POVERTY AND DOMESTIC FUEL CHALLENGES; A THREAT TO GLOBAL DRR CRUSSADE IN NIGERIA

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Abstract.

Nigeria that is crown as the giant of Africa is acclaimed to have one of the world's highest economic growth rates, averaging 7.4% (according to the Nigeria economic report released in July 2014 by the World Bank) yet her over 80 million people (42.4%) are currently living below the poverty line, according to the UN. Instead of eradicating poverty by the year 2030 according to the UN SDG in Nigeria, about 7 people are entering poverty every minute (Oluwale, 2018). The Average kerosene Prices per litre in Nigeria is NGN284.03 and the price of cooking gas per 2.5kg is NGN4000. Charcoal and fuel wood therefore becomes the only alternative domestic power source. In fact, Nigeria currently ranks second to Brazil in the production of charcoal and currently exports 380,000 metric tonnes of charcoal annually. This study uses secondary data and remote sensing GIS to analyse the trends of poverty, charcoal and fuel wood production in the country and the loss of vegetal cover in the western region of the country. The result reveals that there is positive correlation between poverty, fuel wood, charcoal and loss of vegetal cover, and this implies that all Disaster Risk Reduction (DRR) programmes must be intertwine with poverty reduction.

Keywords:, Charcoal, DRR, GIS, Fuel wood, Land Cover, Poverty

Introduction

The application of current global indices to Nigeria in recent times reveals that there has been a persistent increase in poverty levels across the country. According to Oyedepo et al (2018) referencing Insight Nigeria, (2014), the absolute measure of poverty puts the poor in Nigeria at 99.284 million (60.9%); and the dollar per day measure puts it at 99.75 million (61.2%); while the subjective measure of poverty rating puts it at 153.08 million (93.9%). While Ahiuma-Young, (2017) quoting the National Bureau of Statistics (NBS), states that about 112 million Nigerians (67.1%) of the country's total population of 170million live in poverty as global poor hits one billion mark, (Otu et al, 2011).

The current debate on disaster related theory focuses on a better understanding of the complex interplay between society and nature, and rejects one-dimensional or linear cause-effect explanations. Natural hazards are not considered to be the sole cause of an ensuing disastrous situation; hazards must coincide with a vulnerable society in order to trigger a disaster. In these cases, the poverty trap can be described as a downward spiral, ending in a hopeless situation for the affected people (Dams 2002, p. 4). Such scenarios can best be classified as "complex emergencies". A famine, for example, triggered by a drought, is not

only the result of reduced rainfall, but also of armed conflicts, international displacement, or poor governance.

"Vulnerability denotes the inadequate means or ability to protect oneself against the adverse impact of external events on the one hand and on the other to recover quickly from the effects of the natural event. Vulnerability is made up of many political-institutional, economic and socio-cultural factors." (GTZ 2002, p. 47). While resilience refers to the ability of people to cope with and withstand new, changing or unexpected events or situations, for instance by using material, cultural, social or knowledge resources. In general, the notion of resilience focuses on the capacity of systems to absorb external events/stresses without losing their functional characteristics and thereby to maintain "… the capacity to renew and reorganise after disturbances." (Yorque et al. 2002, p. 433).

Poverty in its multiple dimensions has a strong influence on people's vulnerability to disaster, and vice versa. It is important not only to consider the economic aspect of poverty, which is perhaps the most apparent, but also the socio-political dimensions. Deprivation in the political dimension, as an example, can affect not only the economically poor – although there is no doubt that they are affected in the most adverse way – but also the middle class. People in or below this social stratum often lack the political power to enforce their right to adequate construction standards for buildings that can better withstand hazards, even when this is provided for by law. And because of the complex relationship between poverty and vulnerability, disasters typically worsen the poverty situation of these groups, as well as their vulnerability to future risk.

Ironically, poverty translates into environmental mismanagement with human induced disasters in all its forms that make the attainment of the United Nations Sustainable Development Goals (MDGs) a mirage. It has been reported that more than 20 million people in Sub-Saharan Africa are vulnerable to one disaster or the other due to different levels of environmental degradation. The United Nations (2016) confirmed that Yemen, Somalia, South Sudan and Nigeria top the list of countries where the over 20 million people facing the threat of starvation and famine are found. Nigeria in particular may be facing its largest humanitarian crisis as poverty aggravates in the land and well over 2 million persons internally displaced are confronted with extreme hunger. Separate reports from the Central Bank of Nigeria (CBN, 2017), African Development Bank (AFDB, 2017) and World Bank (WB 2017) consistently agree that most of the vulnerable to poverty are in northern Nigeria.

Energy generally is used for cooking, lighting and heating, but giving the various sources of energies to choose from, each household decide on the most affordable, accessible and efficient. The excess consumption of fuel wood and other traditional fuel is at great cost to the community, the economy and the environment. The health hazards to individual during combustion, depletion of community based resources, and the deforestation of the environment that is aggravating the current climate change and its effects, (Fawehinmi and Oyerinde, 2002). This project is therefore of utmost necessity in every disaster discussed.

