

Environmental Health, Desertification and Sustainable Development in North Eastern Nigeria: A Socio-economic Impact Assessment

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ABSTRACT

The study was conducted in the months of July- September, 2017 to assess the socio economic impacts of desertification on local communities in Yusufari Local area of Yobe State, Nigeria. A total of 286 respondents comprising of 280 Local community dwellers and 6 officials of the department of Agriculture and Forestry participated in the study. Descriptive survey method of research was employed using both qualitative and quantitative data. Study data was collected using closed ended self made questionnaire and structured Interview Guide. Statistical Package for Social Sciences (SPSS) Version 6 was also used to analyse data on respondents' characteristics, socio economic impacts of desertification as well as respondents perception of control measures using descriptive statistics. Study findings revealed that married men constituted biggest portion of the respondents while illiterate crop and live stock farmers dominated the occupation groupings. Dominant tribes happened to be Kanuri followed by Fulani and Hausa. Social impacts of desertification were found to be numerous ranging from relocation of houses or whole settlements, a town called Kaska relocated 2 times in less than 30 years, drying up of sources of water, forced migrations as well as Sporadic conflicts and loss of biodiversity and soil erosion. Economically, the impacts manifested in the form of loss of soil fertility, reduction in farmlands, grazing and fishing sites with resultant drop in crop yields and number of animals and deaths. Transportation was also found to be seriously affected. Similarly, the local people were found to be fully aware of the concept of desertification. and its impacts but did not stop acts of deforestation nor engaged in any tangible form of reforestation activities. Governments' efforts towards combating the menace were not enough. Based on these findings and others not mentioned here, it was recommended that local people should be well enlightened on the impacts of desertification and government's programmes to curb the menace, deforestation laws should be strictly adhered to, shelter beats and nursery plots should also be established and maintained.

Keywords: Desertification, socio-economic impacts, local communities, Yusufari

The United Nations defined desertification as the degradation of the soil, landscape and bio-productive terrestrial system, in arid, semi-arid and sub-humid areas, resulting from several factors, including climatic change and human activities (UNCED, 1992). It is a progressive loss of soil fertility through

the destruction of the structures and composition of the soil, which does not permit good agricultural productions, or the existence of vegetation with varied natural species. Dry lands occur in all continents except the Antarctica and are very much susceptible to desertification. The end result of desertification is

barren and unproductive land that cannot be used for crop and food production or other agricultural purposes, and has little biodiversity value (Chibueze, 2015). When desertification occurs, it manifests itself through soil erosion, water scarcity, reduced agricultural productivity, loss of vegetation cover and biodiversity, draught, poverty and migration.

The UN conference convened in Nairobi in 1977 distinguished four kinds of desertification according to their degrees of intensity (Alsaadamny and Amileegy, 2006). These include slight desertification, moderate desertification, severe desertification and very severe desertification. According to Nasiru (2007), desertification is caused by both natural and anthropogenic factors. The natural causes of desertification include the poor physical conditions of soil, vegetation, topography as well as inherent extreme climatic variability as evidenced in periodic draughts. Climatic variation is perhaps the important natural cause of desertification and draughts. The anthropogenic factors is mainly the destructions of the ecological system caused by poor land use and ever increasing pressure put upon on the available resources by the expanding population. More specifically, there are four primary anthropogenic causes, notably over exploitation and poor irrigation practices, and these are influenced by factors such as changes in population, climate and socio-economic conditions.

Desertification is certainly one of the greatest ecological disasters in Nigeria with propensity to undermine the socio-economic development of the entire country. The problem which is much more palpable in the eleven frontline states of Adamawa, Bauchi, Borno, Gombe, Kano, Katsina, Kebbi, Jigawa, Sokoto, Zamfara and Yobe threatens the livelihoods of over 40 million people and engulfing about 2,168sq km of rangeland and cropland each year, obliterating human settlements, inducing forced migration, exacerbating rural poverty and social conflicts. Populations in these states are among the poorest and most vulnerable to climatic variability and land degradation (NAGGW, 2016). The consequences of

