E-ISSN: 1115 – 831X P-ISSN: 3027-2963
MPRI-JAVS | INTERNATIONAL JOURNAL OF AGRICULTURAL AND VETERINARY SCIENCE
VOL. 05 NO. 1 - JULY, 2024

ASSESSMENT OF LIVELIHOOD SUSTENANCE AND NON-TIMBER FOREST PRODUCT AVAILABILITY OF HADEJA-NGURU WETLANDS INHABITANTS.

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Abstract

The study assessed the livelihood sustenance, NTFPs availability of HNWs inhabitants, Parameters evaluated includes; livelihood sustenance practices of inhabitants, Data collection was done using structured questionnaires, Focus Group Discussions (FGDs), In-depth Interviews (IDIs). *Paired sample T-test and chi-square test of association were used in* assessing the interphase of livelihood sustenance practices, NTFPs availability, Result showed that majority of the respondents (78.25%) were males, 68% were married, Agric/farming (15.25%) topped the occupation list, age brackets of 45-50 was highest (23.75%) and 34.5% (highest) of the respondents had primary school education. The highest household size of the respondents (51.75%) was between 7 and 9 children, the highest previous yearly income (36.5%) was between ₦ 50,000. 00 and ₦ 100, 000. 00 per annum while the highest (36.5%) present yearly income was from ₦ 1,000.000, 00 to ₦ 1,500,000.00. majority of the respondents (80.25%) had awareness of climate change, 89.25% were aware of the impacts of climate change on livelihood sustenance and 30.5% indicated sparse distribution of NTFPs as a major effect of climate change. Decreased production in crops, land shade, damaged of harvested crops, increase in insect population, shortening the time of germinating seeds were thought to be the consequences of reduction in rainfall, excessive rainfall, irregular rain pattern and increase in temperatures respectively. Food scarcity (42.5%), reduction in income due to depletion of NTFPs (79.75%) were also pinpointed. The communities in the wetlands depend largely on the natural resources for their livelihood and survival.

Key word: Livelihood Sustenance, Natural Resources, Non Timber Forest Products, Climate Change, Hadejia – Nguru Wetlands.

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Introduction

Background to the Study

The term non timber forest products has multiple meanings depending on who is asking, their motives and understanding. An NTFP thus needs to be put in the context of its source and use (Saka *et al,* 2019). The negative terms used for these products (non-timber and non- wood) appear to relegate them to secondary importance as the anti-thesis of timber. It also refers, for some, to the product's physical characteristics (i.e. a product that is not timber). This in the language used for products (Nwajesu 2014).

The word product is interchangeable with a good or commodity, denoting a thing of use or advantage, produced by or resulting from a natural, social or historical process. In economics a product is commonly a thing of profit or commerce, an exchangeable unit of economic wealth, especially as a primary or raw material. NTFPs are defined here as products of biological origin (plants, fungi and animals) other than timber, derived from natural, modified or managed forested landscapes and other wooded land and trees outside forests. All parts can be used: for plants this includes fruits, nuts, seeds, leaves, stems, bark, essences, fibers, resins, exudates, roots, flowers and wood. For animals flesh, hides, hair, horns, hooves and feathers are commonly used. FAO (2001) Excluded are exotic species such as rubber (*Hevea brasiliensis*) and quinine (*Chinconia spp*.), planted and also now growing wild in the Congo Basin, NTFPs are often classified by their use: food, forage, fuel and energy, materials, utensils, construction, medicines, aromatic products, dyes and colorants, fuel wood and its derivatives; and objects of ornament, art and cultural value .NTFPs are denoted in legal frameworks in the Gabon and CAR but are not clearly defined in Cameroon. Although, FAO (2001) prefers the term Non-Wood Forest Products (NWFPs), using it to exclude all woody raw materials, fuel wood and small woods used for domestic tools/equipment. In Cameroon species producing fuel and tools have not been regulated as timber products and are thus classed in this thesis as NTFPs. Timber denotes trees grown for their wood, and wood suitable for building, carpentry or other uses (i.e. large Squared, dressed wood ready for use or as part of a structure). Wood refers to the hard fibrous substance consisting largely of xylem, which constitutes the majority of stems, branches and roots in trees and shrubs, and to a limited extent in herbaceous plants. A second meaning is that it is suitable or prepared for use (i.e. burning or building) (Saka *et al,* 2019).

Non-timber forest products include numerous forest extracts such bark, roots, tubers, leaves, fruits, flowers, seeds, resins, honey, mushrooms, and firewood (Sunderland, *et al,*2003). They are collected from a wide range of ecosystems such as high forests, farm fallow and farmland, and they are widely used in a variety of ways for subsistence livelihoods, including food, medicine and bartering. Neumann and Hirsch (2000) define

