

# A Review on Fuel Wood Consumption and Implications on the Environment

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## ABSTRACT

Uncontrolled population explosion especially in the developing countries, the need and struggle for survival as well as the quest for more comfort are the major causes of environmental resources depletion in the world with particular reference to Nigeria. One of the environmental resources over exploited in Nigeria without adequate replacement is vegetation particularly trees. Apart from air, water and food, energy is the most important item for human survival. It is essential for meeting various domestic, industrial and commercial obligations. Fuel wood is the dominant source of energy in Nigeria with about 70% of households depending on it as their cooking fuel. Excessive fuel wood consumption jeopardizes the natural environment. It hastens the speed of desert encroachment; escalate soil erosion and causes loss of soil fertility. The environment as a composite asset supplying a variety of services to humanity need to be conserved if we are to achieve our goals of ensuring sustainable development. This project further shows that fuel wood provides energy for more than 60 per cent Nigerians and also responsible for meeting 80 per cent of domestic energy needs. Again, majority of Nigerians adopted fuel wood for meeting domestic energy needs due to the high level of poverty, inadequate infrastructure, low supply of fossil fuel to some regions (northern parts) and lack of political-will to address the country's energy challenges. In conclusion, this project reviews different work that has been done on "Fuel wood consumption in Nigeria" and therefore recommends the use of gas, kerosene, LPG and electricity for domestic needs in order to conserve the nation's forest resources, prevents loss of biodiversity and conserve the ground water.

*Keywords: Fuel, Wood, Environment, Consumption*

## 1. INTRODUCTION

Energy plays the most vital role in the economic growth, progress, and development as well as poverty eradication and security of any nation. Uninterrupted energy supply is vital for all countries today. Future economic growth crucially depends on the long-term availability of energy from sources that are affordable, accessible and environmentally friendly. Security, climate change, and public health are closely interrelated with energy. Energy is an important factor in all the sectors of any country's economy. The standard of living of a given country can be directly related to the per capita energy consumption. The recent world's energy crisis is due to two reasons: the rapid population growth and the increase in the living standard of whole societies.

Nigeria the study area is situated on the west coast of Africa, lying on latitudes 4° and 14° North of the Equator and longitudes 3° and 15° East of the Greenwich Meridian. To the north, it is bordered by the Republic of Niger and Chad, to the east by the Republic of Cameroon, to the south by the Atlantic Ocean and to the West by the Republic of Benin.

Nigeria is a developing country with human population of about 178,516,904 as of July 2014, which is equivalent to 2.46% of the total world population. Nigeria has a total land area of 923.8 square kilometres (World Development Indicators, 2014). The population of urban dwellers is about 91million (51 per cent) while that of rural dwellers is about 87million (49 per cent). The implication of this demographic structure is that large amount of energy will be required for meeting obligations at both the urban and rural areas in the country. The rural dwellers, whose needs are often basic, depend to a large extent on the traditional sources of energy for their domestic energy requirements while the majority of the urban dwellers depend on traditional energy sources and fossil fuels. However, the high level of poverty and other socio-economic problems inhibit both the rural and urban dwellers from having access to adequate and reliable sources of energy for domestic purposes.

In terms of energy availability, there are various ample energy sources in Nigeria such as wind, solar, hydro, coal, oil and gas etc, which if properly managed will alleviate energy problems of the people most especially for domestic consumption. Adetunji (2007) stated that energy option of any country is influenced by national economic condition, individual level of income, technological advancement, the state of energy infrastructure as well as the rate of population growth. The Nigerian energy sector is not well developed based on the fact that despite abundance various energy sources in the country, majority of the people are yet to have access to affordable and reliable energy. Iwayemi (2008) opined that Nigerian energy sector is probably one of the most inefficient in meeting the energy needs of its people. This really encourages poor citizens to make use of available energy source for domestic purpose since other forms of domestic energy are near absence.

Fuel wood is a source of energy derived by burning wood materials like logs and twigs and is common among the rural dwellers. It is a traditional source of energy, which has remained the major source of fuel for over half of the world's population (FAO,1981; Fuwape, 1995; Ogunsanwo & Ajala, 2002). It is found in the Forest and Savanna Zones of Nigeria. Fuel wood is consumed in diverse ways and at different levels, the life of the majority of rural dwellers depends either directly or indirectly on fuel wood. However, meeting rural household fuel wood energy needs in the country has become a herculean task due to the enormous quantity of wood required. Daily consumption of firewood by the rural communities in Nigeria is estimated at 27.5 million kilograms per day (Aide Memo- ire, 2002). In the drive to satisfy fuel wood requirements, most lands have been stripped bare of vegetation cover. This has resulted in soil exposure and erosion thereby placing a heavy burden on the environment and on the resources base. The demand for fuel wood has resulted in massive destruction of many wood resources leading to deforestation and increasing desertification in parts of Nigeria and other parts of sub-Saharan Africa (Barrott, 1972; Adebayo, 2005).

