EVALUATION OF NON-TIMBER FOREST PRODUCTS HARVESTING METHODS IN THE BUFFER ZONE OF SONKPA FOREST RESERVE WUKARI, TARABA STATE

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Abstract: Several methods are used in the harvesting of Non- Timber Forest Products (NTFPs). Such methods are not documented in the study area, therefore, Evaluation of NTFPs harvesting methods in the buffer zone of Sonkpa forest reserve was investigated A total of 180 semi-structured questionnaires were administered to selected communities (1-6km from the Sonkpa forest reserve) in the following order; Hyuku,30; Sohwa, 30; Gidan Idi,30;Kamberi ,30; Ndo-nya,30;Avyi, 30 with only 175 retrieved. Data generated was analysed using tables, frequencies and simple percentages. The result on compendium showed 37 NTFPs were harvested from the buffer zone of Sonkpa forest reserve. The result on contributions of NTFPs showed 30(17.1%), income and medicinal herbs; 20 (11.4%), livestock feeds and building/energy materials; 25(14.3%), dietary supplements; 9(5.1%), rope and weaving materials and 11(6.3%), sponge materials. The result on harvesting methods indicated that, 30(17.1%), felling, cutting, and lopping/Girdle; 16(9.1%), debarking; 24(13.7%), digging and uprooting; 10(5.7%) plucking and picking; 13(7.4%), traps and 12(6.9%), poisoning. The result on effect of harvesting methods indicated that, 35(20%), loss of biodiversity; 30(17.1%), destruction of animals' habitat, trekking long distances before sighting NTFPs, Dis-appearance of large animals; 25(14.3%), erosion and late onset and early cessation of rainfall. Based on the major findings of the study, the followings are recommended; sustainable harvesting; Avoid peeling round the bark of plants; Avoid digging and uprooting; Form collectors 'or buyers co-operative groups; Create awareness as well as In-situ conservation respectively.
Keywords: Buffer, Harvesting, Non-Timber Forest Products, Forest Reserve, Sonkpa

Introduction

The term Non-Timber Forest Products (NTFPs) is used interchangeably with minor forest products (MFPs) or secondary forest products (SFPs). It refers to all biological resources, products and services other than timber that can be harvested from forest ecosystem for subsistence and trade (Shamly *et al.*, 2002; Arnold *et al.*, 2011; Bahru *et al.*, 2012). They include fruits, nuts, spices, oils, vegetables, craft, construction materials, fuel woods, charcoals, medicinal plants, fibre, resins, latex, gums, dye, wild honey, bush meat, fish, rattans and bamboo. There is increasing recognition that NTFPs can contribute significantly to the livelihood of forest edge communities. NTFPs provide food security and nutrition for both human beings and live stocks. It also provides additional income, employment and foreign exchange earnings. NTFPs are also consumed locally all over wukari L.G.A and have been a means of livelihood. Zaku, (2013) recorded 97 species of NTFPs in Gashaka Gumti National Park alone which are consumed locally in Gashaka L.G.A of Taraba State.

The concept of sustainable forest management has suffered a flurry of definitions and interpretations. The original idea of sustainable forest management According to Arnold (1999), was to balance wood harvest with projected growth increment from regeneration and planting. This idea has been viewed as too simplistic and rather deceptive as it focuses on the production of wood without addressing the wider issues of the ecological and social functions of the forest with which timber may or may not be compatible.

In view of the forgoing, the concept of sustainable forest management has evolved to encompass the wider uses and value of the forest. Sustainable forest management according to the International Tropical Timber Organization (ITTO), (1992) " is the process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reductions of its inherent value and future productivity and without undue undesirable effects on physical and social environment" The Food and Agriculture Organization define sustainable forest management as one which ensures that the values derived from the forest meet the present day needs while at the same time ensuring their continued availability and contribution to long –term development needs (FAO,2003).

