An Investigation of the Impacts of Forest Water Resources Exploitation on the Livelihood of Rural Households and their Intensity of Utilization in Benue State, Nigeria

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Abstract: **- The study was conducted to assess the forest water sources utilized and the intensity of utilization by the rural households in Benue State, Nigeria. The study was achieved through the use of well-structured interview schedule purposively administered to 300 eligible respondents in the study area. The study revealed that streams (68.0%) and rivers (66.7) were identified as the major sources of forest water resources very highly utilized (56.0%) for human use and crops irrigation (50.0%) during the dry season by the rural households. The study concluded that the identified water sources streams and rivers played a major role in improving the livelihood of the rural households in the study area. It was recommended that government should build irrigation dams in the study area for dry season farming to improve farm production; more efforts should intensified by government, private organization and individuals to drill bore holes and wells in the study area for human consumption and other domestic purposes, the forests should be protected against unsustainable exploitation by members of the community and outsiders through the setting up of community forest guards, this will help preserve the water sources.**

Key words**- water sources, exploitation, households, intensity, forest**

I. INTRODUCTION

It has long been appreciated that forests offer numerous sources of water to neighboring communities where benefits are derived from these in different ways (Madsen, 2011). The sources of forest water are streams, natural ponds, rivers, springs and dug wells. In developing countries, like Nigeria, forest water requirements of rural households for consumption, fed to livestock and for irrigation purposes especially in the dry seasons when water becomes scarce (Richard *et al,* 2010). Amulya (2011) in a similar view upheld that forest resources from stream, rivers, ponds, springs and dug wells usually serve as the sources of water for human consumption, livestock consumption, irrigation purposes and some sources are used as sacred water for spiritual healing in most rural communities. Wunder (2013) stressed that apart from the consumption of forest water resources by rural households for domestic consumption by human beings, fed to livestock, irrigation purposes and for curing some illnesses this as well contribute to the income and general well-being of the rural households globally.

The main objective of the study was to assess the forest water resources exploited and their intensity of utilization by rural households in Benue State, Nigeria. Specifically, the study was designed to:

i. identify various forest water resources exploited by rural households; and
ii. examine the intensity of utilization of forest water resources exploited by the rural households.

II. METHODOLOGY

The study was carried out in Benue State. The State was created in 1976 with Makurdi as the State capital. It is found in the middle belt region of Nigeria, approximately located between longitude 7° 47′ and 10° 0′ East of the Greenwich Meridian and Latitude 6° 25′ and 8° 8′ North of the equator. Benue has a population of 4,253,641 according to 2006 population census and is placed ninth as the most populous state in Nigeria.The State has a total land area of about 30,995 square kilometres.The State shares boundary with five states: Nassarawa to the North, Taraba to the East, Enugu to the South west, Cross River to the South east and Kogi also to the south west. The south eastern part of the state shares boundary with the Republic of Cameroon. It is bordered to the North by 280km of River Benue, second largest river in Nigeria, which the state derived its name. The state is also traversed by 202km of River Katsina-Ala in the in-land area with its catchment area from Cameroon.

A three-stage sampling procedure was used for this study. In the first stage, out of 23 LGAs in Benue State, 2 Local Government

Areas (LGAs) from zone A, B and C were purposively selected because of the forest resources availability in such LGAs giving a total of 6 LGAs (Katsina-Ala, Kwande, Makurdi, Tarka, Otukpo, and Okpokwu) covered for the study. During the second stage, 4 communities from each of the 6 LGAs were selected using simple random sampling balloting technique giving a total of 24 communities. During the third stage, 50 households were randomly selected from the 4 communities in each of the 6 LGAs using simple random sampling balloting technique giving a total of 300 respondents for the study.

Data for this study was collected from the households through the use of structured interview schedule to elicit information from rural households. It was subjected to both face and content validity to avoid ambiguity of items as well as to ensure its validity. The interview schedule contained relevant questions on the study. It was pretested in one of each villages sampled for the study, the reliability of the instrument was determined using the split half technique. Secondary information was collected through the review of relevant literatures, maps, pamphlets bulletins, biographies, previous projects, theses, dissertations and materials from internet sources.

Multiple regression model was used to estimate the contribution of each variable to the dependent variable to determine the best variable predictive of livelihood activities by rural households and their effects on the livelihood of rural households in the study area due to forest resources exploitation and utilization activities.