The rate of deforestation in Nigeria due to fuel wood consumption is estimated at 400,000 hectares per annum. (Popoola, 2000) observed that the country's forest reserve which was estimated to be at 10% of the total land area in 1970 has been reduced to just 5% as of 1999, which is alarming. In Katsina state, which is located in Northern Nigeria, it was reported that the major source of firewood is farm trees, whose density is diminishing (Aide Memoire, 2002). In Benue state, the total land area covered by forest reserve is put at 2%. This falls far short of the 20% standard of the total land area set by the federal government for each state as minimum target for self-sufficiency in forest goods and services.

Benue state is placed at about three million cubic metres by the year 2010. By implication, all the stakeholders in fuel wood consumption will have to find alternative sources of fuel for energy supply, if the environmental quality and energy supply are to be sustained. The continuous burning of fossil fuels, fuel wood and bush burning have also contributed to environmental pollution (NEST, 2003). The increasing current demand on the natural purifiers

(trees) for fuel wood without concomitant replenishment is an indication that the forest area will disappear fast, which makes the environmental situation more precarious (Ancha & Asue, 2013). If no measures are put in place to check these threats, the environment might not be able to support life after a few years, particularly in the savannah ecological zone that is more fragile relative to the rainforest.

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

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

<b>Year</b>	<b>Total production</b>	<b>Household consumption</b>	<b>Percentage of total production</b>	<b>Industrial consumption</b>
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)**

The table shows an increase in the level of production and utilization of fuel wood for domestic and industrial purposes. A critical analysis of the table shows that between 1997 and 2006 (a ten-year period), about 23,787 thousand cubic meter of fuel wood was the marginal increase in the level of fuel wood consumption for meeting domestic energy needs in the country. In addition, the table shows a steady percentage increase of 72.3 per cent in the yearly fuel wood consumption for domestic energy purpose. Fuel wood is therefore playing a very significant role in domestic energy needs in the country.

## **2. MATERIAL AND METHODS**

Literature Review

## **3. RESULTS AND DISCUSSION**

Audu (2013) worked on "Fuel Wood Consumption and Desertification in Nigeria" found out that, one of the major consequences of fuel wood utilization in Nigeria is desertification. Most of our land in Nigeria has been over taken by desertification. From table 2, the total land area over taken by desertification in Nigeria is 355, 306 km<sup>2</sup>. The total population involved as at 2006 population census was 43, 223, 510, while between 1991 and 2006, the affected population increased by 16, 643, 977. The high population of the region coupled with the high population increase as well as the absence of a close substitute to fuel wood account for the high rate of fuel wood consumption in the region which is contributing in no small measure to the desertification of the zone as fuel wood is needed on daily basis for cooking, roasting, bakery, black smith and for warming during harmattan. Desertification is also affecting

agriculture in the zone due to over dryness of the environment, dry spells, drought, inadequate rainfall, increasing temperature, reduction in transpiration, increasing evaporation, low soil nutrients, inadequate pasture, erosion and flooding among others. This therefore is contributing to food shortage, food insecurity, malnutrition, depletion of vegetative resources, increasing unemployment, increasing conflicts between farmers and herdsmen, shortage of both surface and underground water especially in dry season as well as the migration of birds, domestic animals, jungle animals and people in search of means of survival.

**Table 2: States Affected by Desertification, Areas (KM<sup>2</sup>) and their Populations (pop)**

S/No	State	Area km <sup>2</sup>	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
	<b>Total</b>	355,306	26,579,533	43,223,510	16,643,977

**Source: Adapted from Audu, 2013)**

Tee and Asue (2009) in their work " Evaluation of Fuel Wood Consumption and Implications on the Environment" The result of the group discussions and personal observations during ecological surveys in makurdi area revealed that, there has been considerable decrease in the vegetal (tree) cover in terms of number and species diversity. Over 90% of the respondents accede to the fact that this decrease was due to removal of trees for fuel wood, construction and agricultural purposes. Consequently, deforestation and its attendant effects; desertification, soil erosion, flooding, drought, and temperature rises were being experienced in the area for the past four years and at a threatening rate. At least 78.3% of the respondents attested that there has been serious disappearance of many tree species within their surroundings in the last 10 years. This finding agrees with that of (Jande, 2005) that over 50% of the forest cover in Markurdi environs and suburbs have been deforested for fuel wood and timber production in the last five years (2000-2004). Other activities that affected the environment negatively were the release of smoke or green-house gases (Carbon monoxide and Carbon dioxide) into the atmosphere from burnt brick production and brewing activities.