From the above definitions, the concept of sustainable forest management can be said to imply the management of the forest to supply timber on a sustainable basis while it continues to provide fuel wood, food, bush meat, pole, fibres and other goods and services for those living in and around the forest. According to FAO (2005), achieving sustainable forest management would involve the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forest. It would also imply various degrees of deliberate human intervention, ranging from actions aimed at safeguarding and maintaining the forest ecosystem and its functions to favouring specified socially or economically valuable species or groups of species for the improved production of goods and services. Furthermore, the concept of sustainable forest management would include adequate attention being paid to area where forest are disappearing as a result of encroachments and clearing for agriculture, where excessive grazing is preventing regeneration of trees and where wood harvesting for charcoal and firewood is causing forest degradation. Thus, sustainable forest management include the involvement of people and also the availability of appropriate techniques and adequate finance. It is absolutely necessary to be sensitive to the fact that rural people are dependent upon Non-Timber Forest Products for ensuring household food and economic security and there is an apparent lack of alternative to these resources. This study intends to document the impacts of Non-Timber Forest Products harvesting in Sonkpa forest reserve Wukari and its impacts on sustainable forest management. NTFPs have being identified to contribute to community livelihood. Such contributions are people as well as site specific and may be short-lived if continuous availability cannot be guarantee. Information on the harvesting of NTFPs in Sonkpa forest reserve is crucial to its sustainable management. However this information has not been properly documented in Wukari Local Government. Therefore Evaluation of NTFPs

harvesting methods in the buffer zone of Sonkpa forest reserve Wukari, Taraba State was investigated.

NTFPs contribute to the economy of the rural dwellers (Mercer and Arnold, 1996; Miller, 1998). They supplement household food, income generation, medicinal benefits and provide employment for a large number of people (FAO,1995). However, the major problem that usually arises from the used of these NTFPs to satisfy the need of rural dwellers is their harvesting method. Aya, (2002) in a related study in Cameroon, reported the following destructive ways of harvesting NTFPs; uprooting, cutting down a whole plant, lopping/ girdling, cutting of tree tops, debarking, burning to mention but a few as unsustainable ways of harvesting Non-Timber Forest Products. However, there has not being any deliberate effort to study or to evaluate the various NTFPs extracted within and around the Sonkpa forest reserve. This study therefore intends to bring to the public glare, the various harvesting methods used in the extraction of NTFPs in Sonkpa Forest Reserve and its effects on sustainable forest management.

Materials and Methods

Study Area

Sonkpa forest reserve is located in Wukari. It is about 3km away from Wukari town, it is located between Latitude$7^{o}58^{1}56^{11}$ to $8^{0}40^{1}\,55^{11}$ N and Longitude $10^{0}02^{1}\,24^{11}$ to $10^{0}\,11^{1}\,50^{11}$ E of the Greenwich, it is bounded in the west by Sohwa, East by Ndo-nya and Hyuku in the northern part (Fig 1.). Sonkpa Forest Reserve has a total land mass of 200km^2.

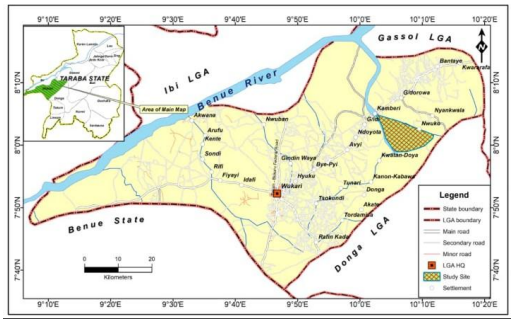

Fig. 1: Map of Wukari Local Government Area showing Sonkpa Forest Reserve
Source: Zaku, (2019).

Survey Design/Sampling Techniques

Semi-structured questionnaire which is simple and easy to understand with open and close ended questions to be answered by respondents was used to generate data for this study. Six Forest edge-communities that are one to six kilometres away from Sonkpa Forest Reserve were purposely selected for this study (Hyuku, Sohwa, Gidan Idi, Kamberi, Ndo-nya, Avyi). A total of 180 semi-structured questionnaires were administered to the respondents in the purposely selected communities to generate data for this objective in the following order; Hyuku, 30; Sohwa, 30; Gidan Idi, 30; Kamberi, 30; Ndo-nya, 30; Avyi, 30 respectively, There by bringing the total to 180 questionnaires for this study with only 175 retrieved due to relocation of some respondents. Forest edge communities that are one to six kilometres away from Sonkpa Forest Reserve were purposely selected for this study because of their proximity to the forest reserve, 30% sampling intensity was used to draw respondents from these communities using the method of Diaw *et al.*, (2002). Also, three field Assistants namely Alhaji Useni (Taxonomist), one hunter and one medicinal herbs collector were used in the study. The hunter and the medicinal herbs collector gave local names of the NTFPs while the taxonomist gave the scientific names of some NTFPs that could not be identified by the researcher.