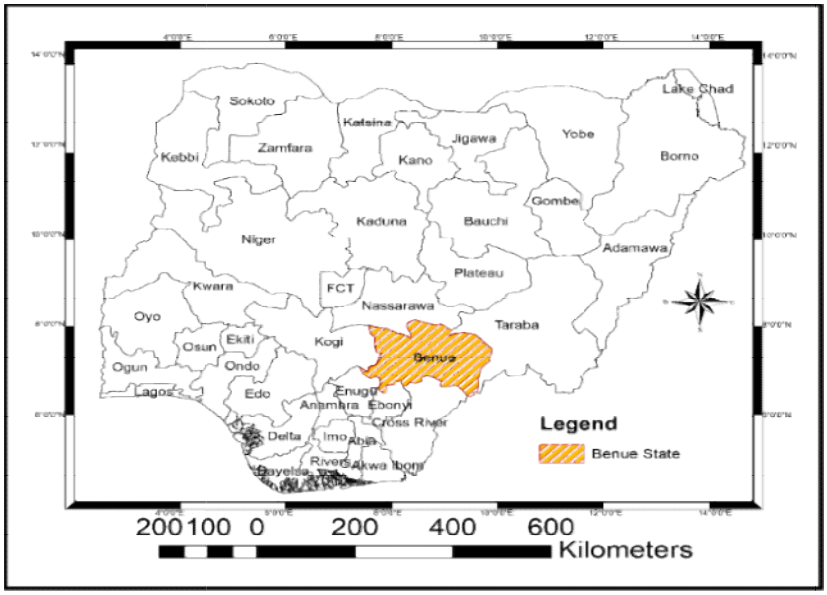


Figure 1: The study area within Nigeria

Source: Produced from GADM Shapefile

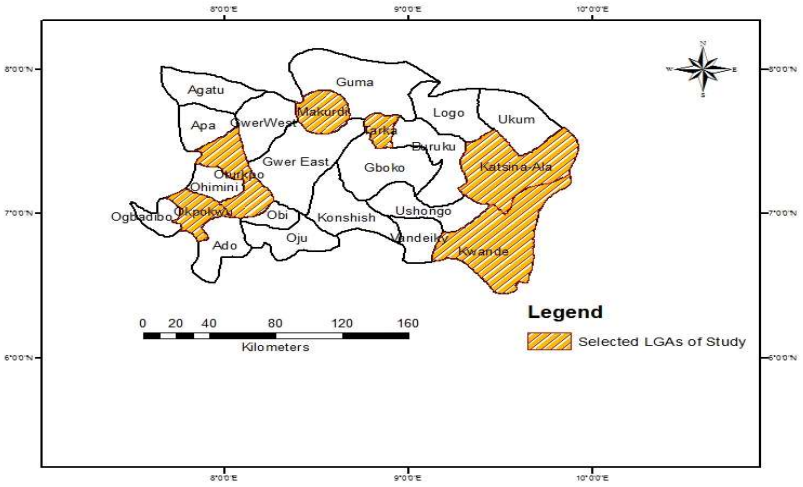


Figure 2: Selected LGAs for the study in Benue State

Source: Produced from GADM Shapefile

III. RESULTS AND DISCUSSIONS

Identified Forest Water Resources

The result on identified forest water resources in Table 1 shows that 68.0% of the water harvested in the forest by the respondents is from streams, 66.7%, 56.7% and 13.3%from natural ponds, rivers and springs respectively. Majority of the respondents (68.0%) utilized water harvested from the forests from streams that run through the forests which hardly dry completely due to the shady environment. This implies that some streams running through the forests serve as water sources utilized by the respondents both during the wet season and dry seasons for domestic uses. Amulya (2011) in a similar view upheld that forest waters from streams running through the forests usually served as good source of water for human consumption, livestock consumption, for irrigation purposes and some forest water sources are used as sacred water for spiritual healing in most rural communities. Richard *et al.* (2010) reported that in developing countries like Nigeria, forest water resources contribute greatly to the domestic water requirement of rural households for consumption, feed to livestock and for irrigation purposes especially in the dry seasons when water is scarce.