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NTFPs as the biological materials (other than industrial round wood and derived sawn timber, wood chips, wood based panels and pulp) that may be extracted from natural ecosystems and be utilized within the household, be marketed, or have social cultural or religious significance. Forest products have been identified as a source of livelihood mainly for rural households (Shackleton and Shackleton, 2010; Fisher; *et-al,* 2008). Although the timber industry is often discussed in the context of its contribution to both national and local economies, but NTFPs receive little notice from social scientists and development planners (Jimoh and Adebisi, 2006), perhaps because of the small scale and dispersed nature of extractive activities. Chikamai and Tchatat (2004) note that most non-wood forest products in Sub-Saharan Africa provide both social and economic benefits to the livelihoods of rural communities. At the subsistence level, these products normally address livelihood strategies like secure provision of food, health care needs, and concerns to reduce risk factors. Extraction of NTFPs is mostly undertaken by poor households, as it is labor-intensive and the returns are relatively low.NTFPs remain an important source of income for the rural poor throughout the developing world, especially in Sub-Saharan total livelihood income. This is a clear indication that the poor tend to rely more on NTFPs than wealthier households. Shackleton and Shackleton (2003) reported that ad hoc trade in NTFPs is a common safety net for rural households in South Africa and other African countries (for example, as a fallback for income in the off season or during periods of weak crop yields), which in some instances becomes a permanent source of livelihood. Although the cash incomes from NTFP trade are small, they provide an important contribution that complements the diverse livelihood strategies within a household, especially for the poorer sectors of rural society. In developing countries, most of the rural households and a large proportion of urban households depend on NTFPs to meet some parts of their nutritional, health, and raw material needs, and for income from selling these products in local markets. In some cases, NTFPs are the only source of income for local communities (Wollenberg and Septiani 1998), and they form an integral part of the rural economy. Muino (2009) observed that non-wood forest products are an important source of livelihood for rural communities in Mozambique especially during times of economic, social, or bio-physical shocks. Jimoh and Adebisi, (2006) reported that in Nigeria‘s rural areas, NTFPs contribute significantly to household income and food security and thus, play an important role in poverty reduction. He noted that income from sale of forest products constitutes a substantial amount of total household income in Nigeria. Most households in rural areas of developing countries obtain wild fruits, vegetables, and edible insects from the forests for household consumption and/or commercial purpose. NTFPs support both cash income and employment. Therefore, commercialization of NTFPs in poorer communities has potential for trade expansion and is expected to increase employment opportunities as well as rural household incomes (Nwajesu 2014). The study is limited to the assessment of livelihood sustenance, NTFPs availability of HNWs inhabitants.

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Hadeja-Nguru Wetlands (HNWs) of North Eastern Nigeria supports about 1.5 million farmers, fishermen, and herdsmen, who entirely depend on the ecosystems for their livelihoods, (Kaugama and Ahmed, 2014). The fishermen and farmers represent about 75% of the indigenous community population. The wetlands also support herdsmen who often also farm and provide fuel wood and leaves for making mats and ropes. The wetland supports wet season rice farming, flood recession agriculture and dry season farming using irrigation. The wetland is situated within Sudan-Sahel ecological zone, characterized by desert encroachment and, surrounded by large communities that utilize diverse biological resources which call for the need to preserve the wetlands' rich biodiversity through sustainable management (Birds Life International, 2015).

In spite of this there has not been any comprehensive documented information on the types and extent of NTFPs for livelihood sustenance practices in the study area, this study aim to assess the livelihood sustenance, NTFPs availability of HNWs inhabitants. The specific objectives are to; evaluate the livelihood sustenance practices of inhabitants of the study area.

The collecting and gathering of vegetation resources constituted the main source of livelihood. Today, however, due to increased population and penetration of forces and influences of development have enormous competitive alternative and uses which includes; permanent human settlements, agriculture and forest resources commerce. Therefore, household welfare that was previously assured by a relatively smaller stable competing factors is no longer ascertain. This study will thus provide baseline information on livelihood sustenance practices on NTFPs.

MATERIALS AND METHODS

Study Area

Location of the Study area

The HNWs is located at a point where Rivers Hadejia and Jama'are flow through a fossil dune field before converging and draining into Lake Chad (Barbier and Thompson, 1998) and lie between longitude 10°15′E and 11°30′E, and latitude 12°13′N and 12°55′N. The wetlands extend for approximately 120 km from West to East within Jigawa State and a further 60–70 km downstream in adjacent Yobe State (Barbier and Thompson, 1998). In width, the wetlands range from lokm to more than 50 km from North to South, with approximately 8000 km^2 of floodplain covering three Nigerian States (namely Bauchi, Jigawa, and Yobe). The extent of the floodplain varies considerably from year to year depending on the volume of rainfall and complex interactions of river flow, dam releases, flood regimes, and topography. In Nigeria, wetlands cover about 28,000 km^2 (about 3%) of the 923,768 km^2 of the country's land area (Abubukar *et al.*, 2016). One of these is the HNWs named after two major towns (Hadejia and Nguru) in the area and are surrounded by many villages (Figures 1 to 3).

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The Hadejia-Nguru Wetlands (HNWs) is an extensive floodplain created by the Hadeja and Jama'are Rivers to form the Komadugu- Yobe River which drains into Lake Chad. The wetlands cover an area of about 350, 000 ha and have an altitude of (asl) 152 - 305m (Bird Life International, 2015). The Nguru Lake and Marma Channel Complex Wetlands (located within the HNWs) were designated as the first Nigerian wetlands of international importance under the Ramsar Convention. According to Ramsar, (1994), the wetlands are notably known for the recharge and replenishment of underground water in the Komadugu-Yobe Basin, economically rich habitats for the biodiversity of various fauna and flora. The area is a major tourism site for the Palearctic and Afrotropical migrant water birds (Eaton and Sarch, 1997).

