.191	0.242 ^{Ns}
Wild vegetables	4.4 (4)	12.2 (11)	25.6 (23)	41.1 (37)	83.3 (75)	9.382	0.025**
Wild mushrooms	5.6 (5)	10 (9)	20 (18)	17.8 (16)	53.4 (48)	0.395	0.941 ^{Ns}
Bush meat	7.8 (7)	11.1 (10)	20 (18)	30 (27)	68.9 (62)	1.505	0.681 ^{Ns}
Firewood	8.9 (8)	16.7 (15)	20 (15)	28.9 (26)	74.5 (64)	3.709	0.295 ^{Ns}
Honey	1.1 (1)	5.6 (5)	14.4 (13)	20 (18)	41.1 (37)	4.060	0.255 ^{Ns}
Medicinal plants	3.3 (3)	5.6 (5)	11.1 (10)	18.9 (17)	38.9 (35)	0.318	0.957 ^{Ns}
Poles	8.9 (8)	14.4 (13)	28.9 (26)	38.9 (35)	91.1 (82)	5.353	0.148 ^{Ns}

Ns: Non significant, **Significant at $P < 0.05$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

residence in the village significantly increases extraction of wild vegetables. However, extraction of wild fruits, wild mushrooms, honey, bush meat, poles, firewood and medicinal plants increases as one stays in the village for a long period. This would mean that the respondents have amassed a lot of experience and knowledge on availability, values and sources of different useful plant species by staying for long periods in the respective villages. This is consistent with the observation by Paulo (2007) who found that in Kilwa district, increase in years of residence in the village significantly increased collection of wild mushrooms, wild vegetables and medicinal plants.

Distance

In this study, it was revealed that extraction of firewood and poles differ significantly with distance (Table 6). It was further revealed that, decreases in the distance from the forest results in an increase of extraction of wild fruits, wild mushrooms, honey, bush meat and medicinal plants. However, the decreases in extraction of these products were not significant. These findings indicate that the

respondents living close to the forest (less than 5 km) depend much on forests for social and economic benefits. According to Melese (2016) people living nearest to the forest will inevitably depend much on NTFPs for their daily use.

Occupation

The respondents in the surveyed villages were grouped into five categories of occupations. These were employees, farmers, fishermen, business people and jobless. Results (Table 7) show that farmers were the main collectors of NTFPs. This implies that most Tanzanians are being involved in NTFPs activities simply because they are of great value to them. A study conducted in Lagos State, Nigeria revealed that farming was the economic mainstay of rural people in the area (Otekhile and Verter, 2017).

Conclusions

The varieties of NTFPs identified in the study area were

Table 6. The influence of distance on collection of NTFPs by the respondents from NFR, Morogoro, Tanzania.

Product	Distance (km)			Total (%)	χ^2 -value	Significance
	1-2	2-5	Above 5			
Wild fruits	56.8 (50)	25 (22)	3.4 (3)	85.2 (75)	0.539	0.764 ^{Ns}
Wild vegetables	54.4 (49)	25.6 (23)	3.3 (3)	83.3 (75)	0.632	0.729 ^{Ns}
Wild mushrooms	45.6 (41)	17.8 (16)	2.2 (2)	65.6 (59)	1.284	0.526 ^{Ns}
Bush meat	46.7 (42)	21.1 (19)	1.1 (1)	68.9 (62)	1.929	0.381 ^{Ns}
Firewood	61.1 (55)	28.8 (26)	7.8 (7)	97.7 (88)	8.856	0.035 ^{**}
Honey	24.4 (22)	16.7 (15)	0 (0)	41.1 (37)	4.246	0.120 ^{Ns}
Medicinal plants	28.9 (26)	7.8 (7)	2.2 (2)	38.9 (35)	3.913	0.141 ^{Ns}
Poles	63.3 (57)	24.4 (22)	3.3 (3)	91 (82)	7.932	0.019 ^{**}

Ns: Non significant, **Significant at $P < 0.05$, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

Table 7. The influence of respondent's occupation on collection of NTFPs in NFR, Morogoro, Tanzania.

Product	Occupation					Total (%)	χ^2 -value	Significance
	Employed	Farmer	Fisherman	Business	Jobless			
Wild fruits	1.1 (1)	79.5 (70)	3.4 (3)	1.1 (1)	1.1 (1)	86.2 (76)	0.919	0.82 ^{Ns}
Wild vegetables	1.1 (1)	77.8 (70)	0 (0)	3.3 (3)	1.1 (1)	83.3 (75)	6.000	0.199 ^{Ns}
Wild mushrooms	0 (0)	61.1 (55)	0 (0)	3.3 (3)	1.1 (1)	65.5 (59)	5.908	0.206 ^{Ns}
Bush meat	0 (0)	65.6 (59)	0 (0)	3.3 (3)	0 (0)	68.9 (62)	8.069	8.089 ^{Ns}
Firewood	1.1 (1)	90 (81)	1.1 (1)	3.3 (3)	1.1 (1)	96.6 (87)	0.222	0.994 ^{Ns}
Honey	0 (0)	38.9 (35)	0 (0)	2.2 (2)	0 (0)	41.1 (37)	2.914	0.572 ^{Ns}
Medicinal plants	0 (0)	34.1 (31)	0 (0)	3.3 (3)	1.1 (1)	38.9 (35)	7.698	0.103 ^{Ns}
Poles	1.1 (1)	84.4 (76)	1.1 (1)	1.1 (3)	1.1 (1)	88.8 (82)	0.627	0.960 ^{Ns}

Ns: Non significant, χ^2 = Chi-Square value. Figures in the brackets present frequencies of responses and outside brackets present percentages of respondents.

found to be useful in day-to-day life of the local communities surrounding NFR. Findings from this study clearly indicated that, socio-economic factors such as income level, education level, age distribution, household size, occupation, distance from the forest and residence duration influence extraction and use of NTFPs to improve the livelihood of local communities. Despite the existing legal framework regulating the utilization of the NTFPs in Tanzania, appropriate strategic plans should be put forward to organize extraction and utilization of NTFPs resources in a sustainable and environmentally healthy manner.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

Villagers and leaders of Sagamaganga, Signali and Lungongole villages are appreciated for supply of availing

information on NTFPs. Last but not least, author wishes to thank Valuing the Arc Project for financial support of this study.