Table 1: Distribution of respondents according to the identified forest water resources exploited and utilized

Water resources	**Frequency***	**Percentage**
From streams	204	68.0
From natural ponds	170	56.7
From rivers	200	66.7
From springs	40	13.3
Total	**614**	**204.7**

*Multiple responses

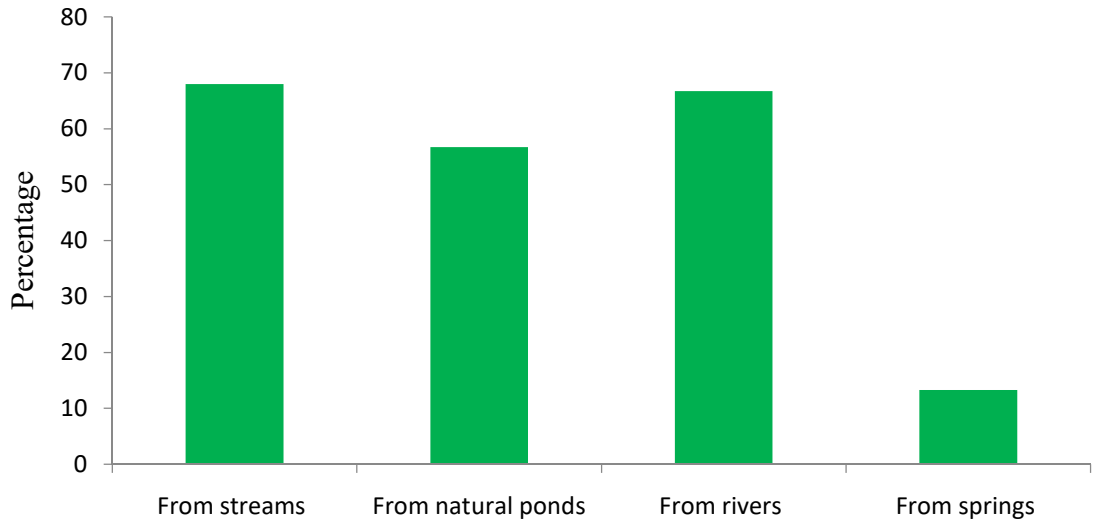


Figure 3: Distribution of respondents according to the identified forest water resource exploited and utilized

Level of Intensity of Utilization of Forest Water Resource by the Rural Households

The result on level of intensity of utilization of forest water resources by the rural households in Table 2 shows that for human consumption majority (50.0%) of the respondents indicated that forest water resource was being utilized on a very highly intensive way and 9.0% indicated that it was low intensively utilized for human consumption. For irrigation purposes majority (50.0%) indicated that forest water was very highly intensively utilized, it was low intensively utilized (12.0%), 45.0% of the respondents indicated that they utilized the forest water to fed the livestock on a very highly intensive way (36.0%) and7.0% low intensively utilized the forest water resource. For level of the use of the forest water for spiritual healing as sacred water, 62.0% lowly intensively utilized the water and 2.0% very highly intensively utilized it.

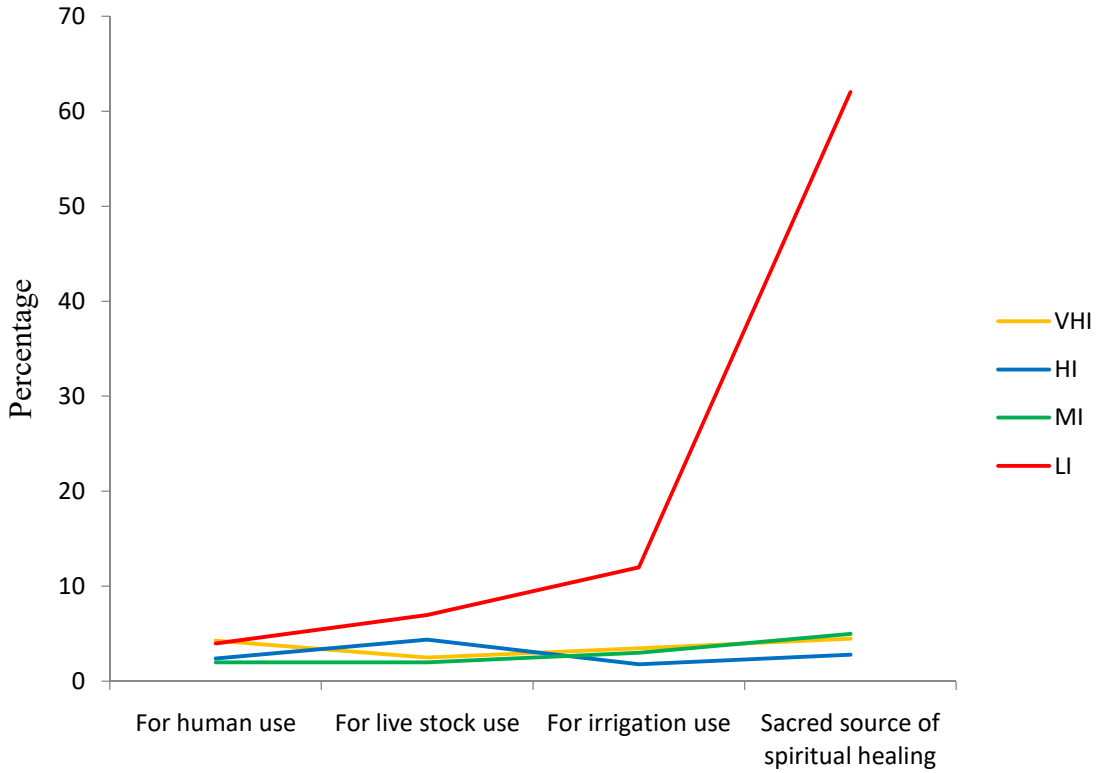
The highest percentage (50.0%) for the respondents who used the water for domestic consumption implies that the forest water is preferred for its cool nature as a result of cooling effect of the forest environment especially during dry season. Also availability of water sources in some forests which hardly dry up could be linked to the shady environment which prevents direct sunlight from reaching the water sources thereby, preventing rapid evaporation. The highest percentage (50.0%) for irrigation purposes signifies that the households in the study area practiced dry season agriculture like planting of vegetables at the fringes of forests both for households' consumption and sale for increased households' income. Wunder (2013) also observed that forest water resources play a significant role in sustaining the rural households especially during the dry seasons for purposes such as: households' consumption, irrigation, fed to livestock and for spiritual healing when the water is deemed sacred for curing some illnesses.