desertification are far-reaching and diverse. (Olagunju, 2015). All aspect of human lives is either directly or indirectly impacted wherever the phenomenon exists. It ranges from food insecurity and socio-economic hardship to political unrest. Specifically, impacts of desertification include alteration of ecosystem services locally and globally, loss of biodiversity, habitat loss, species endangerment, changes in hydrological and climatic cycle, reduced agricultural yields and socio-economic welfare (Olagunju, 2015). Migration has also been cited as one of the impacts of desertification by some scholars. Conclusively, desertification reduces soil fertility, particularly base cation content, organic matter count, pore space, and water retention capacity. It also reduces vegetation productivity leading to long term declines in agricultural yields, livestock yields, plant standing biomass and plant diversity. These changes reduce the ability of the land to support people, often sparking an exodus of rural people of the area to urban areas. Breaking the strong connection of the people to the land produces profound changes in social structures, cultural identity and political stability.

Background

For many years, drought and desertification present inexorable challenges to sustainable development of the countries in Africa's Sahel – Savannah region where millions of people rely upon the land as a vital source of life. Not only is this natural asset the basis of food security and agricultural production, it also generate employment and mitigates social crisis for the region's most poverty stricken and vulnerable groups. About 83% of the rural Sub-Saharan people are dependent on land for their livelihoods, yet 40% of the land resources are presently degraded, driving poverty, hunger, unemployment, forced migration and conflicts, while exacerbating climate risks, particularly drought and flood (NAGGW, 2016).

Desertification constitutes one of the international environmental problems whose global importance has been recognized by the international community. This importance is clearly visible in the massive

endorsement that states have given to the UN convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa adopted in 1994 (Nasiru, 2007). Desertification in Africa is a major cause and consequences of poverty and resources depletion, which threaten economic growth (UNESCO, 2007). The extent and severity of desertification in Nigeria has not been fully established neither the rate of its progression properly documented (CCD, 1999).

Nigeria is one of the countries in the south of Sahara faced with a rapid desert encouragement, with notable effects on the northern part of the country. Out of the 909,890Km² of the country's land area, about 580,841Km² accounting for 63.83% of the total land is impinged on by desertification (Olagunju, 2015). Desertification phenomenon has been reported in the northern Nigeria since 1920, but the impact has been more glaring since the famine of 1971 to 1973 in this part of the country (CCD, 1999).

It is common knowledge that land degradation and desertification constitute major causes of forced human migration and environmental refugees, deadly conflicts over the use of dwindling natural resources, food insecurity and starvation, destruction of critical habitats and loss of biological diversity, socio economic instability and poverty and climatic variability through reduced carbon sequestration potential (UNESCO, 2007). The impacts of drought and desertification are among the most costly events and processes in Africa. Drought for example led to the reduction in the GDP growth in Nigeria from 18.4% in 1971-1972 to 7.3% in 1972-1973 (Oladipo, 1993).

Information is no doubt a key to combating drought and desertification. However, empirical evidence points to the fact that the way government has managed awareness creation on the twin menace in Nigeria especially in the north-east, has limited effect on the people as established in a study by Nkwocha (2017) which revealed that 61.5% of the respondents noted that government awareness activities in relation to programs on drought and desertification, does not get to them neither do they know about

it. This supports the agreement of Olagunju (2015) that, government is yet to raise enough awareness on drought and desertification, which he further said will provide people with the understanding of the causes and consequences of the phenomena so as to stop all possible actions that encourage the situation thus prevent further degradation of the soil. According to Nkwocha (2017), the strategies so far adopted by government in combating drought and desertification have been more of rhetoric than reality and have a major defect in that they are not citizen oriented.

Statement of the Problem

Desertification constitutes one of the international environmental problems whose global importance has been recognized by the international community. Desertification in Africa is a major cause and consequences of poverty and resources depletion, which threaten economic growth (UNESCO, 2007) Nigeria is a large country with a substantial part of its area extending in to the Sudano - Sahelian belt with an estimated population of 140 million; human pressure on land particularly in the marginal areas has continued to take its toll on the environment, resulting in desertification.