Aim and objectives

This study seeks to examine poverty level, charcoal production and environmental degradation toward sustainable development and Disaster Risk Reduction in the South-Western region of Nigeria. This is to be achieved through the following objectives:

i. To examine the level of poverty generally in Nigeria,
ii. examine the relationship between poverty and environmental disaster,
iii. examine the accessibility of alternative domestic power supply and charcoal production activities in selected south-western villages of Nigeria,
iv. evaluate the charcoal business and deforestation activities as it relate to DRR in Nigeria and proffer sustainable measures that can be adopted.

The Study area

Oyo State is an inland state in south-western Nigeria, with its capital at Ibadan. It is bounded in the north by Kwara State, in the east by Osun State, in the south by Ogun State and in the west partly by Ogun State and partly by the Republic of Benin, see fig 1. Oyo State covers approximately an area of 28,454 square kilometres and is ranked 14th by size. It was formed in 1976 from Western State, and included Ọsun State, which was split off in 1991. Oyo State is homogenous, mainly inhabited by the Yoruba ethnic group who are primarily agrarian but have a predilection for living in high-density urban centres. Ibadan had been the centre of administration of the old Western Region, Nigeria since the days of British colonial rule. Agriculture is the main occupation of the people of Oyo State. The climate in the state favours the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, palm produce, cashew etc. There are a number of government farm settlements in places like Ipapo, Ilora, Eruwa, Ogbomosho, Iresaadu, Ijaiye, Akufo and Lalupon.

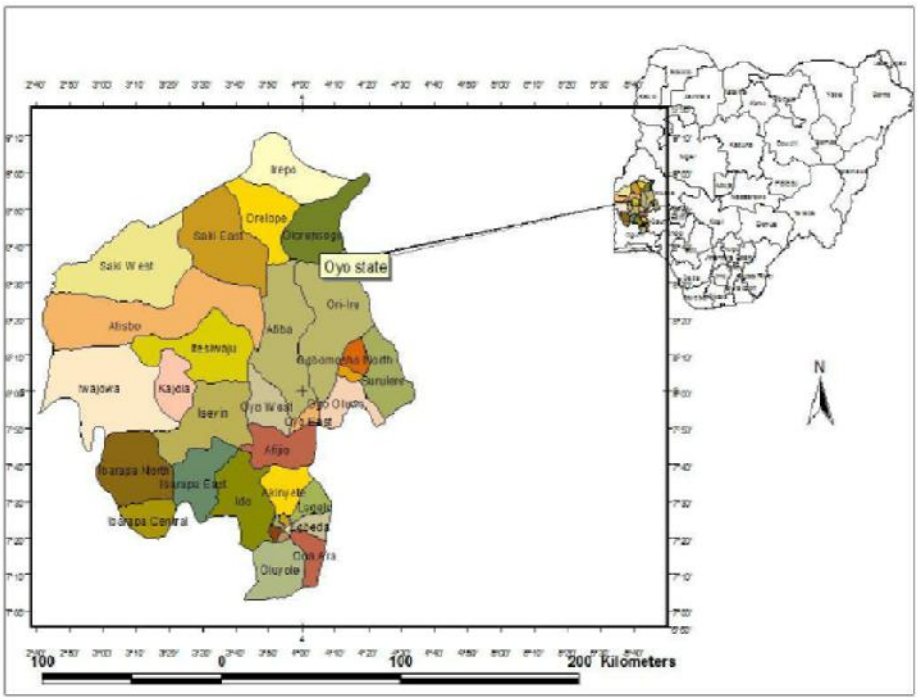

Figure 1. Location Oyo State, Nigeria.
Source: Google Image.

Review of Literature

Poor people's communities and their countries are at much risk of disasters and the consequences of natural hazard than their wealthier nations of the world. Poverty erodes society's self-help capabilities in preventing extreme natural occurrences from turning into a human disaster, (Eschborn, 2005). Rapid population growth and societal poverty often result into the development of endangered settlement areas and the overexploitations of natural resources that exacerbate the risk. Poor knowledge of fatal frequent natural phenomena also prevent people from taking sufficient precautionary measures for their safety. Disaster vulnerability has everything to do with poverty and development, and vice versa." (Wolfensohn and Cherpitel 2002). Disasters triggered by natural events often raise poverty rates in the affected regions and destroy achieved development progress, as illustrated in Fig. 2.