Result and Discussion

Compendium of NTFPs Extracted from the buffer zone of Sonkpa Forest Reserve, Wukari.

The result on compendium of Non-Timber Forest Products extracted from the buffer zone of Sonkpa forest reserve in Wukari, indicated that all the respondents harvested different Non- Timber Forest Products from Sonkpa forest reserve. (Table1).

The result also indicated that a total of thirty seven (37) Non-Timber Forest Products were harvested from the buffer zone of Sonkpa forest reserve. These comprises of thirty (30) NTFPs from twenty two (22) families. The result on life form of Non-Timber Forest Products harvested from the buffer zone of Sonkpa forest reserve showed that twenty eight (28) trees, one (1) Shrub, one (1) Herbs and seven (7) dietary supplements are being utilized from Sonkpa forest reserve by the respondents (Table 2).

Table 1: NTFPs Extracted from the buffer zone of Sonkpa Forest Reserve, Wukari.

S/N	Variables	No. of Respondents	Percentage
1.	Do you extract or harvest NTFPs from the buffer zone of Sonkpa Forest Reserve?		
	Yes	175	100
	No	0	0
	Total	175	100

Source: Field Survey, (2022).

Table 2: Compendium of NTFPs Extracted from the buffer zone of Sonkpa Forest Reserve, Wukari.

S/N	Local Name (Hausa)	Scientific Name	Family	Live Form
1	Gwaska	*Andira inermis*	*Papilionaceae*	Tree
2	Hana gobara	*Commiphora kerstingii*	*Burseraceae*	Tree
3	Dashin jeji	*Commiphora pendunculata*	*Burseraceae*	Tree
4	Nono giwa/ Hantsar giwa	*Kigelia Africana*	*Bignoniaceae*	Tree
5	Tsardar masar	*Spondias mombin*	*Anacardiaceae*	Tree
6	Kawo	*Afzelia Africana*	*Caesalpiniaceae*	Tree
7	Maji	*Daniellia oliveri*	*Caesalpiniaceae*	Tree
8	Madaci	*Khaya senegalensis*	*Meliaceae*	Tree
9	Tsamiya	*Tamarindus indica*	*Caesalpiniceae*	Tree
10	Tuburku	*Millttia thonningi*	*Papilionaceae*	Tree
11	Kiriya	*Prosopis Africana*	*Mimosaceae*	Tree

12	Dinya	*Vittex doniana*	*Verbenaceae*	Tree
13	Kasfiya or Kashin awaki	*Crossopteryx febrifuga*	*Rubiaceae*	Tree
14	Madobia or Madrid	*Pterocarpus erinaceus*	*Papilionaceae*	Tree
15	Rimi	*Ceiba pentandra*	*Bombacaceae*	Tree
16	Gwandar daji	*Annona senegalensis*	*Annonaceae*	Tree
17	Kafafago	*Uapaca togoensis*	*Euphorbiaceae*	Tree
18	Marike	*Anogeissus leoicarpus*	*Combretaceae*	Tree
19	Kargo	*Piliostigma thonningii*	*Caesalpiniaceae*	Tree
20	Baure	*Ficus sycomorus*	*Moraceae*	Tree
21	Gawo	*Acacia albida*	*Mimosaceae*	Tree
22	Aduwa	*Balanites aegyptica*	*Zygophyllaceae*	Tree
23	Kirni	*Bridelia ferruginea*	*Euphorbiaceae*	Tree
24	Tsada	*Ximenia americana*	*Olacaceae*	Tree
25	Kuka	*Adansonia digitata*	*Bombacaceae*	Tree
26	Dorowa	*Parkia biglobosa*	*Leguminosae*	Tree
27	Kadanya	*Vitellaria paradoxa*	*Sapotaceae*	Tree
28	Gawo	*Faidherbia albida*	*Mimosaceae*	Tree
29	Soso	*Luffa cylindrical*	*Cucurbitaceae*	Climber
30	Zakamii	*Datura metel*	*Solanaceae*	Herb
31	Nama daji	Bush meat	Mammals	Mammals
32	Nama itace	Mushroom	Basidiomycete	Basidiomycete
33	Tsutsa	Catarpillers	Insects	Insects
34	Gara	Termite	Insects	Insects
35	Zuma	Honey	Insects	Insects
36	Fara	Grasshopper/ locust	Insects	Insects
37	Kifi	Fish	Pisces	Pisces

Source: Field Survey, (2022).