Vegetation of the study area

The general vegetation is characteristic of the Sudan savanna**,** – Sparse shrubs and isolated tall trees mostly *Acacia Species.* Three broad types of vegetation occur in HNWs. There is a scrub savanna, which consists of upland farmland areas and *Acacia* Woodlands. The second includes the "tudu" (raised areas) which are never inundated with tree species of *Acacia*, *Zizphus species*, *Balanites aegyptiaca*, *Tamarindus indica* and *Adansonia digitata*, while common grasses include *Cenchrusbiflorus*, *andropogon* species and *Vetiveria nigritana*.

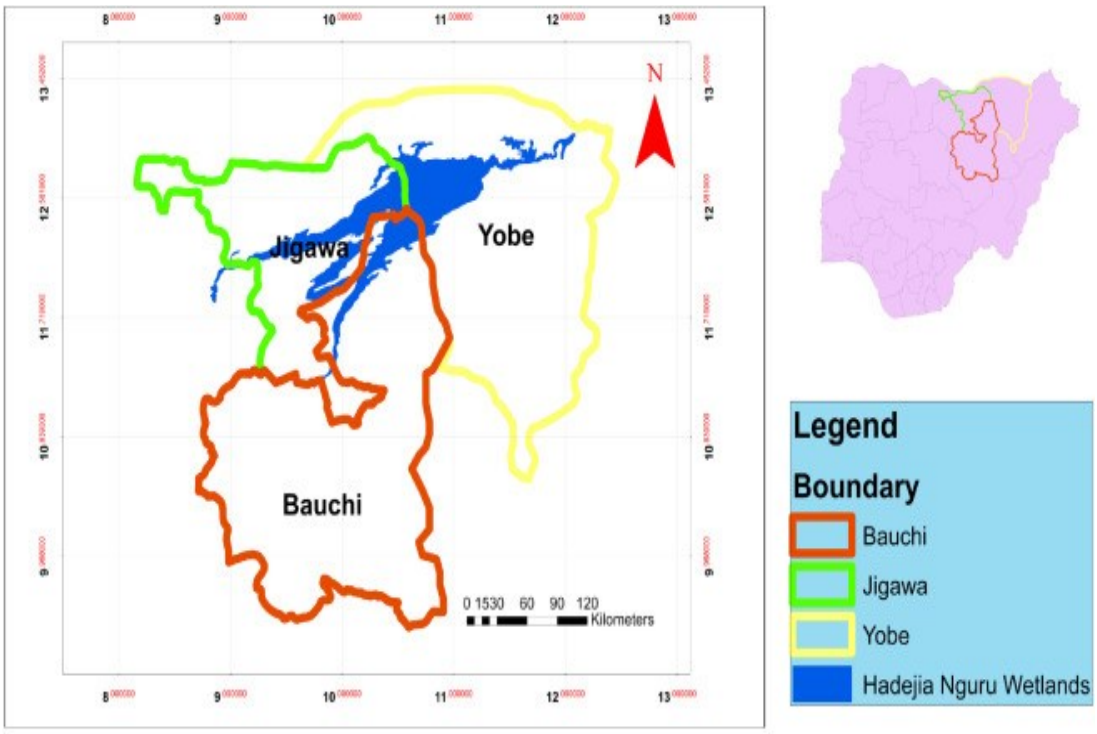

Figure 1: Map showing boundary demarcations of HNWs between States
Sources: GIS University of Maiduguri (2021)