Nigeria is one of the countries in the south of Sahara faced with a rapid desert encouragement, with notable effects on the northern part of the country. Out of the 909,890 Km² of the country's land area, about 580,841 Km². Desertification is made very severe in the dry lands of the country by increasing human attempts to exploit the resources of the ecological zone in the face of persistence drought (Nasiru, 2007). All aspect of human lives is either directly or indirectly impacted where ever the phenomenon exists. It ranges from ecological impacts, habitat destruction and loss of biodiversity, changes in penology, health impacts, heat waves, cancer, vector born disease, loss of plants of medical importance, geo-chemical impacts, global warming, increased erosion, hydrological impacts, reduced water supply, over exploitation of ground water, socio-economic impacts, reduced agricultural

productivity and food insecurity, economic loss and reduced economic growth, migration, resource use conflict and unemployment (Olagunju, 2015).

Nigeria is presently losing about 351,000km² of its land mass to the desert which is advancing south wards at the rate of 0.6km per year (Amadi, *et al.*, 2011). Desertification is not only preventable but reversible. It is the most important environmental problem, affecting fifteen northern states of Nigeria. Yobe state which is one of the worst affected states has about 48% of its land under siege from desert encouragement. (Amadi, *et al.*, 2011). Entire villages and major access roads are being threatened and buried under sand dunes in the northern portions of Yunusari and Machina Local Government Areas of Yobe state.

Nevertheless, governments at all levels had come up with many strategies aimed at combating the menace of desertification in Nigeria such as awareness programmes on drought and desertification, yearly tree planting campaigns, community development programmes involving planting of trees, enforcement of laws restricting community dwellers from engaging in discriminate falling of trees and provision of irrigation dams for farmers and maintaining the dams for optimal use. Driven by the urgent desire to ensure sustainable development of the dry lands of Africa vulnerable to this irrepressible problems of desertification, the African Union (AU) in 2007 endorsed the Great Green Wall for the Sahara and the Sahel originally conceived by the former Nigerian president Olusegun Obasanjo as a strategy to tackle the detrimental social, economic and environmental impacts of desertification and land degradation in the region. However, despite all these efforts and those not mentioned here, the presence of desertification in this region and its resultant devastating impacts are still evident.

It is in this light that, this research was conducted to study and establish the extent of the impacts of desertification on people's livelihoods in Yusufari L.G.A. of Yobe state.

MATERIALS AND METHODS

The research which studied the socio economic impacts of desertification on local communities in Yusufari Local Government Area of Yobe state, Nigeria was conducted in the months of July – August 2017 in three settlements of Yusufari, Kaska, Sumbar, Gumshi and Tulu Tulo all in Yusufari L.G.A. Descriptive Survey method of research involving the use of both quantitative and qualitative data collection was used. A total of 286 respondents comprising of 280 local people and 6 officials of the Department of Agriculture and Forestry were selected using the Purposive, Snowball and Systematic Random sampling methods based on some inclusion criteria. Researcher made closed ended questionnaire was used to collect quantitative data while Interview Guide was also used to get some qualitative data. All data collected was analyzed using the Frequency, Percentage, Mean and Standard Deviation distribution tables.

Study Area

Yusufari is a local government area in Yobe state, Nigeria at coordinates 13° 04' 06" N 11° 10' 33" E / 13.06833° N 11.17580E. It shares borders in the north with the republic of Niger. It has a total area of 3,928km² and a population of 111,086. The climate is characterized by short wet season (June-Aug) and a long dry season (Oct- May) with high temperatures throughout the year. Annual rainfall is usually very low while evapotranspiration is high.

Data Analysis and Interpretation

Demographic characteristics of the local people

For better understanding of characteristics of the local communities living in the study area, demographic characteristic of the respondents who participated in the research study regarding their gender, age, marital status, level of education, household size, occupation and tribe was captured as indicated in the table below:

Table 1: Showing demographic characteristics of the local people

Variables	Frequency	Percent
Gender		
Male	263	92.0
Female	23	8.0
Total	286	100.0
Age		
15-24	33	11.5
25-34	40	14.0
35-44	63	22.0
45-54	69	24.1
55-64	61	21.3
Above 65	20	7.0
Total	286	100.0
Marital Status		
Single	42	14.7
Married	223	78.0
Divorced	21	7.3
Total	286	100.0
Level of Education		
Arabic Education	152	53.1
Primary Certificate	79	27.6
Secondary Certificate	23	8.0
Diploma Certificate	22	7.7
Bachelors degree	10	3.5
Total	286	100.0
Household Size		
1-5	29	10.1
6-10	199	69.6
11-15	38	13.3
16-20	17	5.9
Above 21	3	1.0
Total	286	100.0
Occupation		
Crop farming	98	34.3
Livestock farming	70	24.5
Fishing	11	3.8