The low number of thirty seven (37) NTFPs recorded in Sonkpa forest reserve implies that the reserve is under serious deforestation. Land clearing for agriculture, charcoal production and firewood harvesting as well as illegal timber harvesting may be responsible for this menace. This agreed with Zaku (2013) and Zaku *et al*. (2022).

Contributions of NTFPs extracted in the buffer zone of Sonkpa Forest Reserve.

The result on the contributions of Non-Timber Forest Products extracted from the buffer zone of Sonkpa forest reserve indicated that, 30 respondents representing 17.1% each are used both as income and medicinal herbs respectively; 20 (11.4%), are used both as livestock feeds/ fodder, building and energy materials; 25 (14.3%), dietary supplements; 9 (5.1%), rope and weaving materials and 11(6.3%) are used as sponge materials (Table 3).

Table 3 Contributions of NTFPs extracted in the buffer zone of Sonkpa Forest Reserve

S/N	Variables	Number of Respondents	Percentages
1	Income	30	17.1
2	Livestock feeds/fodder	20	11.4
3	Building and energy materials	20	11.4
4	Medicinal herbs	30	17.1
5	Food (fruits, nuts and seeds)	15	8.6
6	Vegetable, oils, spices and condiment	15	8.6
7	Dietary supplements	25	14.3
8	Cattle sticks and chewing sticks	0	0
9	Wrapping leaves	0	0
10	Rope and weaving materials	9	5.1
11	Sponge materials	11	6.3
12	Palm wine	0	0
13	Dye and gums	0	0
14	**Total**	**175**	**100**

Source; Field Survey, (2022).

The high number recorded on the contribution of NTFPs extracted from the buffer zone of Sonkpa forest reserve on income, medicinal herbs, livestock feeds, building and energy materials, dietary supplement, food, rope, weaving materials and sponge materials implies that, they are the variables that contribute to the socio- economic well-being of the forest edge communities such as (Kamberi, Sohwa, Gidan Idi, Hyuku etc). This corroborates Zaku (2013) and Zaku *et al.* (2022).

Methods Used in the Harvesting of NTFPs in the buffer zone of Sonkpa Forest Reserve, Wukari.

The result on methods used in the harvesting of Non-Timber Forest Products in the buffer zone of Sonkpa forest reserve indicated that,30 (17.1%) each uses felling, cutting, and lopping/Girdle respectively 16 (9.1%), debarking method; 24 (13.7%), digging and uprooting; 10 (5.7%) each used plucking and picking methods; 13 (7.4%), traps and 12 (6.9%), poisoning respectively (Table 4)

Table 4: Methods used in the harvesting of NTFPs in the buffer zone of Sonkpa forest reserve, Wukari.Source

S/N	Variables	No. of Respondents	Percentages
1	Felling	30	17.1
2	Cutting	30	17.1
3	Debarking	16	9.1
4	Digging/ uprooting	24	13.7
5	Tapping	0	0
6	Lopping/ girdle	30	17.1
7	Plucking	10	5.7
8	Setting traps	13	7.4
9	Poisoning	12	6.9
10	Bow and arrow	0	0
11	Picking	10	5.7
12	Shooting with gun	0	0
13	**Total**	**175**	**100**

Field Survey, (2022).

The high numbers and percentages recorded on method of harvesting such as felling, cutting, lopping/ Girdle, digging and uprooting implies that, they are the most widely used. These methods of harvesting are poor and destructive and may lead to depletion of NTFPs and consequently extinction of species in question due to incessant use. This corroborate Zaku (2013) and Zaku *et al.* (2022).

Most NTFPs in Sonkpa forest reserve either have their branches cut down by people in the forest edge communities or are fell down completely to harvest firewood. Similarly, medicinal herbs collectors cut barks of trees round the stem, dig out large portion roots and may sometimes uproot the entire plant in order to collect its roots. Also Herds men during dry season, when all grasses have wither away, normally climb and lope trees branches for their cattle. These methods are destructive and unsustainable because they lead to the extinction of plants in question. This explains why only thirty seven (37) NTFPs were identified in Sonkpa forest reserve.

Effects of the various harvesting methods on sustainable management of Sonkppa forest reserve.

The result on the effect of harvesting methods on sustainable management of Sonkpa forest reserve indicated that, 35 (20%), loss of biodiversity; 30(17.1%) each; destruction of animals habitat, trekking long distances before sighting Non-Timber Forest Products, escape of large animals such as Elephant and Hippopotamus; 25 (14.3%) each; erosion and late onset and early cessation of rainfall (Table 5).

