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A Review on Fuel Wood Consumption and Implications on the Environment

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Natural asset consumption is basically brought about by an unrestrained populace development, especially in non-industrial countries, as well as by a requirement for and battle for endurance as well as a craving for more noteworthy solace, especially in Nigeria. One of Nigeria's over-utilized environmental resources is vegetation, particularly trees, without adequate replacement.

Notwithstanding food, water, and air, energy is the most fundamental asset for human endurance. To fulfill various domestic, commercial, and industrial obligations, it is necessary. Fuel wood is the most common form of energy in Nigeria, and it is used for cooking in approximately 70% of homes. The excessive use of fuel wood jeopardizes the natural environment. It makes the desert grow bigger, makes soil erosion happen faster, and makes the soil less fertile. Preserving the environment as a whole that serves a variety of human needs is essential if we are to meet our goals of ensuring sustainable development.

This project also demonstrates that fuel wood supplies energy to over 60% of Nigerians and meets 80% of domestic energy needs. Again, the majority of Nigerians use fuel wood to meet their

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domestic energy needs due to the high level of poverty, inadequate infrastructure, and limited fossil fuel supply to some regions (the north) as well as the lack of political will to address the country's energy challenges.
In conclusion, this project examines a number of studies on "Fuel wood consumption in Nigeria" and recommends using electricity, gas, kerosene, and LPG for household needs to preserve ground water, biodiversity, and the country's forest resources.

Keywords: Fuel Wood Consumption; deforestation; forest resources utilization; energy consumption; heat combustion; biomass fuel; fuel wood energy.

1. INTRODUCTION

Any country's financial development, progress, and advancement, as well as the end of neediness and its security, are subject to energy. Having a solid stockpile of energy is fundamental for all countries today. The drawn out accessibility of fuel from sources that are reasonable, available, and agreeable to the climate is essential to the extension of the economy later on. Energy is closely linked to public health, climate change, and security. Energy plays a significant role in all aspects of an economy. The amount of energy consumed per person can have a direct impact on a nation's standard of living. There are two causes for the current global energy crisis: the rapid rise in the standard of living and population of entire societies.

The study area is located on the west coast of Africa in Nigeria, between 4 and 14 degrees north of the Equator and 3 and 15 degrees east of the Greenwich Meridian. Chad and the Republic of Niger lie to its north, Cameroon to its east, the Atlantic Ocean to its south, and Benin to its west.

As of July 2014, there were approximately 178,516,904 people living in Nigeria, a developing nation. which amounts to 2.46 percent of the world's total population. According to World Development Indicators (2014), the total land area of Nigeria is 923.8 square kilometers. The quantity of occupants in metropolitan occupants is around 91million (51%) while that of country tenants is around 87million (49%). According to this demographic structure, it will take a lot of energy to fulfill responsibilities in both the country's urban and rural areas. For the majority of their domestic energy requirements, urban dwellers rely on fossil fuels and conventional energy sources, whereas rural dwellers, whose requirements are typically minimal, heavily rely on renewable sources. However, both urban and rural residents are unable to access sufficient and dependable domestic energy sources due to poverty and other socioeconomic issues.

Nigeria has a wide range of energy sources, including wind, solar, hydro, coal, oil, and gas, among others, that can be utilized. If managed properly, these energy sources will alleviate the nation's energy issues, particularly for domestic consumption.

As indicated by Adetunji [1], a country's energy decision is impacted by its public financial condition, individual pay, mechanical headway, energy framework state, and populace development rate. The primary reason Nigeria's energy sector is not well developed is that the majority of people do not yet have access to energy that is both affordable and dependable.

According to Iwayemi [2], the energy sector in Nigeria is probably one of the most inefficient when it comes to meeting the needs of the population for energy. This really encourages poor citizens to use the available energy source for domestic purposes because other domestic energy sources are rapidly disappearing.

Fuel wood is a typical energy source in country regions that is delivered by consuming wood materials like logs and twigs. More than half of the world's population still relies on it as their primary source of fuel [3-5]. It is seen as in the Woodlands and Savanna Zones of Nigeria.

The majority of people who live in rural areas rely on fuel wood, which is used in a variety of ways and at various levels, either directly or indirectly. However, meeting rural household fuel wood energy needs in the country has become a monumental task due to the enormous amount of wood required. As per Help Memoire (2002), the country networks of Nigeria consume an expected 27.5 million kilograms of kindling every day. In an effort to satisfy the demand for fuel wood, the majority of the land has been cleared of all vegetation. Soil openness and

disintegration have happened thus, overburdening the climate and the assets base. Numerous wood assets have been hugely obliterated because of the interest for fuel wood, prompting deforestation and developing desertification in Nigeria and different pieces of sub-Saharan Africa [6,7].

In Nigeria, it is estimated that the use of fuel wood causes the deforestation of 400,000 hectares annually. As per Popoola [8], the nation's backwoods hold has contracted from 10% of the absolute land region in 1970 to only 5% starting around 1999, which is unsettling.