Trading	23	8.0
Transportation	36	12.6
Irrigation	24	8.4
Fuel wood harvesting	24	8.4
Others	6	2.1
Total	286	100.0

Tribe		
Kanuri	168	58.7
Fulani	70	24.5
Hausa	37	12.9
Bade	7	2.4
Others	4	1.4
Total	286	100.0

Demographically, male were found to be the majority (92.0%) while age groups of 35-54 years were also the majority (46.1%). Married men and women were also the dominant respondents (78.0%) and those respondents without any form of western education also occupied the largest portion of the respondents (53.1%). Similarly, crop farming, livestock farming and transportation were found to be the dominant occupations of the local people represented by 34.3%, 24.55 and 12.6% respectively while household sizes of the respondents were also found to be relatively large ranging from 6-15 family members (82.9%) and unsurprisingly, Kanuri tribe was also the dominant ethnic group (58.7%) followed by Fulani, Hausa, and Bade represented by 24.5%, 12.9% and 2.4% respectively. Other tribes were also represented by 1.4%.

The Table 2 shows responses of the respondents with respects to social impacts of desertification in the study location where 88.46% agreed that these impacts of desertification in the area are far reaching and the situation is very bad (mean value 3.33, std .661). These social impacts manifest in form of destruction and relocation of houses and even whole settlements, conflicts among people especially farmers and herdsman, loss of soil fertility, diminishing grazing fields, drying up of sources of water such as ponds, loss of biodiversity, increased soil erosion and overall reduced quality of life among the local people.

Table 2: Showing social impacts of desertification

Sl. No.	Questions	4	3	2	1	Mean	STD
SID1	Desertification leads to destruction and relocation of houses	73 (25.5)	169 (59.1)	37 (12.9)	7 (2.4)	3.68	.692
SID2	Sometimes whole settlements relocate as a result of desertification	95 (33.2)	126 (44.1)	56 (19.6)	9 (3.1)	3.07	.807
SID3	Conflicts among people do occur as a result of desertification	188 (65.7)	90 (31.5)	8 (2.8)	0 (0)	3.63	.539
SID4	Desertification affects soil fertility	175 (61.2)	111 (38.8)	0 (0)	0 (0)	3.61	.488
SID5	Farming and grazing activities are also affected by desertification	136 (47.6)	141 (49.3)	9 (3.1)	0 (0)	3.44	.558
SID6	Desertification leads to drying up of sources of water	89 (31.1)	176 (61.5)	11 (3.8)	10 (3.5)	3.20	.671
SID7	As a result of desertification loss of biodiversity is experienced	68 (23.8)	105 (36.7)	98 (34.3)	15 (5.2)	2.79	.865
SID8	Desertification induced problems lead to overall reduced quality of life among people	144 (50.3)	138 (48.3)	4 (1.4)	0 (0)	3.49	.528
SID9	Desertification leads to migration of people from the area	86 (30.07)	146 (51.04)	39 (13.64)	15 (5.24)	3.02	.778
SID10	Increase in soil erosion is noticed in recent years	99 (34.61)	177 (61.89)	10 (3.50)	0 (0)	3.45	.535
Overall Average		117(40.95)	133(46.70)	29(10.18)	6(2.18)	3.33	.661

Quantitative data on economic impacts of desertification in the study location was captured

Using a questionnaire and the responses indicated in the Table 3 were gathered. From the Table it can be seen that majority of the respondents 80.2% (mean value 3.25, std .647) agreed that the economic impacts of desertification on the local communities are diverse and the situation is very bad. According to the responses, these impacts are manifested in form of drop in crop yields, adverse effects on fishing activities and transportation activities, hike in transport fares, increase in prices of goods generally, direct or indirect impacts on many other businesses, reduction in number of animals or even death, complete loss of sources of livelihoods, considerable drop in the amount of rainfall as well as overall low income among the people.