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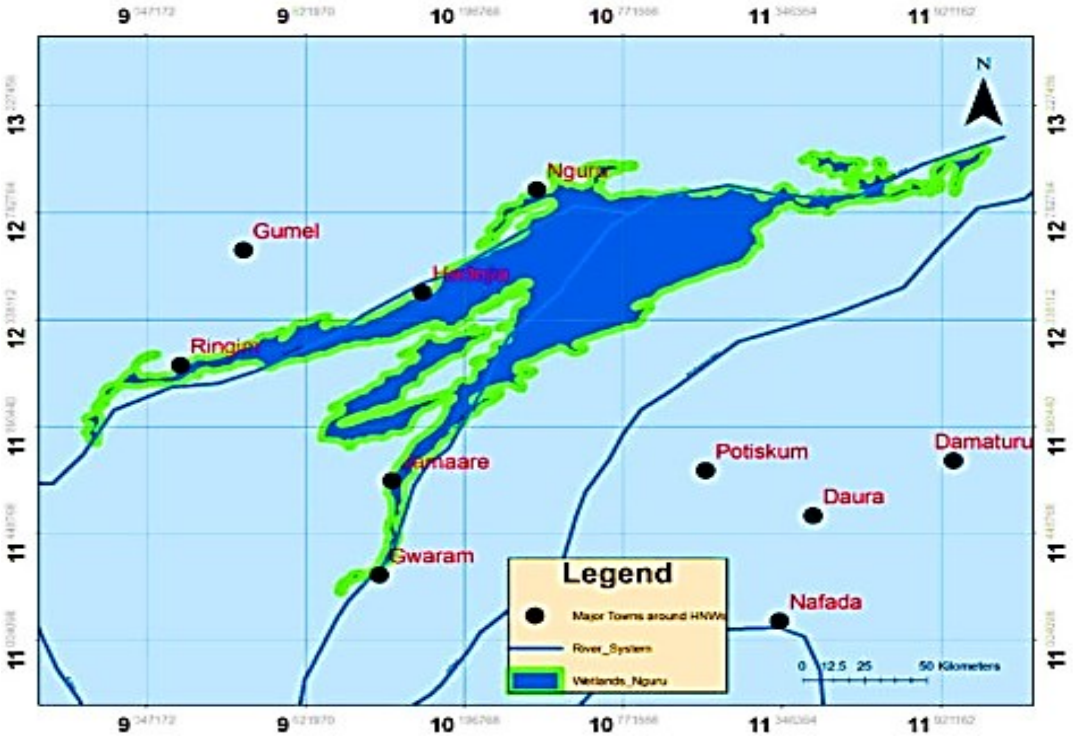
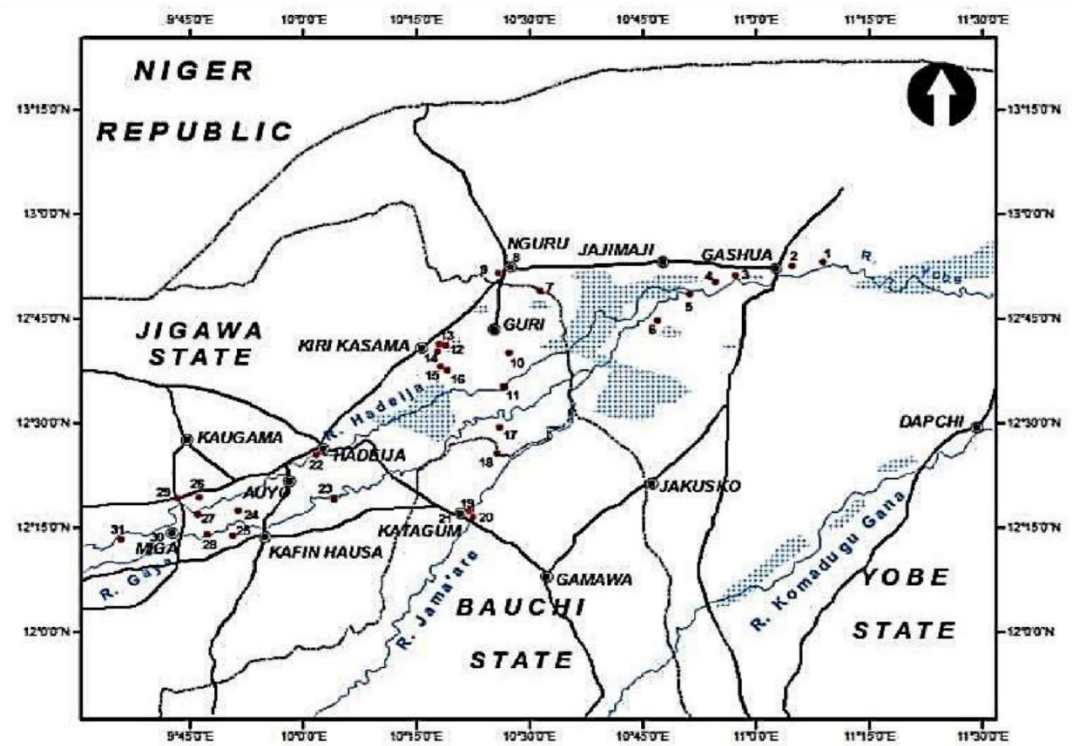


Figure 2: Legend Map of HNWs
Sources: GIS University of Maiduguri (2021)



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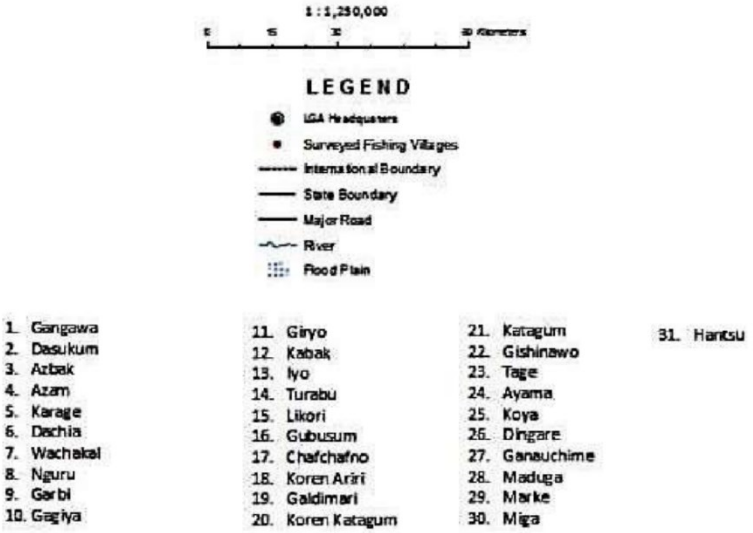