Table 2: Distribution of respondents according to their perception on the intensity of exploitation and utilization of forest water resources

Forest Water Resources Uses	VHI		HI		MI		LI	
	Freq*	%	Freq*	%	Freq*	%	Freq*	%
Human use	168	56.0	90	30.0	30	10.0	12	4.0
Livestock use	135	45.0	108	36.0	36	12.0	21	7.0
Irrigation use	150	50.0	75	25.0	39	13.0	36	12.0
Spiritual healing	6	2.0	24	8.0	84	28.0	186	62.0

*Multiple responses

NB:VHI=Very highly intensive; HI= Highly intensive; MI= Moderately intensive and LI= Low intensity



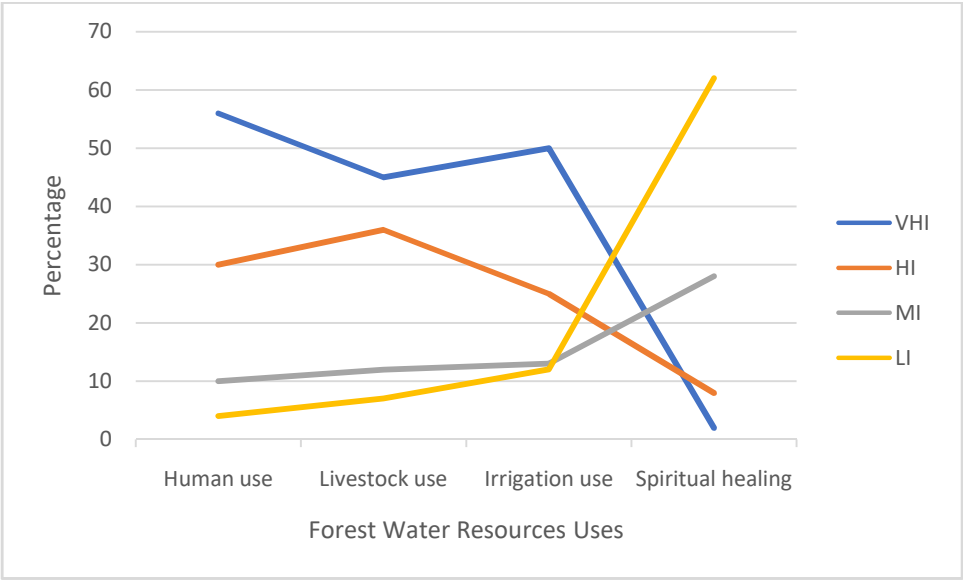


Figure 4: Distribution of respondents according to their perception on the intensity of exploitation and use of forest water resources

IV. CONCLUSION AND RECOMMENDATION

The study concluded that streams and rivers were the forest water resources identified to be the most intensively utilized sources in the study area. It was recommended that: government should build dams for irrigation to boost dry season irrigation farming in the study area; boreholes, wells should be drilled in the study area by government and private organizations for human consumption and other domestic uses; community efforts should be made to set up forest guards among members of the community to protect the forest from unsustainable exploitation for enhance preservation of the forest water resources.

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