The Table 4 shows responses of the respondents on the issue of controlling the menace of desertification and its impacts in the area. About 74.5% of the respondents agreed that the local communities are very well aware

of the adverse impacts of desertification on their livelihoods and the community while another 78.7% of them also agreed that the local people despite being aware of the impacts of desertification have not stopped all acts of deforestation such as felling down of trees for different purposes. Similarly, 73.1% of the respondents did also agree that the local communities do not engage in any reforestation activities such as planting of trees to minimize desertification whereas 95.4% and 84.6% did also strongly agree that efforts of the government and other stakeholders in combating desertification as well as government’s intervention in ameliorating the economic impacts of desertification on the local communities are not something to write home about.

Discussions

Demographically, characteristics of the local communities were found to be diverse in terms of tribe and occupations. Male respondents were found to constitute about 92% while only 8.0% were females. It is a known fact that, tradition of the study

Table 3: Showing economic impacts of desertification

Sl. No.	Questions	4	3	2	1	Mean	STD
EID1	Loss of soil fertility and reduction in farmland sizes as a result of desertification leads to drop in crop yields	276 (96.5)	10 (3.5)	0 (0)	0 (0)	3.87	.184
EID2	Reduction in sources of water has affected fishing activities	196 (68.5)	86 (30.1)	4 (1.4)	0 (0)	3.67	.499
EID3	Transportation activities are affected with resultant hike in transport fares	82 (28.67)	162 (56.64)	28 (9.79)	14 (4.90)	3.09	.756
EID4	Generally, prices of goods have increased as a result of hike in transport fares	72 (25.2)	96 (33.6)	97 (33.9)	21 (7.3)	2.77	.912
EID5	All other businesses are as well affected as a result of the many desertification induced problems	85 (29.72)	132 (46.15)	47 (16.43)	22 (7.69)	2.98	.878
EID6	Desertification leads to decrease in number of animals reared and death	70 924.5)	162 (56.6)	32 (11.2)	22 (7.7)	3.14	.766
EID7	Desertification induced poverty leads to people engaging in environmentally devastating activities such as fuel wood harvesting	100 (35.0)	153 (53.5)	22 (7.7)	11 (3.8)	3.20	.738
EID8	There is general decrease in people's overall incomes as a result of loss of sources of livelihoods caused by desertification	276 (96.5)	6 (2.1)	4 (1.4)	0 (0)	3.95	.273
EID9	Considerable drop in the amount of rainfall has been noticed in recent years	98 (34.27)	143 (50.0)	31 (10.84)	14 (4.90)	3.73	.755
Overall Average		141 (49.3)	88 (30.9)	41 (14.6)	15 (5.2)	3.25	.647

area and that of most parts of Yobe state in particular and northern Nigeria in general confines women to homes responsible only for household activities such as cooking, fetching water and firewood but do not engage in strenuous economic activities. However, they sometimes help their husbands and parents in such activities. Thus, the high number of male respondents portrayed by this study can be well attributed to this fact. Similarly, married men were also found to be the dominant respondents as well (78.0%). In the same spirit, one of the traditions of the Kanuri ethnic group who are the dominant tribe in the study location, force young men and girls to marry at tender ages of 25 and 15 years; a reason good enough to explain why majority of the respondents were married. Most importantly, Omolehin *et al.*, (2007), reported that married men are more conscious of the need to get better livelihood so that they could meet

their family food needs. Agricultural practices in the rural areas is mostly associated with the married individuals and it is also likely that they engaged their family members in farming activities and hence making farm work relatively simple in operation (Jamala *et al.*, 2013). In the aspect of education, 53% of the respondents had tertiary education, while 16.8% had secondary education, 13.3% non-formal education, 3.3% of the.

Overwhelmingly, it was discovered by this study that the local communities lack the basic western education needed for efficient development because, more than 53% of the local people were found to possess only Arabic education meaning, they can only read and write the holy Qur'an while only 35.1% claimed to have primary and secondary education certificates. However, Steian (2003) pointed out that education is one of the important human capitals

Table 4: Showing perceptions of the local communities on control measures against desertification