Babanyara and Saleh (2011) in bauchi also worked on Urbanization and Population Growth in Nigeria, reported that Urban demand for fuel wood leads to the indiscriminate cutting down of trees, mainly wet wood which in turn leads to deforestation. The combined effects of felling of trees for timber, urbanization, road construction and industrialization have immensely contributed to deforestation and shortage of fuel wood in Nigeria (Nura, 2006).

Rural dwellers in their bid to increase their income through wood harvest for urban fuel wood supply increase their poverty indirectly, the reason is that, indiscriminate cutting down of trees, with regeneration slower than consumption, can cause these renewable resource to reduce or deplete, and this is a process of deforestation and with the increase in urban demand for fuel wood. Deforestation is sure to set in and in turn cause desertification. Impact of deforestation in Nigeria includes the following:

Erosion: When trees are cut down, the land becomes vulnerable to erosion and hence land degradation in the form of desertification. Nigeria is currently loosing 351,000km<sup>2</sup> of its land to desert and is increasing south wards, (Wikipedia 2008) a situation if not checkmated will

put agricultural production in crises.

**Economic Problems:** Since agriculture is the major occupation of rural dwellers and urban centres depends on the rural areas for food, a decline in production means a decline in the economy of rural dwellers and hunger for Nigeria.

**Loss of Valuable Flora Species:** The indiscriminate felling of trees creates loss of valuable tree species which could be used in improving crop variety and increase agricultural yield. **Loss of Valuable Fauna Species:** The reduction or disappearance of the flora (loss of habitat) could sometimes lead to the extinction of some fauna species.

**Fuel Wood Scarcity:** In Nigeria, the total fuel wood consumption in 1985 was 87.587 million cubic metres. Oluwalana (2000) stated that 55million tons of fuel wood and charcoal were burnt, and it increased to 80 million cubic metres (43.4 x 10<sup>9</sup> kg) of fuel wood annually for cooking and domestic uses (Sambo, 2005). According to (Yahaya, 2002), there exists a direct relationship between human population and fuel wood demand, hence the cutting down of wet wood can said to be on the increase. The rate of consumption of fuel wood in Nigeria exceeds the rate of production. It is therefore right to say this renewable source of energy would sooner or later be scarce, should these form of exploitation continues.

#### **4. CONCLUSION**

Fuel wood is the least expensive energy source in Nigeria because it is readily available; it has become the dominant household energy source for cooking in rural areas and in some part of urban centres in Nigeria. There is a dangerous situation because of the pollution, deforestation and ecological problems associated with the biomass fuel burning.

The need to provide adequate domestic energy supply through other energy sources apart from fuel wood is a necessity in the process of achieving efficient energy utilization and protection of forest resources in Nigeria. There is a strong need to develop the various energy resources in the country. The issue of climate change must be taken into consideration by ensuring a great reduction in the volume of carbon dioxide being emitted into the atmosphere through energy generation and utilization. Clean energy sources that emit very low to zero quantity of carbon dioxide into the atmosphere should be given a priority in energy development agenda of the country.

In conclusion, Nigeria's environmental resources are becoming over depleted especially vegetation. Wood, flowers, herbs, grasses, stems, roots, leaves as well as fruits are on the decline due to non-replacement of trees. Therefore, there is an urgent need for environmental resuscitation, restoration, renewal and protection to prevent the extinction of these resources. Also, due to the over extraction of vegetative resource without corresponding replacement, there is the existence of disequilibrium to the extent that even if this resource is left unharnessed to regenerate, it would take many decades for it to regenerate and for an environmental equilibrium, stability or balance to be achieved. It is therefore pertinent that the role of man to revive this resource and the environment is non-debatable. It is never too late to correct an error, but always too late not to take a step. So the time to act is now.

#### **Recommendation**

To ensure fuel wood supply and environmental sustainability in Nigeria, the following suggestions are being proposed for consideration.

(a) Urgent need for government to provide cheap, reliable and affordable sources of energy like kerosene, electricity, solar energy and cooking gas at affordable prices so as to avert the reliance on fuel wood with its related negative effects on the environment.

(b) Provision of modern fuel efficient stoves will encourage people to shift to the modern energy and reduce the excessive usage of fuel wood.

(c) Finally, trees are of immense importance to man, not only in maintaining environmental balance, but also for other uses, hence their preservation and conservation is essential for the present and future needs. Conservation and preservation strategies adopting community participatory approach should be harnessed.

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