REFERENCES

- Ahenkan A, Boon E (2011). Non-Timber Forest Products (NTFPS): Clearing the confusion in semantics. *Journal of Human Ecology* 33(1):1-9.
- Asfaw A, Lemenih M, Kassa H, Ewnetu Z (2013). Importance, determinants and gender dimensions of forest income in Eastern Highlands of Ethiopia: The case of communities around Jelo Afromontane forest. *Forest Policy and Economics* 28:1-7.
- Balama C, Augustino S, Eriksen S, Makonda FB (2017). The role of priority Non-Timber Forest Products in enhancing local adaptive capacity to climate change stresses in Kilombero district, Tanzania. *Climate and Development* 9(3):231-243.
- Basnayake B, Gunaratne L (2011). Estimation of technical efficiency and its determinants in the tea small holding sector in the mid country wet zone of Sri Lanka. *Sri Lankan Journal of Agricultural Economics* 4(1):137-150.
- Dubey P (2007). Sociocultural factors and enabling policies for Non-Timber Forest Products-based microenterprise development. *The Journal of Entrepreneurship* 16(2):197-206.
- Elikana J (2013). Economic valuation of selected non-timber forest products in Chiwale general land forest: A case study of Masasi district, Mtwara region-Tanzania (Doctoral dissertation, Sokoine

- University of Agriculture). pp. 176-177.
- Food and Agricultural Organisation (FAO) (2011). Economic and social significance of forests for Africa's sustainable development. *Nature and Faune* 25(2):1-96. Available at: <http://www.fao.org/docrep/014/am723e/am723e00.pdf>
- Islam M, Quli S (2016). Non-Timber Forest Products (NTFPs) supporting food security In Tribal Jharkhand. *Jharkhand Journal of Development and Management Studies* 14(1):6855-6864.
- Kajembe GC (1994). Indigenous management systems as a basis for community forestry in Tanzania: a case study of Dodoma urban and Lushoto districts, Wageningen Agricultural University. pp. 120-125.
- Mbeyale GE (2007). The impact of institutional changes on the management of common pool resources in Pangani River Basin. A case of Eastern Same Kilimanjaro Tanzania (Doctoral dissertation, Thesis for Award of PhD Degree at University of Dar es Salaam, Tanzania. pp. 125-130.
- Melese SM (2016). Importance of non-timber forest production in sustainable forest management, and its implication on carbon storage and biodiversity conservation in Ethiopia. *International Journal of Biodiversity and Conservation* 8(11):269-277.
- Mhinte A (2000). Analysis of rural households coping strategies against seasonal food insecurity in Kilosa District. MSc Dissertation, Sokoine University of Agriculture. pp. 119-121.
- Mulenga BP, Richardson RB, Mapemba LD, Tembo G (2011). The contribution of non-timber forest products to rural household income in Zambia (No. 109887). Michigan State University, Department of Agricultural, Food, and Resource Economics. Available at: <https://ideas.repec.org/p/ags/midcwp/109887.html>
- Nyingili BR (2003). Contribution of non wood forest products to household food security in Mbozi district, Tanzania. Unpublished Dissertation for Award of Msc. Degree at Sokoine University of Agriculture, Morogoro. Tanzania. 118p. Available at: http://www.mcdgc.go.tz/catalogue/index.php/view/contribution_of_no_n-wood_forest_products_to_household_food_security_in_mbozi/
- Otekhile CA, Verter N (2017). The socioeconomic characteristics of rural farmers and their net income in OJO and Badagry local government areas of Lagos state, Nigeria. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 65(6):2037-2043.
- Paulo T (2007). Contribution of Non-Timber Forest Products in improving livelihood of rural community in Kilwa District, Tanzania. MSc Dissertation, Sokoine University of Agriculture. pp. 120-124.
- Saxena N (2003). Livelihood diversification and non-timber forest products in Orissa: Wider lessons on the scope for policy change. London, UK: Overseas Development Institute. pp. 555-560. Available at: https://assets.publishing.service.gov.uk/media/57a08d12ed915d3cfd0017cc/wp223_print.pdf
- Schaafsma M, Morse-Jones S, Pose P, Swetnam R, Balmford A, Bateman I, Burgess ND, Chamshama S, Fisher B, Freeman T (2014). The importance of local forest benefits: economic valuation of non-timber forest products in the Eastern Arc Mountains in Tanzania. *Global Environmental Change* 24:295-305.
- Suleiman MS, Wasonga VO, Mbau JS, Suleiman A, Elhadi YA (2017). Non-timber forest products and their contribution to households income around Falgore Game Reserve in Kano, Nigeria. *Ecological Processes* 6(1):23.
- Wickens GE (1991). Management issues for development of non-timber forest products. *Unasylva* 42(165):3-8.
- Wollenberg E, Nawir AS (1998). Estimating the incomes of people who depend on forests. *Incomes from the forest: Methods for the development and conservation of forest products for local communities*. Center for International Forestry Research, Bogor, Indonesia. pp. 157-187.