Sl. No.	Questions	4	3	2	1	Mean	STD
CMD1	Local people are not aware of the impacts of desertification on their lives and the community	21 (7.3)	52 (18.2)	112 (39.2)	101 (35.3)	1.98	.912
CMD2	Local people have not stopped all deforestation acts to stop desertification	98 (34.3)	127 (44.4)	39 (13.6)	22 (7.7)	3.05	.887
CMD3	Local people do not engage in reforestation activities to combat desertification	171 (59.8)	38 (13.3)	65 (22.7)	12 (4.2)	3.29	.956
CMD4	Efforts of government and other stakeholders towards combating desertification are not enough	107 (37.4)	166 (58.0)	9 (3.1)	4 (1.4)	3.31	.603
CMD5	Governments do not intervene in ameliorating the socio economic impacts of desertification on the local people	83 (29.0)	159 (55.6)	29 (10.1)	15 (5.2)	3.08	.772
Overall Average		94(32.9)	108 (37.8)	51(17.8)	31(10.8)	2.94	.826

which play important roles in determining status in society. Education is expected not only to contribute to people’s ability to read and understand instructions but also help them to adopt new techniques. According to Amaza and Tashikalma (2003), the literacy level of farmers is important as it determines the rate of adoption of improved technology for increased productivity.

Also, Adekunle (2009) pointed out that the level of education of farmers will directly affects their ability to adapt to change and to accept new ideas. Besides, household sizes were also found to be relatively big majority of whom range between 6-15 family members (82.9%). With respect to their occupations, the local people were found to crop and livestock farmers represented by 34.3% and 24.5% respectively who mainly illiterates were managing to survive amidst hard biting impacts of desertification. The literacy level of farmers is important as it determines the rate of adoption of improved technology for increased productivity. Adekunle (2009) pointed out that the level of education of farmers will directly affects their ability to adapt to change and to accept new ideas.

Unsurprisingly, it was also discovered that majority of the local people were from the Kanuri tribe (58.7%) followed by the Fulanis (24.5%) and the Hausas (12.9%). Yobe state is a predominantly Kanuri state

living as the majority ethnic group in 9 out of the 17 Local Government Areas of the state.

Social Impacts

According to the findings of this study, social impacts of desertification on the local communities were diverse and far reaching (87.65%, mean value 3.06 and std .661) where 84.6% of the respondents agreed that it led to destruction of many houses or even relocation to other places. According to the local people, as a result of desertification, the soil becomes so loose thereby rendering it so vulnerable to gully erosion which led to destruction of houses during the rainy season.

Sometimes whole settlements relocate to other villages or form new settlements in places felt to be better (77.3%). The intricate linkage of soil degradation, agricultural production, food security and poverty, many household members may as a consequence of desertification leave their homes and seek to supplement the income of their families through cash remittances. Other may even be uprooted with their whole families and decide to migrate in order to survive. In fact, it is one of the key findings of the Millennium Assessment that recurring drought and land degradation are predominant factors in the movement of people from dry-land to other area (Bauer, 2007).

It was so alarming to discover that desertification forced the whole town of Kaska, one of the study areas to relocate entirely for two times in the last thirty years; meaning, in the next 9 years, the town will have to relocate again if measures are not taken. Such migrations are necessitated because when land becomes uneconomic to farm, people are often forced into internal or cross-border migration. In some countries, land degradation has led to massive internal migrations, forcing whole villages to flee their farms for already overcrowded cities. Fifty million people are at risk of displacement in the next ten years if desertification is not checked (UNU 2007). Migration impacts on family life leads to separation of families-wives and children and ultimately the destruction of family patterns (Oladipo, 1993) as women, children and the elderly ones are often left with the burden of agricultural activities.

However, the story from Gumshi town was quite an encouraging one. Bulk of those respondents who disagreed with majority of the facts presented in the questionnaire was from this town. In Gumshi town, most of the problems associated with desertification were found to be very much relatively less in comparison to other towns. Vast areas used as grazing fields and farmlands were still obtained with good number of farmers engaged in both crop and livestock farming. In fact, the town was considered by farmers as the heaven of Yusufari L.G.A. where large numbers of nomadic herdsmen coming from neighbouring states converge to graze their animals. The only problem which the respondents complained of was that of shortage of drinking water which they attributed to the rocky nature of the area.