In the northern Nigerian state of Katsina, Aide Memoire [9] claims that farm trees, whose density is decreasing, are the primary source of firewood. In Benue State, the forest reserve's total land area is estimated to be 2%. The federal government's requirement of 20% of each state's total land area for self-sufficiency in forest products and services is far higher than this.

There will be approximately three million cubic meters in Benue State by 2010. All parties involved in the consumption of fuel wood will need to locate alternative fuel sources for energy supply if the environment's quality and energy availability are to be maintained.

Ecological contamination has likewise been exacerbated by the persistent consuming of non-renewable energy sources, fuel wood, and hedge fires (Home, 2003). As indicated by Ancha and Asue (2013), the rising current interest for fuel wood from regular purifiers (trees) without simultaneous recharging is an indication that the backwoods region will quickly vanish, making what is happening considerably more tricky. In the savannah biological zone, which is more delicate than the rainforest, the climate will be unable to help life following a couple of years in the event that no actions are taken to address these dangers.

Table 1 shows the level of consumption of fuel wood for meeting energy needs in Nigeria.

The table shows an expansion in the degree of creation and usage of fuel wood for homegrown and modern purposes. A basic examination of the table shows that somewhere in the range of 1997 and 2006 (a ten-year time span), around 23,787 thousand cubic meter of fuel wood was the negligible expansion in the degree of fuel wood utilization for meeting homegrown energy needs in the country. In addition, the table indicates that the annual consumption of fuel wood for domestic energy purposes has steadily increased by 72.3%. As a result, fuel wood is a significant contributor to the nation's domestic energy requirements.

2. RESULTS AND DISCUSSION

The study "Fuel Wood Consumption and Desertification in Nigeria" (Audu, 2013) discovered that desertification is one of the main effects of using fuel wood in Nigeria. Desertification has taken over the majority of Nigeria's land.

As indicated by Table 2, desertification has obliterated 355, 306 km2 of Nigerian land. The impacted populace expanded by 16, 643, 977 somewhere in the range of 1991 and 2006, coming to 43, 223, 510 at the hour of the 2006

Table 1. Fuel Wood Consumption Pattern in Nigeria (Thousand Cubic Metres)

Year	Total production	Household consumption	Percentage of total production	Industrial consumption
1997	152433	110194	72.3	31069
1998	156500	113134	72.3	31897
1999	156500	113145	72.3	31901
2000	160272	115861	72.3	32666
2001	163959	118526	72.3	33418
2002	167973	121428	72.3	34236
2003	172098	124410	72.3	35077
2004	175884	127147	72.3	35848
2005	179754	129944	72.3	36667
2006	185357	133981	72.3	37789

Source: Energy Statistics Database: United Nations Statistical Division (2008)

Table 2. States Affected by Desertification, Areas (KM^2) and their Populations (pop)

S/No	State	Area km2	1991 pop.	2006 pop	Difference
1	Bauchi	49, 119	4, 351,007	4, 676,465	325, 458
2	Borno	72, 609	2,536,003	4,151,193	1, 615,190
3	Gombe	17, 100	Not available	2,353,879	2,353,879
4	Jigawa	23, 287	2,875,525	4,348,649	1,473,124
5	Kano	20, 280	5,810,470	9,383,682	3,573,212
6	Katsina	23, 561	3,753,133	5,792,578	2,039,445
7	Kebbi	36, 985	2,068,490	3,238,628	1,170,138
8	Sokoto	27, 825	4,470,176	3,696,999	773,177
9	Yobe	46, 609	714,729	2,321,591	1,606,862
10	Zamfara	37, 931	Not Available	3,259,846	3,259,846
	Total	355,306	26,579,533	43,223,510	16,643,977

Source: Adapted from Audu, 2013)

populace statistics. The high pace of fuel wood utilization in the locale, which is contributing by and large to the desertification of the zone since fuel wood is expected consistently for cooking, simmering, baking, blacksmithing, and for warming during harmattan, is represented by the high populace of the district, as well as the high populace increment and the shortfall of a nearby substitute for fuel wood. A few of the factors that contribute to the region's desertification include excessive dryness, dry spells, drought, insufficient rainfall, rising temperatures, decreased transpiration, increased evaporation, low soil nutrients, inadequate pasture, erosion, and flooding. This is resulting in food scarcity, food insecurity, malnutrition, an increase in unemployment, an increase in conflicts between farmers and herders, a lack of surface and underground water, particularly during the dry season, and the migration of birds, domestic animals, jungle animals, and people seeking means of survival. It is also contributing to the depletion of vegetative resources, the depletion of food resources, and malnutrition.