Table 5: Effects of the various harvesting methods on sustainable management of Sonkpa forest reserve.

S/N	Variables	No of Respondents	Percentage
1	Destruction of animals habitat	30	17.1
2	Erosion	25	14.3
3	Loss of biodiversity	35	20
4	Trekking long distance before sighting NTFPs	30	17.1
5	Escape of large animals e.g Elephants	30	17.1
6	Late onset and early cessation of rainfall	25	14.3
7	**Total**	**175**	**100**

Source: Field Survey (2022).

The high number and percentages recorded on the effects of various harvesting methods on sustainable management of Sonkpa forest reserve on destruction of animals habitats, loss of biodiversity, trekking long distances before sighting NTFPs, escape of large animals such as Elephant, Hippopotamus to other forested areas, erosion, late onset and early cessation of rainfall implies that, they are the effects of the various harvesting methods. Loss of biodiversity and destruction of animals habitats are reasons why people trek long distances before sighting NTFPs that use to be hitherto around their houses. It also explain why Elephant and Hippopotamus are never seen in Sonkpa forest reserve again. Also climate change occurs as a result leading to late onset and early cessation of rainfall and erosion in the reserve. This corroborate Zaku (2013) and Zaku *et al*. (2022) respectively.

Conclusion

The major findings of the study include;

1. Thirty seven (37) NTFPs are extracted from the buffer zone of Sonkpa forest reserve.
2. The major contributions of NTFPs to the socio-economic wellbeing of the forest edge communities include; income, livestock feeds, building and energy materials, medicinal herbs, forest fruits, vegetable oils, spices and condiments, dietary supplement, sponge materials, rope and weaving materials respectively.
3. Nine (9) harvesting methods are used in the harvesting of NTFPs in the buffer zone of Sonkpa forest reserve and they include; felling, cutting, debarking, digging/ uprooting, lopping and girdle, plucking, setting traps, poisoning and picking.
4. There are six (6) effects of NTFPs harvesting methods and they include; destruction of animals habitats, erosion, loss of biodiversity, trekking long distances before sighting NTFPs, escape of large animals such as Elephant and Hippopotamus from the area, late onset and early cessation of rainfall.

Recommendations

Based on the major findings of the study, the followings are recommended;

1. Harvesting methods used in the extraction of NTFPs in the buffer zone of Sonkpa forest reserve are poor and destructive leading to the extinction of NTFPs species and hence the need for sustainable harvesting methods such as peeling just one side of the tree and harvesting only small portion or proportion of lateral roots, harvesting just branches for fuel wood or fire wood.
2. Avoid peeling bark of plants round the stem as this is capable of killing the entire plant.
3. Avoid digging and uprooting of an entire plant as this can also kill the plant in question
4. The forest reserve communities should be encourage to form themselves in to NTFPs collectors' co-operative groups and NTFPs buyers co-operative groups and should register with the management of Sonkpa forest reserve and they should be charge a token fees per quantity of NTFPs collected and their activities supervised by the management of the forest reserve, this implies that, if one is not a member, he cannot collect or harvest or buy NTFPs and since they are charged token fees per quantity of NTFPs collected, this will spur them not to allow a non-member or a non-contributor to harvest or buy NTFPs and since they are living together, it becomes easier to apprehend intruders and this will cushion over-exploitation since they are under close watch.
5. The forest edge communities should be educated on the impacts of their harvesting methods on the environment.
6. NTFPs have been depleted in Sonkpa forest reserve due to pressure, incessant use or multiple usage and this have implication for their sustainable management and hence the need for in-situ conservation. Finally, sustainable harvesting of NTFPs in Sonkpa forest reserve may be a mirage if it is not approach from the individual, family and community level meaning all hands must be on deck.
7. Harvesting of NTFPs should be limited to the buffer zone alone.
8. Lopping where possible should be moderately done to avoid killing the entire plant
9.

References

Abdallah R.K 2007. Use of Medicinal plants for human health in Udzungwa mountains forest: A case study of New-Dabaga Ulongambi forest reserve, Tanzania. Journal of Ethnobiology and Ethnomedicine 3:7-15.