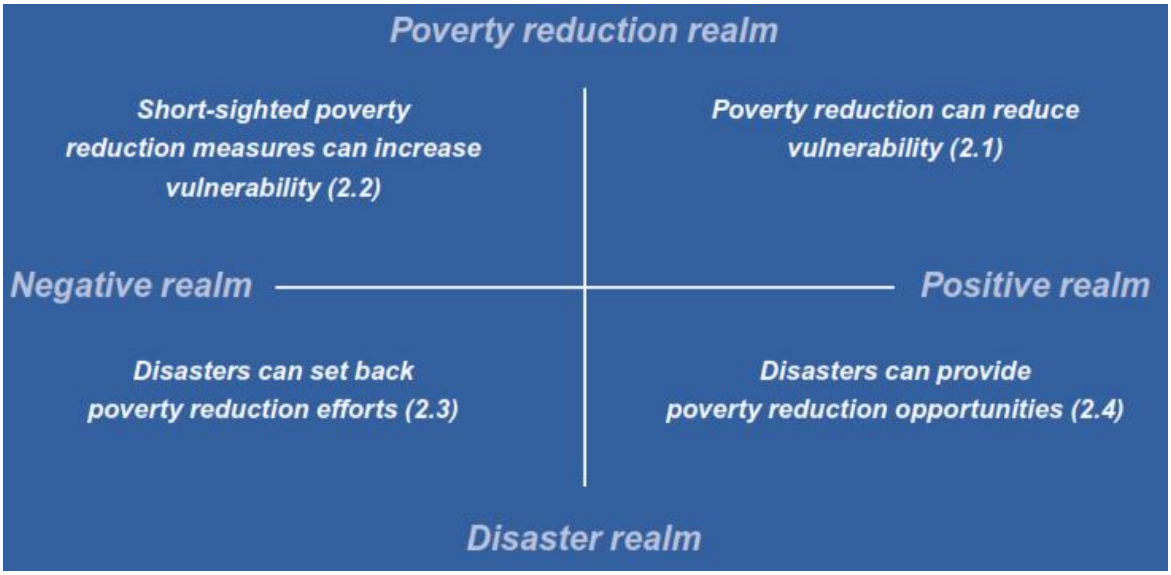

Figure 2– The relationship between poverty and vulnerability to disasters
Source: Adapted from: UNDP 1994, p. 10.

Poverty level in Nigeria

Statistically, over 50% of the world population (about three billion people) are living on less than $2.50 a day. Although Nigeria has one of the world's highest economic growth rates, averaging 7.4% according to the World Bank report (2014), yet over 42.4% of the population (80 million Nigerians) currently live below the poverty line. From every indication, the situation is getting worse than the world projected 2030 or 2050.expectation. It has being opined that by February 2018, Nigeria will overtake India as the country with the highest people in extreme poverty. According to the World Bank standards, living in extreme poverty is living on less than $1.90 (N684) per day. The first item of the 2015 UN Sustainable Development Goals is "to eradicate extreme poverty for all people everywhere by 2030". However to achieve this globally, researchers have projected that 90 people need to leave poverty line every minute to eradicate poverty totally by 2030; and for Africa, 57 people have to leave every minute; while for Nigeria, 12 people have to leave per minute. Ironically and unimaginably for Nigeria, about 7 people are entering extreme poverty every minute.

Poverty in Nigeria is not unconnected to reasons; 1) the nation's population is growing faster than its economy, and by 2050, according to the UN, Nigeria will be third most populous

country in the world after India and China. In fact, the 2018 was to run on deficit, and will be funded by much borrowing with government debts already on the rise according to President Buhari.. 2) The country's recent dwindling oil wealth due to the global oil price reduction affected badly her oil-dependent GDP. 3) The high rate of unemployment and poor business incentives. 4) High level of corruption has also helped in plunging millions in the country into worse poverty as the young ones are now scavenging on waste dump sites, see figure 3.

Figure 3. Nigerian children scavenging at waste dump site (Photo: **Oxfam**)

Domestic power and Utilization of Cooking Gas in Nigeria

One of the major indices of human development is the levels of access to domestic power supply, and the three alternatives are: Cooking gas, Kerosene and the old but persistent fuel wood and charcoal which is not environmental friendly. Nigeria is among the world's top ten (NNPC 2015) countries in terms of natural gas proven reserves (over 180 trillion cubic feet (World Energy Review, 2015), world's top five (Pesaran, Shin, and Smith, 2001.) exporters of liquefied natural gas (LNG) and a major supplier to the West African Gas Pipeline (WAPCo). With the commissioning of the West Africa Gas Pipeline (WAGP) in 2011, the country is yet to fully utilize the Global Gas Flaring Reduction Partnership (GGFR). They provided an exclusive opportunity for "Zero Routine Flaring by 2030 Initiative" by accepting to finance pre-feasibility and feasibility studies for monetization of flare gas at oil production sites that is presently contributing to the Soot problem in Port Harcourt and its Environs, Onolemhemhen et al (2017).

Nigeria commenced exportation of gas to neighbouring Ghana with plans to extend delivery to Benin and Togo as well (Delano, 2014). While at the moment, the domestic gas utilization in the generation of power does not so much encourage effective domestic consumption. Although the federal government has instituted a Domestic Supply Obligation (DSO) aimed at guaranteeing gas availability for domestic use as part of plans of deepening the domestic gas market. The major challenging issue is the affordability of the product where the Average price for the refilling of a 5kg cylinder for Liquefied Petroleum Gas (Cooking Gas) is predictable as it ranges between $6,97 (N2,510) and $4.72 (N1,700) in June 2018. Similarly, average price for the refilling of a 12.5kg cylinder for Liquefied Petroleum Gas (Cooking

Gas) ranges between $11.79 (N4,244) and in Lagos is $10.04 (N3,615) as illustrated in figure 4.

