

Conservation of Neem Tree in Katsina State, Northwest Nigeria

Abba Abidina¹, Musawa Bello Bello², Bello Abubakar³

¹Department of Biological Sciences, Faculty of Science, Federal University, Lokoja, Nigeria

²Department of Science Laboratory, Faculty of Sciences, Federal Polytechnic Kaura Namoda, Zamfara, Nigeria

³Centre for Biodiversity and Conservation, Department of Biology, Faculty of Natural and Applied Sciences, Umaru Musa Yaradua University, Katsina, Nigeria

Email address:

abdin2007@gmail.com (A. Abidina)

To cite this article:

Abba Abidina, Musawa Bello Bello, Bello Abubakar. Conservation of Neem Tree in Katsina State, Northwest Nigeria. *International Journal of Natural Resource Ecology and Management*. Special Issue: *Forest and Wildlife Management*. Vol. 5, No. 1, 2020, pp. 1-5.

doi: 10.11648/j.ijnrem.20200501.11

Received: October 17, 2019; **Accepted:** January 10, 2020; **Published:** January 30, 2020

Abstract: The study on the conservation of Neem tree (*Azadirachta indica*) in Katsina state, Nigeria was conducted in which nine local government areas were covered based on the predominant nature of the Neem tree and desertification nature of the Area. Structured questionnaire were designed set to address some key questions as well as the field observation of the vegetation cover with emphasis on the Neem tree. Most of the respondent on the effect of cultural practices on the conservation of neem indicate 47.22% of the respondents indicate their desire to using charcoal while 40% prepare to use Kerosine source and 12.78% choose other source of energy. Also on the Perception of farmers on the importance of conservation it was found that about 60% of the respondents consider the conservation of Neem tree as very important for forest conservation and management, while 29.44% see it as less important; last category that respond with they don't care which amounts to 10.55% as such, the study recommend public enlightments and provision of sustainable way that make farmers reduce over relying on the deforestation to get fuel wood and source of income.

Keywords: Climate Change, Cultural Practices, Deforestation, Forest Ecology

1. Introduction

Conservation of Natural resources has been a serious challenge in the world especially developing countries like Nigeria where the need for infrastructural development of economic stability is highly needed. Significant increase in human population and food insecurity has also exerted a lot of pressure in forest reserve especially Neem tree. Neem is a fast-growing, small to medium-sized, ever-green tree, (5 to 20 m high), which sheds most of its leaves in the dry season and then blooms in full foliage. Two thirds of the height may be reached after 3 to 5 years. The first fruits can be harvested after 5 years and the first timber crop after 5 to 7 years [1].

The tree was introduced into Nigeria from Ghana, and it was first grown from the seed in Maiduguri, the then Bornu Province (Now Borno State), Nigeria, in 1928 [2]. In Nigeria, Neem tree occupied more than 3,500 ha of land in Katsina,

Kebbi, Sokoto, Borno and Zamfara in Northern Nigeria, with a density of about 1,200 trees per ha [3]. The fruit yield is variable ranging from 10 – 50 kg per tree with an average of 20 kg [4, 5]. It is now grown all over the country as a shade and avenue tree in villages and towns, in hospitals, schools, government houses, offices and railways stations [6]. The Neemtrees have been grown successfully in all parts of Nigeria. Neem has become naturalized species in various parts of Nigeria in quite diverse ecological and climatic conditions. Although the tree has been introduced to Nigeria for several decades from its natural habitat in the Indian sub continent but its use was mainly as a shade, ornamental avenue tree.

It has been utilized for over a thousand years in agriculture, food storage, and for its medicinal properties. It has been used in commercial products such as shampoo, soaps, bug repellent, and toothpaste. Neem is an immensely useful tree, widely known for its medicinal properties and use as an organic insecticide. Over the past century tropical forests

have been suffering from exceptional rates of change as they are degraded or destroyed by human activities. Approximately one-fifth of the world's population lives specifically within tropical regions consisting of savanna type vegetation [6].