Ahenkan A, Boon E. 2008. Enhancing food security, poverty reduction and sustainable forest management in Ghana through Non-Timber Forest Products farming: Case study of SefwiWiawsoDistrict,publishedonlinebyGRINPublishingatwww.grin.com/de/preview/.html (Retrieved August, 8, 2010)

Ahenkan A, Boon E. 2010. Commercialization of non-timber forest products in Ghana: Processing, packaging and marketing. *Food Agric and Env*, 8: 962-969.

Anderson AB.1990. Extraction and forest management by rural inhabitants in the Amazon estuary, In: AB Anderson (Ed.): *Alternatives to Deforestation: Steps Towards Sustainable Use of the Amazon Rain Forest.* New York: Columbia University Press, pp. 65-85.

Annold C (1999) "Towards sustainable forest management, an examination of the technical, economics and institutional feasibility of improving management of the global forest estate working paper prepared for the world bank forestry policyimplementation review and strategy forest and planning division FAO Rome.

Arnold JEM, Ruiz Perez M 1998. The role of non-timber forest products in conservation and development. In: E Wollenberg, A Ingles (Eds.): *Incomes from the Forest: Methods for the Development and Conservation of Forest Products for Local Communities.* Bogor, Indonesia: CIFOR / IUCN, pp. 17–42

Arnold M.J.E., Powell, B., Shanley, P. and Sunderland,T.C.H. 2011. Forests, biodiversity and food security. International forestry Review, Special Issue 13(3).

Aya 2002 threat to the sustainability of cross river state forest proceedings of 31st annual conference of FAN held in Markudi, Benue state, Nigeria. Pp165-180

Bahru, T.,Asfaw, Z. and Demissew, S. 2012. Indigeneous Knowledge on Fuel wood (Charcoal and or fire wood) plant species used by the local people in and around the semi-arid Awash National Park, Ethiopia. Ecology and the Natural Environment 4(5):141-149.

Basu, J.P. 2009. Adaptation , Non-Timber Forest Products and Rural livelihood: An empirical study in West Bengal, India. Earth and Environmental science 6: 3-8.

Belcher B, Ruiz Pérez M, Achdiawan R 2005. Global patterns and trends in the use and management of commercial NTFPs: Implications for livelihoods and conservation. *World Development*, 9: 1435–1452.

Belcher BM 2003. What isn't a NTFP? *International Forestry Review*, 2: 161–168.

Browder J.O 1992. Social and economic constraints on the development of market-oriented extractive reserves in Amazon rain forests. *Advances in Econ Botany*, 9: 33-41.

Burmer 1990 the potential role of agroforestry in combating desertification and environmental degradation with special reference to Africa Agricultural and rural cooperation.

Chandrasekharan, C. 1995. Terminology, definition and classification of forest products other than wood. In: *Report of the International Expert Consultation on Non-Wood Forest Products. Yogyakarta, Indonesia. 17-27 January 1995.* Non-wood forest products No.3. Rome: FAO, pp. 345-380.

Charlie S, Sheona S. 2004. The importance of Non-Timber Forest Products in rural livelihood security and as safety nets: A review of evidence from South Africa. *SouthAfrica J of Science*, 100: 58-664.

Chia E.L., Somorin, O.A., Movik, S., Sonwa, D.J. and Tiani, A.M. 2013. Local vulnerability, Forest communities and Forest-carbon conservation: Case of Southern Cameroun. International Journal of Biodiversity and Consrevation 5(8):498-507.

Clark LE, Asaha S, Ndam N, Blackmore P. 2004. Eru (*Gnetum africanum and G. buchholzianum*). In: LE Clark, TCH Sunderland (Eds.): *The Key Non-Timber Forest Products of Central Africa: State of the Knowledge.* Technical Paper No. 122, Washington D.C.: USAID, pp. 37-62. URL: http://pdf.dec.org/pdfdocs/ PNADA 851.pd (Retrieved May 25, 2010).

Clark LE, Sunderland TCH, 2004. The key Non-Timber Forest Products of central Africa. State of the knowledge. *Technical Paper Number 122.* Office of Sustainable Development, Bureau for Africa, Washington D.C.: USAID.

Cunningham A.B. 2000. *People, Wild Plant Use and Conservation. Applied Ethno-botany.* London: Earthscan.

Delacote P. 2002 Commons as insurance: safety nets or poverty traps? *Environ Dev Econ* 2009, 14:305–322.