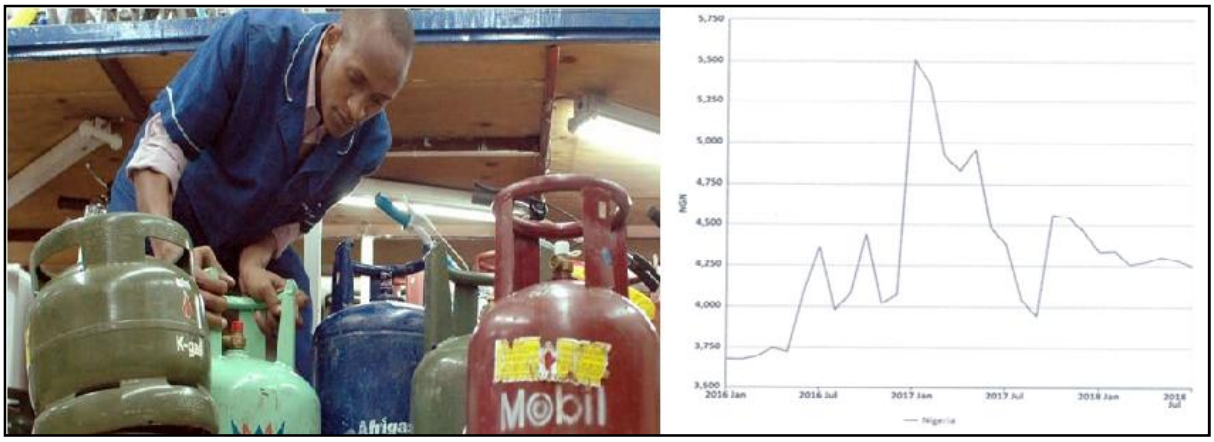

Figure 4. Liquefied Petroleum Gas (Cooking gas) 12.5kg refilling prices
Source: National Bureau of Statistics, Nigeria

Kerosene accessibility in the country

Apart from petrol for vehicles, Kerosene is the most widely utilize in the country as its being used for lighting and cooking in both rural and urban areas. Kerosene is often seen as poor man's fuel but ironically in the Nigeria, is the most priced due to corruption and none concern for the less privileged in the society. Average Nigerian uses kerosene for cooking stove and lantern but the present price is beyond their reach as the price ranges between $0.86 (N310.00) and $0.63 (N227.50) per litre. Similarly, average price per gallon paid by consumers for National Household Kerosene ranges between $2.78 (N1000.19) and Bauchi $2.97 (N1070.00), (National Household Kerosene Price Watch, 2018). This situation has forced millions of Nigerians into the use of fuel wood and charcoal as substitute. This of cause is detrimental to sustainable environment.

Methodology approach of the study

In assessing the impact of charcoal and fuel wood production in the country and the loss of vegetal cover in the western region of the country, the study employed the use of multi-temporal satellite images of 2000, 2005, 2010 and 2018 over the area as detailed in table 1. For the charcoal production process and species of trees, field observations was carried out in some selected villages, while oral interview was also conducted to ascertain the level of production and the associations they belong to for their marketing. Existing poverty baseline value was also used to carry out regression analysis to determine the significant influence of poverty depth on the environmental degradation,

Table 1: Image properties for the years under study

Year	Path and Row	Sensor	Resolution	Date
2000	191/54	ETM^+	30m	06/02/2000
2005	191/54	ETM^+	30m	18/11/2005
2010	191/54	ETM^+	30m	18/12/2010
2018	191/54	ETM^+	30m	19/03/2018

Source: Author's compilation, 2018

On each of the images obtained, the selected Local Government Area was clipped out using the "Submap of raster tool" on the "operation list" of ILWIS 3.3 Academic software. Bands 4,3,2 were used to form the false colour composite for the study, and to calculate the Normalized Difference Vegetation Index (NDVI) of the area, the near infrared band (band 3) and the visible band (band 4) were used to perform this task. NDVI calculation of an area ranges from minus one (-1) to plus one (+1) with 0 representing an approximate value of no vegetation. Values closer to +1 (0.8 - 0.9) shows a significant level of vegetation or possible density of green leaves. This study uses the NDVI formula on ILWIS 3.3 Academic software (NDVI = (NIR - RED) / (NIR+ RED)).

Charcoal production process in the South-west Nigeria

Charcoal is a dark grey residue consisting of Carbon and any remaining ash, produced by the slow process of heating wood and other substances in the absence of oxygen, called Pyrolysis. Charcoal production is best with hardwood species; therefore, the bulk of charcoal wood is harvested from primary and in some cases secondary forest (Brandley, 1991). The logs are covered with grasses/leaves and thereafter, the leaves are covered with earth. The leaves/grasses serve as a lagging material between the logs of wood and the earth covering the entire setup. While covering, a small portion of the heap is left uncovered on any side of the entire setup for the introduction of fire. After lighting the opening is covered and tiny holes are created in various parts of the heap so as to enable the inflow of oxygen for combustion as revealed in figure 5a,b,c,d. Usually hardwood species like Acacia, Mangroves, Oaks and Prosopis are preferred for Charcoal production.

This thermal degradation of biomass results in formation of products of incomplete combustion (PIC) such as CH4, CO2 alkanes, alkenes, oxygenated compound and particulate matter. In the work of Lacaux, et al., (1994), charcoal kiln emission ration of CO, CH4, NMHC, and NH3 to CO2 are larger than those from savannah burning because CO, CH4, NMHC have much higher global warming potential than CO2. Emissions from charcoal production may pose a serious peril to the upper atmosphere. Emissions during charcoal production are significant and contribute heavily to global climate change impact.