According to Tee and Asue's 2009 study, "Evaluation of Fuel Wood Consumption and Implications for the Environment," group discussions and individual observations made during ecological surveys in the Makurdi region revealed a significant decrease in the number and diversity of species found in the vegetal (tree) cover. Over ninety percent of respondents concur that this decrease was caused by the removal of trees for construction, agricultural, and fuel wood purposes. Subsequently, deforestation and the results that accompany it; desertification, soil breaking down, flooding, drought, and temperature rises were being learned about the district for the past four years and at a subverting rate.

At least 78.3% of respondents stated that many tree species have gone extinct in their immediate surroundings over the past ten years. Over the past five years (2000-2004), more than half of the forest cover in Markurdi's suburbs and surrounding areas has been cleared for the production of fuel wood and timber, according to Jande [10]. The development of consumed blocks and fermenting exercises both outcome in the arrival of smoke or ozone depleting substances (carbon monoxide and carbon dioxide) into the air, the two of which adversely affect the climate.

As per Babanyara and Saleh (2011), who likewise distributed a paper named "Urbanization and Populace Development in Nigeria" in bauchi, the metropolitan interest for fuel wood causes the unpredictable chopping down of trees, basically of wet wood, bringing about deforestation. In Nigeria, deforestation and an absence of fuel wood have been extraordinarily exacerbated by urbanization, street development, industrialization, and the felling of trees for lumber [11].

Deforestation occurs when trees are cut down without discrimination, which can reduce or deplete these renewable resources. Additionally, as urban demand for fuel wood grows, rural residents' efforts to increase their income through wood harvesting for urban fuel wood supply indirectly increase poverty. Desertification is inescapable because of deforestation. The following effects have resulted from deforestation in Nigeria:

Erosion: When trees are cut down, the land becomes degraded and becomes desertified, making it more susceptible to erosion. As per Wikipedia [12], Nigeria is losing 351,000 km2 of its property to desertification and growing toward the south, a circumstance that, on the off chance that not tended to, will place rural creation in danger.

Concerns About the Economy: A diminishing underway would bring about a decrease in the economy of provincial Nigerians and an ascent in the quantity of hungry individuals since horticulture is the essential control of the people who live in the open country and the urban communities depend on the rustic regions for food.

Types of Significant Verdure Go Wiped out: When trees are cut down at random, species of trees that could be used to improve crop variety and increase agricultural yield are lost. Important flora and fauna are wiped out: As a result of a decrease in the flora's population or a loss of habitat, some faunal species may eventually become extinct.

Lack of fuel and wood: Nigeria used 87.587 million cubic meters of fuel wood in 1985. As per Sambo [13], 55 million tons of fuel wood and charcoal were scorched in Obuah [14] ascending to 80 million cubic meters (43.4 x 109 kg) every year for cooking and homegrown purposes. Wet wood cutting is on the rise because there is a direct correlation between human population and demand for fuel wood [15]. Fuel wood is produced at a faster rate than it is consumed in Nigeria. Therefore, it is accurate to assert that this renewable energy source will eventually become scarce if these forms of exploitation continue [16-18].

3. CONCLUSION

Fuel wood is the least expensive energy source in Nigeria because it is easy to find. As a result, it has become the most common fuel for cooking in homes in both rural and some urban centers. Because biomass fuel burning causes pollution, deforestation, and ecological issues, the situation is dangerous.

Alternative energy sources other than fuel wood must be used to provide sufficient domestic energy in Nigeria to maximize energy efficiency and protect forest resources. The nation's various energy resources must be rapidly developed. The issue of climate change must be taken into consideration by ensuring a significant reduction in the volume of carbon dioxide released into the atmosphere through energy production and use. In the country's energy advancement plan, clean energy sources that produce very little to no carbon dioxide ought to be given main concern.

In conclusion, Nigeria's environmental resources, including vegetation, are becoming increasingly depleted. Wood, blossoms, spices, grasses, stems, roots, leaves, and natural products are declining because of trees not being supplanted. To forestall the annihilation of these assets, earnest natural revival, rebuilding, restoration, and assurance are required. Moreover, disequilibrium exists because of the unnecessary extraction of vegetative assets without relating substitution. Regardless of whether this asset were left unharnessed to recover, it would require numerous a very long time for a natural harmony, solidness, or adjust to be laid out. Consequently, the meaning of man's job in reestablishing this asset and the climate can't be questioned. While it is never too late to correct a mistake, it is never too late to take action. Therefore, the time to act is now.

4. RECOMMENDATION

The following suggestions are being considered for Nigeria's fuel wood supply and environmental sustainability.

a) The government must urgently provide inexpensive, dependable, and affordable energy sources like kerosene, electricity, solar energy, and cooking gas to avoid reliance on fuel wood and its associated environmental harm.
b) Providing stoves that use less fuel will encourage people to switch to modern energy and reduce their use of wood in excess.
c) Last but not least, humans rely heavily on trees for a variety of reasons, not the least of which is to maintain environmental equilibrium. Subsequently, they should be safeguarded and moderated for both the present and what's in store. Use protection and conservation techniques that take a local area based, participatory

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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