De Beer JH, McDermott M. 1989. *The Economic Value of Non-Timber Forest Products in South- East Asia.* Amsterdam, The Netherlands Committee for IUCN

De Jong W, Campbell BM, Schroder J.M. 2000. Sustaining incomes from Non-Timber Forest Products: Introduction and synthesis. *Int Tree Crops Journal*, 4: 267-275. D0110.1007/s11676-013-0327-Z.Vol.24, No.1 Springer Ecosystem Management. Ecological Society of China, North-East Forestry University.

Falconer, J. 1997. Developing Research Frames for Non-Timber Forest Products: Experience from Ghana: In: M Ruiz Pérez, JEM Arnold (Eds.): *Current Issues in Non-timber Forest Products Research.* Bogor, Indonesia: Centre for International Forestry Research, pp. 143-160.

Food and Agriculture Organization 1992. Forest resources assessment, tropical countries. Technical report, FAO, Rome; FAO. Forestry Paper no112.26

Food and Agriculture Organization of the United Nations FAO, 1992. Forest, Trees and food Rome. pp. 2-4

Food and Agriculture Organization (FAO), 2008. An Information Bulletin on Non-Wood Forest Products. *Non-Wood News*, FAO, Vol 17, Rome, pp. 12-21.

Food and Agriculture Organisation (FAO), 1999a. *An Overview of Non Timber Forest Products in the Mediterranean Region.* Rome: FAO, pp. 1-9.

Food and Agriculture Organisation (FAO), 1999b. *FAO Forestry – Towards a Harmonised Definition of Non-Wood Forest Products. Unasylva–* No. 198, Vol. 50

Food and Agriculture Organisation of the United Nations (FAO), 1995. *Non Wood Forest Products for Rural Income and Sustainable Forestry.* Rome: FAO NWFPs 7.

Food and Agriculture Organization **(**FAO), 2006. *Can Non-Wood Forest Products Help Contribute to*

Achieving The Millennium Development Goals? Rome: FAO, pp. 2-14.

Food and Agriculture Organization of the United Nations, 2005. Center for International Forestry Research. *Forests and Floods: Drowning in Fiction or Thrivingon Facts?* Forest Perspectives Series 2. Centre for International Forestry Research, Bogor, Indonesia.

Food and Agriculture Organization 1995 forest resources assessment 1990. Global synthesis forestry paper 124.Rome.

Homma AKO. 1992. The dynamics of extraction in Amazonia: A historical perspective. *Adv in Econ Botany*, 9: 23-31.

Jean-Laurent P, Patrick R. 2002. Non- Timber Forest Products: In: P Jean-Laurent, R Patrick (Eds): *Between Poverty Alleviation and Market Forces.* Bern, Switzerland: Trees and Forests in Development Cooperation, pp. 4-36.

Jumbe, C.B.L., S.M. Bwalya, and M. Husselman. 2008. Contribution of Dry Forests to Rural Livelihoods and the National Economy in Zambia. In *Managing the MiomboWoodlands of Southern Africa, Technical Annex No. 1*. Washington, D.C.: The World Bank, Sustainable Development Department, Environmental, and Natural Resources Management Unit, Africa Region. Can be accessed at: http://wwwwds. worldbank. org/external/default/ WDSContentServer/WDSP/ IB/2010/03/24/00033 3038_ 20100324030253/Rendered/PDF/536180ESW0P 0971 A0Volume0201P097934 1.pdf

Kosoy N, Martinez-Tuna M, Muradian R, Martinez- Alier J. 2007. Payments for environmental services in watersheds: insights from a comparative study of three cases in Central America. *Ecol Econ* 2007, 61:446–455.

Marshall E, Newton AC, Schreckenberg K. 2005. Commercialization of Non-Timber Forest Products: First Steps in Analysing the Factors Influencing Success, *Int Fores Rev*, 5: 128-135

Mathur RB, Shiva M.P. 1996. *Standard NTFP classification and documentation manual*. Dehra Dun: Khanna Bandhu, pp. 1-40.

Mercer and Arnold, 1996: adoption of agroforestry innovation in the tropics. A review in journal of agroforestry system 60:311-368 kliwer wetherland.

Msuya, T.S., Kideghesho, J.R and Mosha C.E.T. 2010. Availability, preference and consumption of indigeneous forest foods in the Eastern Are Mountains, Tanzania. Ecology of food and nutrition 49:208-227.

Mustelin J, Klein RG, Assaid B, Sitari T, Khamis M, Mzee A, Haji T. 2010. Understanding current and future vulnerability in coastal settings: community perceptions and preferences for adaptation in Zanzibar, Tanzania. *Popul Environ* 2010, 31:371–398.