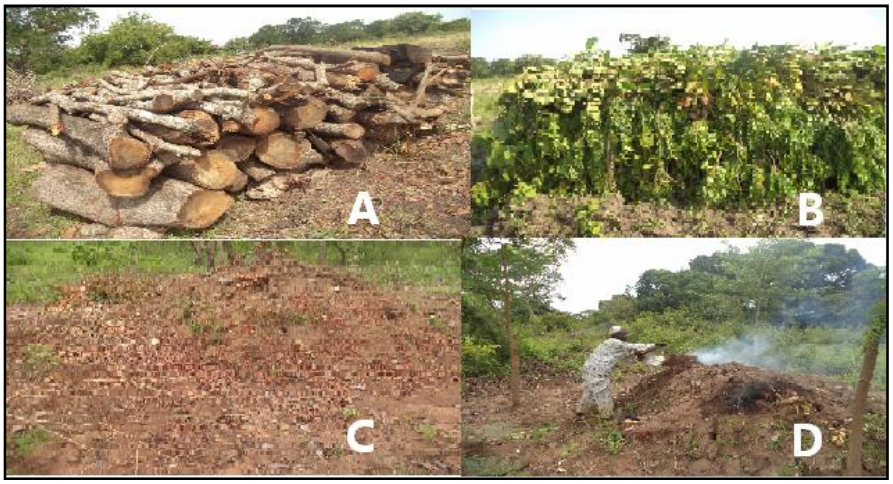

Figure 5. Local charcoal production processes in south-western Nigeria.
Source: After Omoakin et al (2015).

The growth of charcoal business in Nigeria

Charcoal, though an old source of energy is still much a modern source of energy for cooking in both rural and urban centres. Charcoal in addition, is now an export commodity in the world including Nigeria, with a large market in the EU, USA and Asia. Charcoal in addition, is now an export commodity in Nigeria, with a large market in the EU, USA and Asia. The prices range from $170 -$300/ton depending on the packaging. Tropical Africa accounts for 70% of the exports and the market is all year round with a slight drop between July and September, Omoakin et al (2015). In fact, the charcoal industry is a multibillion dollar global industry. According to the publication of Foraminifera (2013) quoting the Food and Agricultural Organization (FAO), over 40million metric tonnes of charcoal are consumed globally and approximately 2.4billion people rely on wood and charcoal for their daily fuel. According to the report, Nigeria currently ranks second to Brazil in the production of charcoal and that the western worlds particularly prefer Nigeria's charcoal which currently exports 380,000 metric tonnes of charcoal annually; as the country is rich in tropical hardwood, which burns slower and hotter. The United Kingdom is one of the largest consumers of charcoal, though other countries around the world like Holland, France, Netherland, Germany Spain, Bulgaria and Denmark also consume the product in large quantity.

Studies like that of Olagunju (2006) have revealed that a small team of 4-8 people can produce three pickup truck loads of charcoal in 2 weeks, and a large team between 7-8 loads. South-western Nigeria is leading in the business as due to many factors that is not unconnected to the abundant rain forest coverage and poor access to a more profiting livelihood business. Table 2 revealed the result of a survey of selected villages that are dominated by the activities who are also members of the larger charcoal business association.

Table 2: Charcoal Production in Selected Villages of Oyo State, Nigeria

S/N	Bags per week	Production	%
1	1 -20	36	73.6
2	21 – 40	6	12.2
3	41 – 60	5	10.2
4	61 – 80	2	4
	Total	**49**	**100**

Source: Field survey

Indeed, the Charcoal Development Dealers Association of Nigeria (CDDAN) recently took a step towards smooth exportation of their products by commencing the process of certification through an international organisation, (Tunde, 2017). In an effort to banning the exportation of charcoal in Nigeria by the Federal Government on the premise that the Charcoal Dealers failed to adhere to its policy of cut-one-plant-two, the association reported their plan to maintain the afforestation status and even strive to meet international standards in the course of their trade to the Federal Government. Furthermore, according to Salami and Briege (2010), the CDDAN president had been working in collaboration with the Forestry Research Institute of Nigeria (FRIN) to plant 30 hectares of **Eucalyptus and Teak trees** at Ijio in Iwajowa Local Government Area and Otu in Itesiwaju Local Government council, in Oyo State. Also in their bid to further step up their ranking among the best exporters on the world

map, they hosted a representative of one of the world's leading firm in forest management certification, Pacific Salmon Commission (PSC), to Nigeria.

Effect of Poverty Level and Charcoal Production on Environmental Degradation

In assessing the significant influence of poverty depth on the environmental degradation, the variables that had significant co-efficient are the quantity of wood collected, knowledge of environmental conservation and size of farm land. The analysis revealed that the coefficients of the quantity of wood collected is 0.0404 and significant ($P<0.01$) meaning that an increase in the quantity of wood collected would result to a proportionate increase in the poverty depth of the farmers by 4.04%. Going by the already established monthly absolute poverty line of $7.3 (N2,627) for the study area, the study observed that about 42% of the farming households were poor. This agrees with previous expectation that the indiscriminate felling of trees makes the farmlands prone to degradation. This finding is in conformity with the findings of Okwi *et. al* (2006) and that of Lal and Okigbo (1990) that deforestation and fuel wood is a major source of human induced environmental degradation, accounting for nearly 15% of the total land degradation in Africa.