Figure 3: Map showing the extracted coordinate location of the study sites
Sources: GIS University of Maiduguri (2021)

The ecosystem comprises permanent lakes and seasonally flooded pools connected by a network of channels. The ecosystem is an important site for biodiversity, especially migratory water birds from Palearctic regions (Abubakar *et al.,* 2016). For example, at one time, the floodplain supports over 423,000 birds of 68 species, including significant numbers of Ferruginous Duck (*Aythyanyroca*), Spur-winged Goose (*Plectropterus gambiensis*), Black-tailed Godwit (*Limosalimosa*), and Ruff (*Philomachu spugnax*) (Birdlife International, 2010). Other wildlife species found include species of gazelle (*Gazella spp.*), duiker (*Cephalophus* spp.), jackal (*Canis spp*) and hyena (*Crocuta crocuta*) (Ogunkoya and Dami, 2007). In total, there are about 378 bird species listed for the wetland, 103 fish species, 250 species of flowering plants and more than 136 species of aquatic flora and fauna (Oduntan *et al*., 2010).

Population

The HNWs is the first Nigeria wetland to be named a RAMSAR site (RAMSAR, 1994). The people in the area depend on this wetland for water supply and other daily activities. Hausa, Kanuri, Fulani and Bade are the most dominant tribes in the wetlands where Hadeja has a population of 139,400 among which 54.6% are male and 46.4% are female (National Bureau of Statistics, 2016) the population including farmers, herders and fishermen who entirely depend on the ecosystem for their livelihoods (Kaugama and Ahmed, 2014; Birdlife international, 2015). The wetlands provide essential income and nutrition benefits in the form of agriculture, grazing resources, Non-Timber Forest Products, fuel wood and fishing (RAMSAR, 2007).

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Fishermen and farmers in the HNWs represent about 75% of the indigenous community population (Birdlife International, 2015), and the wetlands represent their entire source of livelihood through farming and fishing activities. Farming in particular accounts for about 25%, and major crops grown include rice, maize, sesame, sorghum, Wheat, millet, and some vegetables such as tomato, pepper, onions, and carrot (Ogunkoya and Dami, 2007; Kaugama and Ahmed, 2014 and Birdlife International, 2015). The financial benefits of major agricultural outputs in the wetlands have been estimated at US$ 75 million, while the cattle trade annually contributes about US$ 5 million (Eaton and Sarch, 1997).

Geology, Topography and Soil

Permeable sedimentary rocks of the Chad formation underlie this natural wetland, but a film of impervious layers has been formed at the bottom of the water body through successive years of clay deposition. This has significantly impeded percolation (Emmanuel, 2019). A monotonous low-lying plain that gently slopes northeastwards towards Lake Chad characterizes the relief around the site. River flow is highly seasonal and varies considerably depending on rainfall and run-off. Peak flow occurs between August and September when banks overflow and the area is inundated. The river regime in the area has however been affected by river regulation that peak discharge in the wetland is now in September-October (Emmanuel, 2019).

Drainage

Hydrology of the Hadeja-Nguru Wetlands The hydrological genealogy of the Hadeja-Nguru Wetlands sustains water from rainfall and runoff supplements from the wet season and is later depleted by other hydrological output like infiltration to underground, soil moisture recharge and evaporation (RAMSAR, 2007).

Climate

The Hadeja-Nguru wetland, it has a semi-arid climate influenced by the strong convection storm of the Inter-Tropical Convergence Zone (ITCZ). The climate of the wetland is characterized by two distinct seasons; wet season (May- September) and dry season (October-April), The rainfall period is from June to October and has an annual mean of over 1,000mm in the upstream Basement complex area and approximately 500mm. (Sanyu, 1994). The dry season normally sets in October and remains until late May. The temperature recorded in the dry season ranges between 35°C and 40°C. Significant water flows to the wetlands begin in late June or early July with peak discharges in August. Occasionally there may be a mean minimum temperature of 12°C from the month of December to January, (Ogunkoya and Dami, 2007).

Study Design

Evaluation of livelihood sustenance practices of inhabitants of the study area

The qualitative tools used to elicit information from the respondents were structured questionnaires, Focus Group Discussions (FGDs), In-depth Interviews (IDIs) with key

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informants (community leaders) as well as field notes and direct observations were employed to collect data on the socio-economic characteristics, activities of the respondents, changes in livelihood sustenance and changes availability of NTFPs.

The study adopted a simple random sampling technique which was used to select 400 respondents from age 40 years and above constituting of: farmers, fishermen, pastoralist, civil servants, and traders were randomly sampled (Table 1). The distribution of the sample size according to communities as selected was by use of Cochran (1977) allocation techniques as adapted by Kwaga *et al.* (2019) formula is as follows;

$$n_h = N_h \times \frac{n}{N}$$

Where:

n_h = number of questionnaires administered in each community
N_h = estimated population of the people in each community
n = total number of questionnaires administered*
N = total number of people in all the communities