Estimated about 2.5 billion individuals rely on the forest ecosystem to earn a living; such as socio-cultural, economical and environmental purposes, which in turn earmarks the rate of deforestation and deterioration of the forests [7]. High rate increase in global population on the other hand had a great impact on the need for fuel wood and shelter due to urbanization in third world countries [8].

Nigeria is blessed with a unique vegetation cover with about 580 tree species which may grow up to about 12.5m at maturity level [9]. Nigeria on the other hand is one of the highest country with deforestation problem and the highest in African continent; where about 55.8% of its natural forest was destroyed between 2000 and 2005 [10]. Katsina state is very diverse in terms of its forest cover with Neem tree being dominant specie; it also blessed with many species of plants for various uses ranging from fuel wood, ethno medicine, food and many more. This richness of natural resources has led to many interruptions of the natural ecosystem by humans leading to high rates of deforestations [11].

2. Materials and Methods

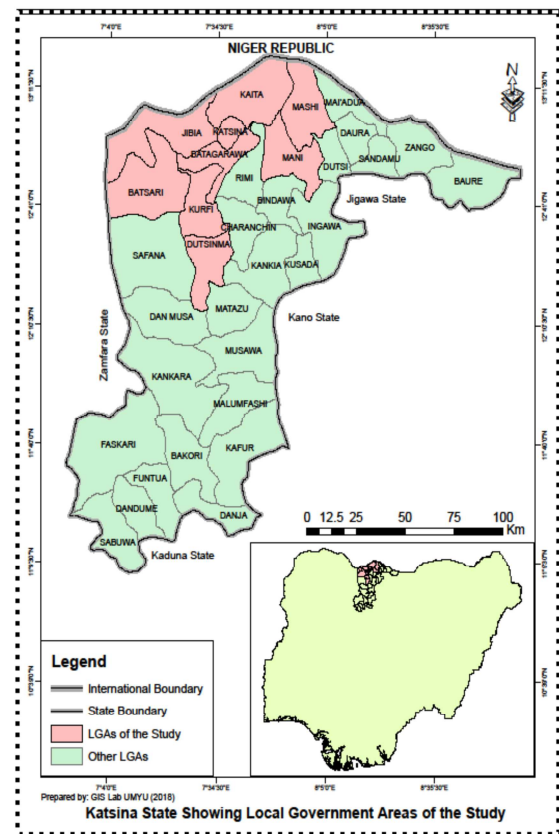
2.1. Study Area

The study area comprises Katsina state in which Nine local governments were selected for the purpose of this research based on scanty vegetation in the areas which leads to several afforestation program examples EEC (Economic European Commission) and KTARDA (Katsina State agricultural and rural development agency), there is much effect or high density of neem in the areas. The local governments were Kaita, Mashi, Jibia, Mani, Batsari, Kurfi, Dutsinma, Batagarawa and Katsina local Government. Katsina State has a land mass of about 24,971.215km² with a population of 5,801,584 as at 2006 national census. The climate of Katsina State is the tropical wet and dry type (Tropical Continental Climate), classified by Koppen as low climate. Rainfall is between May and September with very high intensity between the months of July and August [12]. The average annual rainfall varies from 550 mm in the northern part to about 1000 mm in the southern part of the state. The pattern of rainfall in the state is highly variable. As a result, the state is subject to frequent floods that can impose serious socio-economic constraints [13].

Table 1. Sampling Locations.

Sampling Locations	Langitude	Latitude
Jibia	13°03'38"N	7°09'868"E
	13°03'750"N	7°10'394"E
Kaita	13°05'698"N	7°13'508"E
	13°04'728"N	7°43'721"E
Katsina	12°56'951"N	7°40'130"E
	12°56'950"N	7°40'126"E

Sampling Locations	Langitude	Latitude
Mashi	12°58'869"N	7°55'114"E
	12°58'858"N	7°55'104"E
Batsari	12°51'737"N	7°02'002"E
	12°50'677"N	7°02'102"E
Kurfi	12°43'693"N	7°32'672"E
	12°43'706"N	7°31'654"E
Mani	12°53'009"N	7°46'080"E
	12°53'011"N	7°46'066"E
Batagarawa	12°56'516"N	7°33'119"E
	12°56'496"N	7°33'127"E
Dutsinma	12°32'597"N	7°29'993"E
	12°32'460"N	7°28'959"E



Source: NASA/NOA Spot image 2014 [14].