Maiangwa *et. al*. (2007) also reported that fuel wood is the dominant form of cooking energy for all rural farmers in Nigeria. Poverty constrained options often induce the poor to deplete resources at rates that are incompatible with long term sustainability (Holden *et. al.,* 2004).
It is also observed that a percentage increase in the knowledge of environmental conservation has the tendency of decreasing poverty by 46% among the farmers since poor knowledge of environmental conservation has been shown to be a big problem in Africa. Some authors have also argued that, often, the appropriate land management technologies exist but that information about their use has not being fully utilized at the grass root because of poor coordination of extension services in the country.

GIS impact analysis of deforestation on land cover in Oyo State between 2000 and 2018

The land cover analysis of the area shows the built-up areas were represented in red colours, disturbed vegetation in yellow colour, undisturbed vegetation in green colour while bare surface and water bodies were represented in gray and blue colours respectively. The land cover change analysis for the year 2000, 2005, 2015 and 2018 is as shown in figure 6 and table 3 respectively.

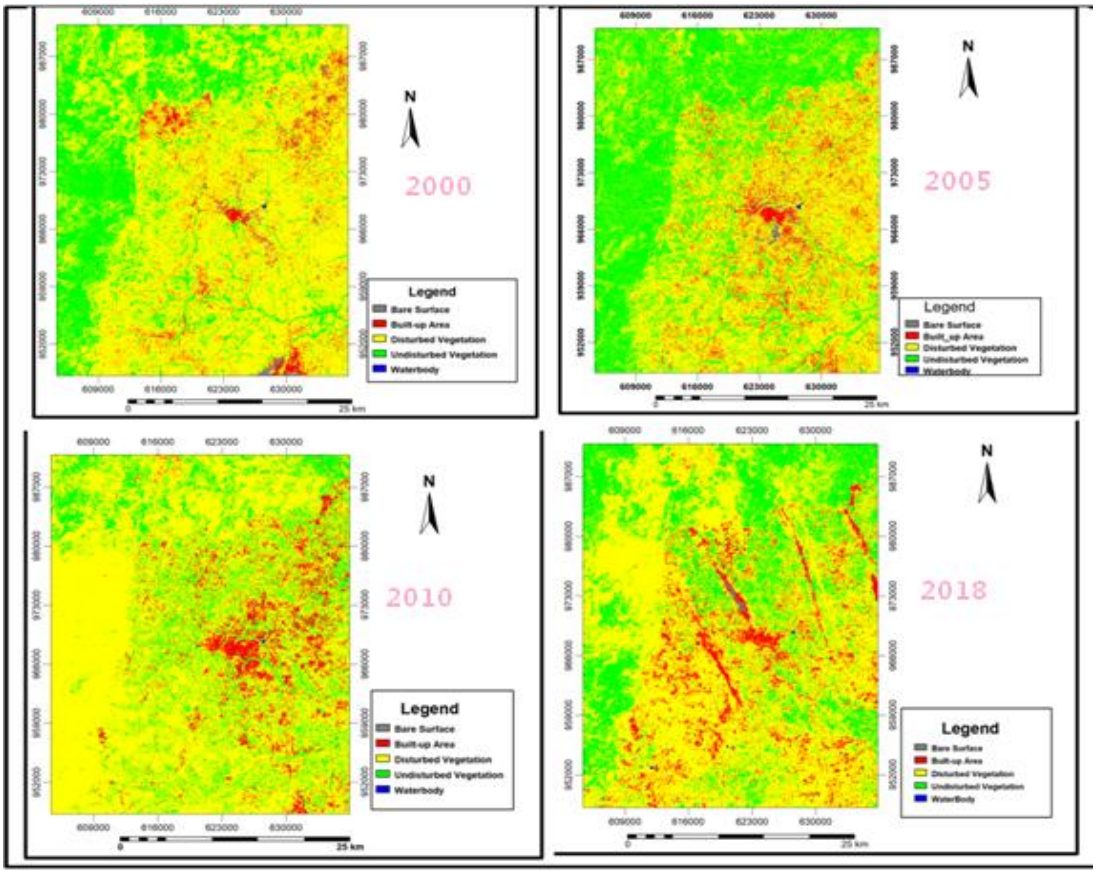

Figure 6: Land Cover of Olorunsogo in 2000, 2005, 2010, and 2018
Source: Author, 2018

Table 3: Spatial Changes in Land cover between 2000 and 2005

Land cover	2000 (KM^2)	2005 (KM^2)	Magnitude of change	Frequency of Change	Percentage of Change
Built-up	65.25	91.03	28.78	5.76	44.11
Bare Surface	15.08	13.64	-1.44	-0.29	-9.55
secondary Vegetation	927.35	770.46	-156.89	-31.38	-16.92
Primary Vegetation	380.22	512.89	132.67	26.54	34.89
Water Body	0.38	0.26	-0.12	- 0.02	- 31.57
Total	1388.28	1388.28	3.0	0.65	20.96

Source: Author, 2018

Table 3 reveals that there is a decrease in secondary vegetation in 2005, with a land area of 770.46Km^2 as against the 927.35km^2 recorded in 2000. A decline of 31.38Km^2 was recorded annually in the land area of secondary vegetation between 2000 and 2005. The decline in disturbed vegetation resulted in an increase in the land area of undisturbed vegetation with a magnitude of change of 132.67Km^2 and an annual frequency of change of 26.54km^2. Land reclamation is not uncommon in this area as physical developments progresses and this has resulted in a decline in the areas coverage of water bodies.