Table 1: Administration of questionnaires Using Cochran formula

S/No	Name of Location	Population	Sample Size	Percentage
1	Gangawa	57	17	4.25
2	Dasumkum	53	11	2.75
3	Azbak	56	16	4
4	Karage	53	12	3
5	Dechia	53	11	2.75
6	Wachakal	53	12	3
7	Ngum	54	14	3.5
8	Garbi	48	9	2.25
9	Gagiya	57	18	4.5
10	Giya	54	13	3.25
11	Kabak	54	15	3.75
12	Iyo	54	14	3.5
13	Turabutu	56	16	4
14	Likari	48	10	2.5
15	Gubusum	54	14	3.5
16	Chalchafno	56	16	4
17	Moren Ariri	57	17	4.25
18	Gaidimari	54	15	3.75
19	Karen katagum	53	12	3

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20	Katagum	54	14	3.5
21	Hyama	56	16	4
22	Koyo	54	13	3.25
23	Dingare	54	13	3.25
24	Gananchima	53	11	2.75
25	Maduga	54	14	3.5
26	Marka	48	8	2
27	Mira	48	9	2.25
28	Taga	35	5	1.25
29	Nguru	110	30	7.5
30	Azam	35	5	1.25
Total			400	100

Sources: Field Survey (2022)

Data Analysis

Evaluation of livelihood sustenance practices of inhabitants of the study area

Socio-economic characteristics data were analyzed using Descriptive Statistics (table and percentages).

RESULTS

Livelihood Sustenance Practices of Inhabitants of the Study Area

Socioeconomic characteristics considered for this study were gender composition, age distribution, marital status, household size, educational background, household income and occupational status (Table 4).

A total of 400 copies of questionnaires were administered to the participating households, out of these number, 313 (78.25%) were male while 87 (21.75%) were female. This is because, usually men are involved in the collection of resources and related activities more, than women. Most of the respondents (36%) were aged between 40 to 45 years followed by age bracket of 45 to 50 with (23.75 %) representing active part of the population, engaged in farming. In terms of marital status, most of the respondents (68.0%) were married, followed by singles including widows (32 %). This shows that, married men are more conscious of the need to provide better livelihood so that they could meet their family needs. The level of education of the respondents indicated that primary education had 138 (34.5%) followed by those with secondary school certificate 106 (26.5%) whereas tertiary education certificate holders and informal education had 71(17.75%) respectively. This implies that the respondent's level of education could Influence their livelihood activities or potentials in the forest zone on their Socio-economic status which could be used to boost production.

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The trends in parts of occupation of the respondent in the study area indicates a disposition of majority of the respondents (58.75%) in different sector of occupational wellbeing with majority also farming 1-3 hectares (36.5%) however the trend reversed when the effect of climate change became more pronounced. Majority of the respondents opined that farming recorded highest number in the present dispensation with about (59%) of the respondents in it and 10 and above hectares of land cultivated. This also translate to indicate more farm land hectares were cultivated presently than the previous hectare with only (36.5%). Results of household sizes in the study area were in the following ranges: 7-9 (51.75%), 4-6 (20.5%), 1-3 (18%) while 10-12 was 9.75%. About 36.5% of the respondents had income between ₦ 1,000.000, 00 and ₦ 1,500,000.00 as the highest. The overall annual income of household's members recorded previously was also between ₦ 50,000. 00 and ₦ 100, 000. 00 (36.5%) in previous years but presently there was change in occupational status in to farming which is believed to be linked with less dependence on the sustenance of resources as a result of changing climatic variables.

Table 4: Socio-economic Characteristics of the Respondents

Variables	Frequency	Percentage
Gender		
Male	313	78.25
Female	87	21.75
Total	400	100
Marital status		
Married	272	68
Single	128	32
Total	400	100
Past Occupational status		
Agric/farming	61	15.25
Artisan	24	6
Trading	50	12.5
Government worker/civil servant	30	7.5
Others	235	58.75
Total	**400**	**100**
Present Occupational status		
Agric/farming	236	59
Artisan	48	12
Trading	40	10
Government worker/civil servant	51	12.75
Others	25	6.25

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Total	**400**	**100**
Age class		
40 – 45	144	36
45 – 50	95	23.75
50 – 55	70	17.5
55 – 60	51	12.75
60 - 65	21	5.25
65 – 70	19	4.75
Total	**400**	**100**

Variables	Frequency	Percentage
Literacy level		
Tertiary education	71	17.75
Secondary education	106	26.5
Primary education	138	34.5
Informal education	85	21.25
Total	**400**	**100**
Family size		
1 – 3	72	18
4 – 6	82	20.5
7 – 9	207	51.75
10 – 12	39	9.75
Total	**400**	**100**
Previous household annual income (Yearly ₦)		
50,000 – 100,000	146	36.5
110, 000 – 200,000	106	26.5
250,000 – 500,000	43	10.75
1,000,000 – and above	19	4.75
Total	**400**	**100**
Present household annual income (Yearly ₦)		
100,000 – 300,000	23	5.75
400, 000 – 600,000	50	12.5
700,000 – 900,000	98	24.5
1,000,000 – 1,500,000	146	36.5
1,600,000 and above	25	6.25
Total	**400**	**100**

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Variables	Frequency	Percentage
Previous household hectares farmed		
1 -3	146	36.5
4 – 6	98	24.5
7 – 9	50	12.5
10 – above	23	5.75
Total	**400**	**100**
Present hectares farming		
1 -3	20	5
4 – 6	27	6.75
7 – 9	117	29.25
10 – above	236	59
Total	**400**	**100**