Figure 1. Map of the study Area Showing sampling Sites.

2.2. Sample Procedure

For the sampling a 0-20cm depth was dug and soil was collected with collecting kit and place into a plastic bag and zipped for transporting to the laboratory.

2.2.1. Sample Preparation

The samples were dried with hot air oven technique and sieved with a 2mm mesh size seiver and transferred into a sealed polythene bag before analysis.

2.2.2. Determination of Soil Properties

To determine the Soil pH we use pH meter by Hanna and follow manufacture manual, Soil temperature was determined by Soil thermometer, Organic matter content of

the soil were determined following Titrimetric method [15]; Fluoride content was determined using selective ion meter following manufacturer's manual, while Digital water analyzer were used to determine EC content of the soil.

2.3. Distribution of Questionnaire

A structured questionnaire was designed for the purpose of obtaining information from the farmers in which a total of one hundred and eighty (180) questionnaires were distributed

across the nine (9) local governments under study.

3. Results

The results of the study on the conservation of Neem tree *Azadirachta indica* A. Juss in katsina were highlighted below including the responses from the local farmers as well as the results on physicochemical analysis of the soil from the study area.

Table 2. Perception of Farmers on the Importance of Conservation and planting of Neemin Katsina State Northwest Nigeria.

Sampling Locations	Very Important	Important	I don't Know	Total respondents
Batsari	11	6	3	20
Jibia	3	13	4	20
Kaita	14	4	2	20
Katsina	16	3	1	20
Kurfi	18	2	0	20
Mani	16	3	1	20
Batagarawa	18	0	2	20
Dutsinma	2	17	1	20
Mashi	10	5	5	20
Total	108	53	19	180
Percentage	60%	29.44%	10.55%	

Table 2 shows the response of farmers on the importance of Neem tree conservations in which total of 180 farmers were administered with a structured questionnaire where three key questions were ask. As Very important, important

and I don't know. The result shows about 60% of the respondents consider the conservation of Neem tree as Very important, while 29.44% see it as important while the last category that respond with 'I don't Know' amount to 10.55%.

Table 3. Effects of cultural practices on the Neem tree conservation with emphasis on source of energy by farmers in Katsina State, Northwest Nigeria.

Sampling Locations	Charcoal source	Kerosine Source	Others	Total respondents
Batsari	6	8	6	20
Jibia	7	13	0	20
Kaita	6	9	5	20
Katsina	4	14	2	20
Kurfi	5	10	5	20
Mani	16	3	1	20
Batagarawa	12	6	2	20
Dutsinma	17	3	0	20
Mashi	12	6	2	20
Total	85	72	23	180
Percentage	47.22%	40%	12.78%	

Table 3 showed the effects of cultural practices on conservation of Neem tree *Azadirachta indica* A. Juss in which 47.22% of the respondents indicate their desire to using

charcoal while 40% go for Kerosine source and 12.78% choose other source of energy.

Table 4. Neem tree *Azadirachta indica* A. Juss Density observed by survey at Different sampling locations in Katsina state.

1	11-50	51-100	101-200	201-400	500	501-1000	1000+
2	Kaita	Jibia	Mani	Mashi	Batagarawa	Dutsinma	Katsina
3						Kurfi	Batsari

Table 3 shows the density of Neem tree *Azadirachta indica* A. Juss in the study locations where four locations in the were found to be highest as Katsina, Batsari (1000+)

followed by Dutsinma and Kurfi (500-100) trees. Others in an ascending order were Kaita < Jibia < Mani < Mashi < Batagarawa.

Table 5. Soil properties recorded during the study in Katsina state.