Table 4: Spatial Changes in Land cover between 2005 and 2010

Land cover	2005 (KM^2)	2010 (KM^2)	Magnitude of change	Annual Frequency of Change	Percentage of Change
Built-up areas	91.03	102.46	11.43	2.29	12.57
Bare Surface	13.64	2.78	-10.86	-2.17	-79.62
Disturbed Vegetation	770.46	1042.02	271.56	35.25	35.25
Undisturbed Vegetation	512.89	240.72	-272.17	-54.44	-53.07
Water Body	0.26	0.29	0.03	0.006	11.54
Total	1388.28	1388.28	-0.01	-19.06	-73.33

Source: Author, 2018

In table 4, a total of 271.56Km^2 vegetal covers were lost between 2005 and 2010 with an annual decline of 35.25Km^2 within the period. The increase in the land area of secondary vegetation between 2005 and 2010 can be attributed to anthropogenic activities in the local government area which include deforestation for charcoal production, fuel wood, and lumbering for physical development. The land area of undisturbed primary vegetation also declined due to the anthropogenic activities in the area between 2005 and 2010. A total of 54.44km^2 of the primary vegetation were lost annually in the area, with a magnitude of change of -272.17km^2.

Table 5: Spatial Changes in Land cover between 2010 and 2018

Land cover	2010 (KM^2)	2018 (KM^2)	Magnitude of change	Frequency of Change	Percentage of Change
Built-up	102.46	119.25	16.79	2.10	16.39
Bare Surface	2.78	4.10	1.32	0.17	47.48
Disturbed Vegetation	1042.02	1058.83	16.81	2.10	1.61
Undisturbed Vegetation	240.72	205.15	-35.57	-4.45	-14.78
Water Body	0.29	0.94	0.65	0.08	224.14
Total	1388.28	1388.28			

Source: Author, 2018

Between 2010 and 2018 in table 5, an increase in anthropogenic activities, population growth and quest for space for physical development can be attributed to the increase in bare surface degraded lands. The bare surfaces/ degraded lands increased to 1.32Km^2. A further increase was observed for secondary vegetation area; with an annual increase of 2.10km^2 between 2010 and 2018. Between 2010 and 2018, a total land area of 4.45km^2 was lost to anthropogenic activities (charcoal and fuel wood) annually in the study area. The analysis of the NDVI of the LGA was carried out for the year 2000, 2005, 2010 and 2018 is as depicted in figure 7 to further reveal the impact of deforestation in the area