Sauces: Field Survey (2022)

The prior household's annual income of the respondents indicated that 146 (36.5%) individuals earned between ₦ 50,000.00 and 100,000.00 followed by those who earned between ₦ 110,000.00 and 300,000.00 who were 106 (26.5%) whereas, individuals who earned between ₦ 250,000.00 and 500,000.00 were 43 (10.75%) and those who earned from ₦ 1,000,000.00 and above had 19 (4.75%). The present-day households annual income of the respondents indicated that 146 (36.5%) individuals earned between ₦ 1,000,000.00 and 1,500,000.00 followed by those who earned between ₦ 700,000.00 and 900,000.00 who were 98 (24.5%), individuals who earned between ₦ 400,000.00 and 600,000.00 were 50 (12.5%), individuals who earned between ₦ 100,000.00 and 300,000.00 were 23 (5.75%) and those who earned from ₦ 1,600,000.00 and above had 25 (6.25%).

Findings on the prior number of hectares in cultivation by respondents showed that 1-3 hectares was cultivated by 146 (36.5%) respondents, 4-6 hectare by 98 (24.5%), 7-9 hectares by 50 (12.5%) while 10 and above hectares was cultivated by 23 (5.75%). The existing number of hectares in cultivation by respondents showed that 1-3 hectares was cultivated by 20 (5%) respondents, 4-6 hectare by 27 (6.75%), 7-9 hectares by 117 (29.25%) while 10 and above hectares was cultivated by 236 (59%).

Table 5 NTFPs from Hadeja Nguru wetland and their uses

Scientific name	Family	Hausa name	Products	Uses
Momordica balsa mina		Garahuni	Leaves &fruits	Food and medicine
Sesbaina sesban	Fabaceae	Gasiya	Leaves	Food

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Hibiscus spp	Malvaceae	Yakuwa	Leaves	Food
Cassia sora	Lauraceae	Tafsa	Leaves	Food
Ceratathera sesamoides	Pedaliaceae Le		Leaves	Food
Adansonia digitata	Bombacaceae	kuka	Fruit Leaves	Food and medicine
Acacia Senegal	Leguminocae	Dakora	Gum(grade1)	Medicine
Acacia seyal	Leguminocae	Farin kaya	Gum(grade2)	Medicine
Tamarindus indica	Leguminocae	Tsamiya	Fruit Leaves	Drinks, medicine
Pilostigma spp	Leguminocae	kargo	Leaves	Medicine
Acacia nilotica	Leguminocae	Gabaruwa	Fruit	Medicine Tanning
Balanites aegyptiaca	Balanitaceae	Aduwa	Fruit Leaves	Food medicine
Ximenia Americana	Olacaceae	Sada	Leaves, roots	Fruits Food medicine
Boscia senegalensis	Capparidaceae		Fruits, seeds	Food
Ziziphus spina Christi	Ramnaceae	Kurna	Food, leaves, Bark,	Food, medicine
Ziziphus Mauritania	Ramnaceae	magarya	food, leaves, Bark,	Food, medicine
Annona senegalensis	Annonaceae	Gondan daji	Fruits, roots, leaves,	Food, medicine
Detarrium senegalensis	Caesalpinioideae	Taura	Fruits ,leaves	Food, medicine
Vitex doniana	Verbenaceae	Dinya	Fruits, barks	Food, medicine
Celtis integrifolia	Ulmaceae		Leaves, Food,	Medicine
Parkia oliveri	Mimosoideae	Toso	Fruits Food	Medicine
Diospyros mespiliformis	Ebenaceae	Burrum	Fruits Food	
Courbonia spp	Capparadaceae			
Nymphaea lotus	Nymphaeceae		Tuber Food	
Dioscorea spp	Diocoreaceae	Doyan daji	Tuber Food	
Ampelocissus spp	Euphorbiaceae	Rogon daji	Tuber Food	

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Oryza barthii	Gramineae	Shankafan daji	Cereals Food	
Digitaria exilis Anum	Gramineae	Acharya	Cereals Food	Medicine
Anogeisus leiocarpus	Combretaceae	Marke	Leaves, bark, root Fodder,	Medicine

Source: Field survey, (2022)

DISCUSSION

Livelihood Sustenance Practices of Inhabitants of the Study Area

The socio-economic survey of the communities along the HNWs revealed that more than 20 communities existed previously (respondent personal communication) but at present 30 communities were identified along the HNWs some of the settlers in the area are migrants (Respondents' Personal Communication, 2020). Fishing along the wetland was the main attraction that influenced most of the settlements. Later, farming and pastoralism become major means of livelihoods. Farming became the major occupation after some years.