Locations	BTR	JBY	MNI	KAT	KTN	DTM	KRF	BTG	MSH
Organic Matter (%)	0.91±0.13	1.05±0.22	1.25±0.22	0.85±0.2	1.18±0.2	1.76±0.56	1±0.56	0.7±0.18	0.85±0.8
Bryl-I AVL P (ppm)	5.5±3.19	4.3±1.9	2.63±0.75	3.9±1.3	4±2.4	2.8±1.3	1.2±0.7	2.8±0.7	4.3±1.9
EC (mm hoslc)	0.67±0.3	0.4±0.2	0.69±0.4	0.2±0.1	0.8±0.2	0.9±0.3	0.9±0.3	0.6±0.7	0.6±0.2
Soil pH (CaCl ₂)	5.1±0.08	5.0±0.1	5.5±0.2	5.3±0.2	5.5±0.3	5.4±0.2	5.5±0.3	5.7±0.5	5.5±0.2
Soil pH (wáter)	5.2±0.7	5.7±0.2	5.7±0.3	6.1±0.2	6.1±0.2	5.7±0.1	5.7±0.1	5.9±0.1	5.7±0.1

The results indicate organic matter which is high in Dutsinma (1.76 ± 0.56) and Mani (1.25 ± 0.22) with Batagarawa and Batsari having least values with 0.7 ± 0.18 and 0.91 ± 0.13 respectively, while Kurfi had the lowest value (1.2 ± 0.7). The statistical analysis of the various parameters observed against the sampling locations shows significant difference $P < 0.05$.

4. Discussions

Forest management is a vital part in natural resources management, which consists on aspects such as wild fire caused by rampant burning of timber trees with Neem tree being the major candidate specie. With the current understanding of forest ecosystem most of these problems can be addressed vividly by applying ecosystem management principles to forest management. These principles include partial-cut approach system and focusing on yielding and application of approved burning of forest. However, perception of the farmers towards the needs to preserving forest was found to be very negative as observed during the study as seen in Table 2. Also these findings are in agreement with [16]; who also emphasizes on the public involvement due to lack of knowledge on the importance of forest conservation.

Understanding the knowledge of forest conservation indicates very poor concern of the respondents. As such, the need for the effort to more commitments by the communities, groups and authorities with possible community based forest management system. This poor participation could be attributed to the neglect or poor integrated approach from the authorities concerned as observed by [17]. However, based on the findings of [18] in his study titled 'Assessing the contribution of Community Based Natural Resource Management programme to environmental sustainability in Ondo State, Nigeria' he retreat the lack of awareness by the villagers as one of the factors affecting increasing practices of Deforestation.

In vitro conservation may help in mitigation of forest degradation where germplasm conservation will be employed to reduce the probability of extinction and also increase genetic variability for sustainable forest ecosystem. These techniques include the storage of plants in the laboratory control for a period of time which will help in preserving of genotype [19]. Other in vitro methods includes; the cryopreservation as well as the slow growth method [20].

5. Conclusions

The conservation of Neem tree in Katsina state, Northwest Nigeria reveals the strong relationship between farmers' cultural attitude and over dependence on the Neem tree as a source of energy and commercial charcoal. Also observed in the study was the high deforestation in the affected areas as well as the poor Neem tree density in the total vegetation

cover, also studied were lack of knowledge on the importance of forest conservation among the farmers, which has contributed a lot to these problems as such its recommend for public enlightenment and provision of sustainable way that make farmers reduce over relying on the deforestation to get fuel wood and source of income. Also the locals should embark on managing the woodland resources and the dilapidated forest population through integrated efforts from various conservation organizations that should mainly focused on the preservation and restoration of the forest.