Myers N 1988. Tropical forests: Much more than stocks of wood. *J Trop Ecol*, 4: 209–221.

Nepstad DC, Schwartzman S. 1992. Non-timber products from tropical forests: evaluation of a conservation and development strategy. *Advances in Economic Botany*, 9: vii–xii.

Okafor, J.C.; Omoradion, F.I. and Amaja. 1994. *Non-Timber Forest Products (Nigeria):* Consultancy Paper prepared by the Tropical Forest Actions Programme (TFAP) Forest Management, Evaluation and Co-ordination Units (FORMECU) and Federal Department of Forestry (FDF) Abuja, Nigeria. P. 8.

Peters, C.M. 1996. The ecology and management of non-timber forests resources. *World Bank Technical Paper Number 322.* Washington, DC: The World Bank.

Peters, C.M, Gentry AH, Mendelsohn R.O. 1989. Valuation of an Amazonian. *Forest Nature*, 339: 655-656

Plotkin, M. Famolare L. (Eds.), 1992. *Sustainable Harvest and Marketing of Rain Forest Products*. Washington D.C.: Conservation International. Island Press.

Ros-Tonen MAF, Lammerts B EM, Dijkman W. 1995. *Commercial and Sustainable Extraction of Non-Timber Forest Products. Towards a Policy and Management Oriented Research Strategy.* Wageningen, the Netherlands: The Tropenbos Foundation. Ros-Tone MAF, Andel T, Assies W, Dijk JFW, Duivenvoorden JF, Hammen MC, Jong W, Reinders M,

Shiva MP, Verma S.K. 2002. *Approaches to Sustainable Forest Management and Biodiversity Conservation: With Pivotal Role of Non-timber Forest Products*. Dehra Dun: Centre for Minor Forest Products, Valley Offset Printers.

Sunderland TCH, Harrison ST, Ndoye O. 2004. Commercialisation of non-timber forest products in Africa: history, context and prospects. In: T Sunderland, O Ndoye (Eds.): *Forest Products, Livelihoods and Conservation: Case Studies of Non-Timber Forest Product Systems. Volume 2: Africa*. Bogor: CIFOR, pp. 1-24.

Wong Jenny L.G. 2000. The biometrics of Non-Timber Forest Product resource assessment: A review of current methodology. Report commissioned under the ZF0077 pre-project of the Forest Research Programme of the United Kingdom Department for International Development. www.etfrn.org/etfrn/workshop/ntfp/ download.html (Accessed June 2010).

Wunder S, Angelsen A. 2003. Exploring the forest-poverty link: Key concepts, issues and research implications. *CIFOR Occasional Paper No. 40.*

Zaku, S.S. 2013a. Harvesting and Utilization of Non-Timber Forest Products by Forest communities in Gashaka-Gumti National Park. Ahmadu Bello University, Zaria. ISSN 1596-6267, Vol.8, No. 1. April, 2013.pp15-22.

Zaku, S.S. 2013b. The Prevalence of Non-Timber Forest Products in Gashaka- Gumti National Park. Ahmadu Bello University, Zaria. ISSN 1596-6267, Vol.8, No. 1. April, 2013.pp62-80.

Zaku S.S : D.C A Amadi, A.A Maiguru and I. Yakubu 2022: Assessment of women Involvement in the utilization of NTFPs in the enclaves of Gashaka –Gumti National Park Serti, Taraba State, Nigeria. International Journal of Agricultural Research, Sustainability and Food sufficiency (IJARSFS) Vol. 9 (01) 28 April, 2022, PP539-55 www. Academiascholarly Journal. Org/ ijarfs/ index – ijarsfs.htmISSN: 2360-932X© Academia schorlarly Journals.Also Available @: Archive.org/Zaku *etal*. Open access.

Zaku S.S : D.C A Amadi, A.A Maiguru and S. Rabo 2022: Contributions of Parkia biglobosa (Jacq) Benth to community livelihoods in Jema'a Local Government Area of Kaduna State, Nigeria. International Journal of Agricultural Research, Sustainability and Food sufficiency (IJARSFS) Vol. 9 (01)28 April, 2022, PP552-559 www. Academiascholarly Journal. Org/ ijarfs/index – ijarsfs.htm ISSN: 2360-932X© Academia scholarly Journals.Also Available @: Archive.org/Sabo *etal*. Open access.