The dominance of youths (36%) in the population has a negative implication on the resources of the wetland. This is because the youths are the most active group in the demography of the communities and are involved in vigorously agricultural activity, cutting and processing of the woody plants for both fuel wood and timber. They are also the most active in terms of hunting and fishing. Therefore, deforestation and increase extraction of vegetation resources along the wetland area may not be distinct with the great number of active people among the population of the local dwellers. This finding agrees with the report of Cormac (2009) and Kabir, (2019) in their separate studies on the interaction between population growth and deforestation and Evaluation of Biodiversity Status and the Supporting Systems in Relation to Socio-Economic Characteristics in Lakeshore Communities of Kainji Lake National Park, Nigeria respectively. This also implies that there is high tendency of anti-conservation activities of growing population which has led to deforestation and unsustainable resources utilization leading to agricultural land expansion.

Due to the influence of the Islamic traditions most of the respondent were males. The characteristic nature of the subsistence farming in the study area has it support and this has led to finding alternative means of livelihoods and has tremendous influence on social arrangements and family activities. This observation is in agreement with the findings of Lambin *et al*. (2003) and Kabir, (2019) in their separate studies in the sub-Saharan countries of Africa. Majority (78.25%) of the respondents were males. This may perhaps be attributed to Islamic beliefs that restrict the movement of women outside their homes in the study area which may have translated to adoption of alternative means of livelihood by the women.

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The high incidence of low level of education among the population influences the adoption of livelihood sources. Majority of them are into vocations such as farming (involving the primitive type), fishing, fuel wood harvesting, logging, NTFPs collection, pastoralism and hunting which traditionally do not require higher level of education to adopt. The effect of farming in the lakeshore area is exacerbated by the methods used, which is shifting cultivation, a primordial driver of deforestation. Therefore, it is not unexpected that the educational status of the population of local dwellers might have contributed significantly to the drastic deforestation of the wetland vegetation due to lack of basic knowledge of conservation practice. These findings and observations are in line with the report of Aigbe and Oluko, (2012), which observed that 80% of annual deforestation in Nigeria is accounted for by farming. Provision of education to communities has the tendencies of changing illiterate communities into literate ones with the attendant benefit of developing better entrepreneurial skills for sustenance of livelihood schemes (Bologo, 2004 and Paré, 2008).

The findings of this study on previous and present occupations of the local dwellers in the wetland area validates the annotations on the educational status of the local population. Majority of the respondents affirmed that they were previously into activities such as; NTFPs collection and pastoralism with cultivation of few hectares of land (1-3 hectares) but have now adopted arable crop production as there sole occupation with the cultivation of larger hectares of land. This finding therefore lends credence to the observations that farming could be the primordial agent to habitat destruction of the wetlands. This is expected to worsen as time goes on and eventually lead to extinction of resources in the wetland (Ikusemoran and Ezekiel, 2011)

The incidence of farming activities at present along the wetland area also corroborates with the finding of the size and land cultivated by the respondents as compared to previous farm sizes. This is an indication that farming in the area is below the level of subsistence. This implies that a good proportion of the farm produce is sold for money and the proceeds used to acquire improved farm inputs which results into increased crop yields. The multiplier effects of these findings include deforestation, exposure of the soil to erosion, and increased run offs laden with silts and chemicals that silt up stream channels and pollute water bodies. The consequences are reduced vegetation cover, increase in the bare surfaces, reduction in sizes of water bodies and total siltation of stream channels (Ikusemoran and Ezekiel, 2011)

The range of income of majority of the local dwellers is below poverty level of $1 per day. This is an indication that their major occupations of farming are still below the subsistence level and could be the major drive behind the expansion of the agricultural land areas and increase in other activities that are detrimental to resources loss in the wetland communities.

Conclusion

Both natural and human activities are known to modify the natural environment, and HNWs is not an exception. The communities in the wetlands depend largely on the natural

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resources for their livelihood and survival. These natural resources have been significantly altered and continue to deplete due to unsustainable practices and over population. The natural resource scarcity that resulted from environmental changes have had severe impacts on communities through loss of biodiversity, soil productivity and accelerated environmental degradation thereby increasing vulnerability and reducing livelihood options. This hardship imposed led to a number of adjustments by individuals and communities to continue making out a living within the same environment. However, the current community level of adaptation measures may not be sufficient to meet the challenges of the current environmental change particularly in the face of climate change. It is therefore very important to improve the understanding of local populations and communities on the prevailing changes in their immediate environment because the behavior of the climatic factors such as, humidity, precipitation, and temperature, over the study period and the test of the relationship of climatic factors on vegetation cover as represented by the land use changes showed that there is an interwoven relationship among all the factors. The increased temperature had the strongest impact amongst other climatic factors that the research examined on the deterioration of the vegetation cover, wind speed decreased steadily as observed during study periods. Based on the findings of this study, it is clear that the HNWs area supports households' livelihoods through the provision of various resources.

Recommendation

Based on the findings of the study the following are some of the recommendations

i. Therefore, measures to provide alternative means of livelihood is crucial.
ii. There is need to put in place right policies to protect and preserve wetland to enhance its sustainability and resilience to climatic changes and variability.
iii. Generally, in order to minimize the hardship and poverty level there is need to have regular government intervention in sustainable managements of our forest resources.

Contribution to Knowledge

This study has provided new and additional information in the following areas:
That there is a shift in the occupational status of the people within the HNWs communities as observed. Because in the previous year's more people were involved in other resources extraction but as result of the impact/effect on the NTFPs, rural dwellers shifted more towards farming and extraction as occupation.

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