References

- [1] Sacande, M., Hockstra, F. A, VAN Pijlen J. G and Groot S. C (2000). A multifactorial study condition influencing neem (*A. indica*) seed storage longevity. *Seed science research* 8, 473-482.
- [2] Elteraifi, A., and Hassan, A (2001) Oil Azadirachin Contents of Neem (*A. indica*) Seed kernels collected from trees growing in different habitat in Sudan.
- [3] Fujinmi, A. O., Adedeji, S. K., Hassan, W. A., and Babatunde, G. M (1990) Inclusion of neem seeds as feedstuff in rabbit concentrate ration. *Appl. Rabbit Res.*, 13: 125-6.
- [4] Radwanski, S. A., and Wickens, G. E (1981) Vegetative Fallows and Potential Value of the Neem Tree (*Azadirachta indica*) in the Tropics. *Economic Botany*, 35:398-414.
- [5] Schmutterer, H and Singh, R. P (1995) *List of Insects Susceptible to Neem Products*. In: *The Neem Tree Sources of Unique Natural Products for Integrated Pest Management, Medicine, Industry and Other Purposes*, Schmutterer, H. (Ed.). VCH, Publishers, New York.
- [6] Nwokeabia, A. (1994) *Annual report*. Federal Department of Forestry, Fed. Ministry Agriculture, Abuja, Nigeria, pp: 4/3.
- [7] FAO (2011) State of the World's Forests, 2011, FAO Rome, 164 pp.
- [8] Borokini, T. I., Babalola, F. D., Amusa, T. O, Ivande, S. T., Wala, Z. J., Jegede, O. O., Tanko, D., And Ihuma, J. O., (2012) Community-based Forest Resources Management in Nigeria: Case study of Ngel Nyaki Forest Reserve. *Journal of Tropical Forestry and Environment*. 2 (1): 69-76.
- [9] FAO (2006) Global Forest Resources Assessment 2005. FAO Forestry paper 147, Rome, Italy.
- [10] Onyekwelu, J. C., Adekunle, V. J and Adeduntan, S. A (2005). Does the Tropical rainforest Ecosystem possesses the ability to recover from severe degradation? In: Popoola L, Mfon P & Oni PI (eds) Sustainable forest management in Nigeria: lessons and prospects. *Proceeding of the 30th Annual conference of the Forestry Association of Nigeria, Kaduna*, 7th – 11th Nov. 2005, pp. 145–163.
- [11] Abaje, I. B., Ndabula, C and Garba, A. H. (2014) Is the Changing Rainfall Patterns of Kano State and its Ad-verse Impacts an Indication of Climate Change? *European Scientific Journal*, 10 (2), 192-206.

- [12] Abaje, I. B., Ati, O. F. and Iguisi, E. O (2012a) Changing climatic scenarios and strategies for drought adaptation and mitigation in the Sudano-Sahelian Ecological Zone of Nigeria. In M. A. Iliya & I. M. Dankani (Eds), *Climate Change and Sustainable Development in Nigeria* (pp. 99-121). Ibadan: Crown F. Publishers.
- [13] GIS Laboratory UMYU (2018) Department of geography, Umaru Musa Yaradua University NASA spot image archives. Accessed November 2014.
- [14] Walkley, A. J and Black. I. A (1934) Estimation of soil organic carbon by chromic acid titration method. *Soil Science*, 34: 29-38.
- [15] Pawar, K. V and Rothkar, R. V (2015) Forest Conservation and Environmental Awareness. *Procedia Earth and Planetary Science* Vol. 11 (2015) 212-215 Science direct publishers.
- [16] Jumoke B. O., and Jonathan C. O (2019) Assessment of the Prospects of Community-Based Forest Management in Ondo State, Nigeria; *Journal of Forestry Research and Management*. Vol. 16 (2). 1-12; 2019, ISSN 0189-8418 www.jfrm.org.ng.
- [17] Adisa, B. O (2013) Assessing the Contribution of Community-Based Natural Resource Management. Programme to environmental Sustainability in Ondo State, Nigeria. *African Journal of Environmental Science and Technology*. 7(10): 932-93.
- [18] Silva, A. V. C., Jesus, A. S., Soares, A. N. R., and Ledo, A. S(2017). Genetic Diversity Utilization and Conservation of Neem (*Azadirachta indica* A. Juss.) *Biodiversity and Conservation of Woody Plants, Sustainable Development and Biodiversity* Springer International Publishing, DOI 10.1007/978-3-319-66426-2_7.
- [19] Sarasan, V., Cripps, Ramsay, R., Atherton, M. M., McMichen, C., Prendergast, M and Rowntree J. K (2006) Conservation in vitro of threatened plants—progress in the past decade. *In vitro cell devbiol-plant* 42 (3): 206–214.