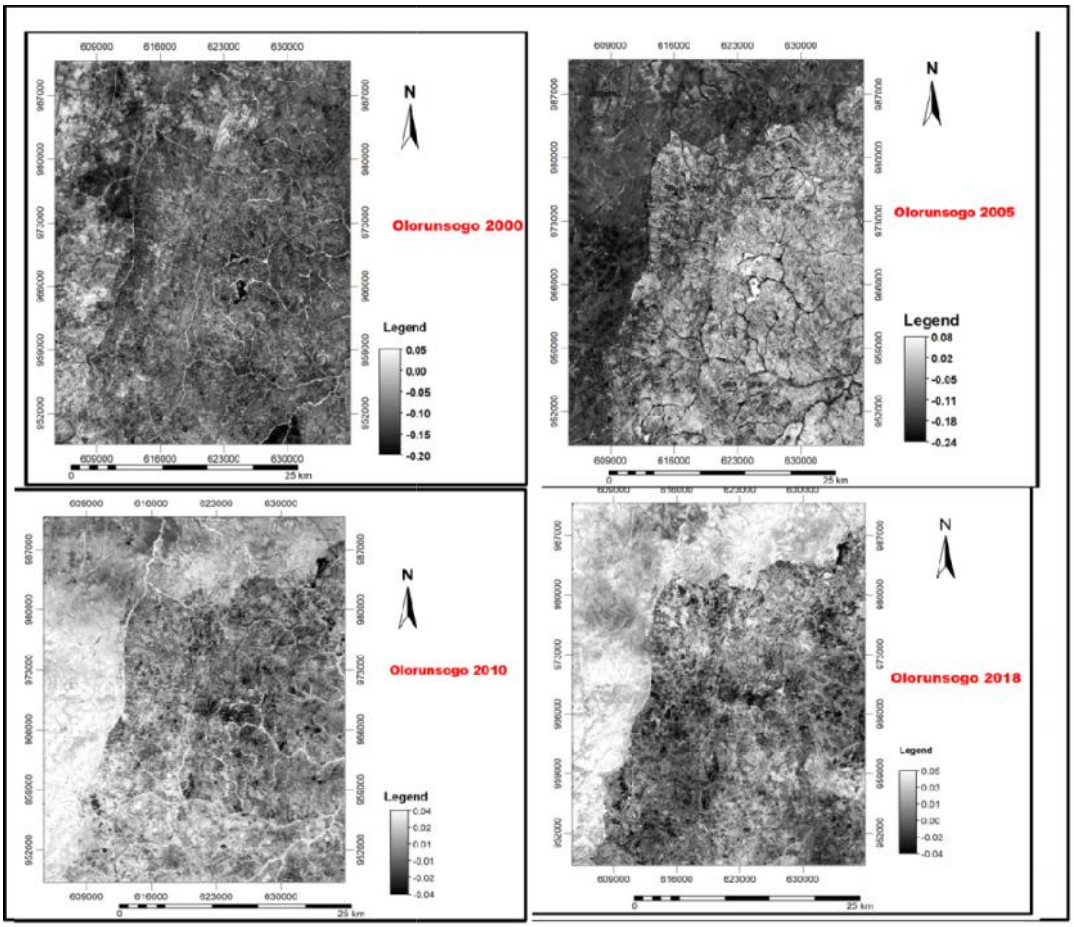

Figure 7: NDVI for Olorunsogo in 2000, 2005, 2010 and 2018
Source: Author's 2018.

In the year 2000, the NDVI result range from - 0.58 to + 0.35. The analysis revealed that the unhealthy vegetated surfaces range from - 0.58 to - 0.01, while the vegetated surfaces range from + 0.01 to + 0.35. This result shows that a substantial level of greenness was observed in the area. The 2000 image analysis also revealed that 16.61Km^2 of the area are without vegetation, but a slight change was however recorded in 2005. The value of the NDVI within this period (2005) range from - 0.44 to + 0.33, the value of the unhealthy vegetated area range from - 0.44 to - 0.01 while the value of the vegetated area range from +0.01 to +0.33. The increase in the anthropogenic activities (bush burning, deforestation for fuel wood and charcoal) also translated into the increase in the areas with no vegetation. A total of 34.68Km^2 of the area are without vegetation in the year 2005.

The NDVI value for the year 2010 range from - 0.13 to + 0.01, this result shows a decrease in green vegetation. The NDVI of 2010 recorded a value of - 0.13 to - 0.01 for unhealthy vegetation, while the vegetated area ranges from +0.01 to + 0.07. A drastic increase in the areas of non vegetation was recorded within this period as the non-vegetated area increased from 34.68Km^2 in 2005 to 263.53Km^2 in 2010. These results show that these LGAs are fast losing their lush vegetation due to consistent increase of anthropogenic activities.

Although, the non-vegetated area declined slightly with a land area of 194.79Km^2 in 2018, the lushness is still not substantial. The analysis revealed that the vegetated area range from +

0.01 to + 0.08 while the unhealthy Vegetation range from - 0.14 to 0.01. The NDVI value of -0.14 to +0.08 was recorded in 2018.

The prospect of DRR in Nigeria

Globally, there is growing realisation that countries and communities need to place more emphasis on a holistic approach to Disaster Risk Reduction (DRR) as against DRM. DRR approaches should generally involve; risk assessment, risk reduction, early warning and disaster preparedness if and only-if the socioeconomic and environmental costs of disasters will be effectively reduced. Disaster risk can be calculated as the interaction between the probability of a hazard occurring and the vulnerability of a community to the hazard, together with the capacity of the community to cope with and recover from a disasterThe elements that formulate disaster risk for a community are expressed in the following risk equation:

$$\text{Risk} = \frac{\text{Hazard x Vulnerability}}{\text{Capacity}}$$

Risk: The probability of a disaster occurring.

Hazard: A potentially damaging physical event, phenomenon or human activity which may lead to a disaster.

Vulnerability: A set of conditions and processes (physical, social, economic and environmental) that increase the susceptibility of a community to the impact of hazards.

Capacity: A combination of all the strengths and resources available within a community that can reduce the level of risk or the effects of a disaster.

Risk perception in rural areas of Nigeria is relatively low and this is not unconnected to the poor socioeconomic characteristics of the people. The poor infrastructural facilities and low economic generating activities exacerbated the proneness of the communities to poverty related environmental hazards. Fuel wood and Charcoal production in the South-Western parts of Nigeria increases because there is a total neglect of cash crops like Cocoa, Coffee Cola-nut and rubber tree. The rural famers and the able bodies who are not gainfully employed engaged in illegal lumbering and Charcoal business as a way of self-employment.

Recommendations

International organizations and researchers have established the fact that poverty reduction and development initiatives must be integrated into DRR for sustainable development. The primary mission of the UNDP is to assist developing countries in poverty reduction through variety of initiatives and structures. The following are some of the recommendation for this part of Nigeria and other African countries:

i. There is an urgent need for strong advocacy drive for every community to embrace agro-forestry. The State Government in conjunction with the local authority should come up with simple inclusive rules and regulations governing the use of existing natural forests resources. This will ensure a systematic harvest and or felling of forest resources.

ii. There is the need to introduce environmental aid programme with political-will that will abate environmental degradation and accelerate economic growth. This will promote environmental-friendly development among the rural poor.

iii. Grassroots education and awareness raising on the potential risks inherent in deforestation and motivation for changes in collective behaviour to reduce risks;
iv. There should be practical Understanding and taking action to mitigate socioeconomic conditions that create the vulnerability of those communities;
v. Develop disaster preparedness plans that cover both emergency management and recovery from potential disaster in the region with hazard monitoring systems and early warning indicators.

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