Furthermore, overwhelming majority of the respondents agreed that the social impacts of desertification in the area manifest itself in recurrent conflicts among different people or communities, loss of soil fertility, decrease in grazing activities as a result of loss of many grazing fields, drying up of water sources upon which many of the local communities depend on for drinking water, loss of biodiversity as well as overall reduced quality of life among the local people. Like all major ecological

changes, desertification may have impacts at three levels; on-site, off-site and global. On-site impact related to change in: Plant growth (reduction of primary production), animal life (reduction of livestock, wild animal) as well as surface deposits (soil erosion, loss organic matter). Off-site impacts are also many and varied including: surface deposits that are transported through water and wind erosion and pile sediment on downstream site of productive lands, road and water reservoirs, suspended particulates (dust) that affect the health of livestock and people which also reduce visibility, salinized surfaces of deserted irrigated fields become sources of salt particles and may be wind-carried to other productive lands as well as forced movement of people who have to leave the land because their life-support system has deteriorated. According to the UNEP's assessment (1992) 1.9 million ha of irrigated crop land (or 18% of the total area), 48.86 million ha of rain-fed crop lands (or 61% of the total area) and 995.08 million ha of rangeland (or 74% of the total area). On global scale the impact of desertification relate to its effects on world food producing capacity, world biodiversity and world climate. (Kassas *et al.*, 1991). On global scale the impact of desertification relate to its effects on world food producing capacity, world biodiversity and world climate (Kassas *et al.*, 1991). In addition, land degradation in the dry lands can have direct consequences on the water cycle. If there is low rainfall, drought ensues: groundwater reserves do not refill, water sources become depleted, wells run dry, plants and animals die and humans have to migrate to more hospitable regions.

Desertification translates into a spiral of declining production, increasing poverty and diminished potential productivity. Desertification and resources scarcity can provoke social unrest and political and armed conflict. Several governments, have been swept from power by the suffering and unrest associated with drought and famine. (Darkoh, 1998).

According to UNESCO (2007), the consequences of desertification on human populations are diverse and include: the growth of poverty and dependence, socio-economic development in disequilibrium as

well as rural populations often lose their possessions during severe drought.

Economic Impacts

Economically, responses of the respondents indicated that the impacts of desertification on the local communities are biting hard on them. Many studies have confirmed that usually, the majority of people who are directly affected by desertification live below poverty line and without adequate access to fresh water. Poverty drives populations to over-exploit the remaining natural resources, triggering a vicious cycle of accelerating land degradation and greater poverty. Poverty is thus both a cause and a consequence of desertification. More than three quarter of the respondents 85.85% (mean value 3.33, std .626) agreed that the situation in respect of economic impacts of desertification in Yusufari was too bad where 84.6% agreed that it led to significant drop in crop yield as a result of loss of soil fertility and reduction in farmlands, decrease in fishing activities as a result of drying up of water sources such as ponds 77.3%, hike in transport fares as a result of decreased transportation activities 85.31%, decrease in other businesses 75.87%, decrease in amount of rainfall as well as increase in prices of general commodities 58.8%. According to Mortimore (1989) desertification and drought were responsible for the rapid increase in prices indices of food stuff and other non oil export. The importance of rainfall for agriculture, especially small holder agriculture, cannot be over emphasized as its variability and scarcity affects sharply the yields and livelihood of farmers.

In fact, transportation was one of the hardest hit aspects of the communities' livelihood by impacts of desertification. Despite its importance and necessity for both social and economic development of an area, tarred roads cannot be constructed in many parts of Yusufari L.G.A. and where they are available; they have been covered by sand dunes making movement by vehicles to other places very difficult or even impossible. Thus, only certain types of vehicles such as Four Wheel Drives, Range Rovers,

Land Rovers, Jeeps and one other vehicle popularly called "ECOMOG" were used by those who could afford them and for commercial purposes while the majority poor people resort to the use of animals such as camels, horses and donkeys for long distant movements. Hence, transport fares are so exorbitant to the extent that many local people cannot afford. In a similar study conducted by Nwokoacha (2017), it was revealed that desertification affected people's livelihoods, there was reductions in the amount of rainfall received each year, there was increase in temperature, and drying of water bodies. Diverse response was also obtained concerning the impact of desertification on farmer's agricultural activities include poor bumper harvest, increase in wind erosion, decrease in the availability of pasture for livestock, as well as drastic reduction in soil fertility.

The Sahel desertification has brought an alarming drop in agricultural production: millet, sorghum and ground-nut harvests have been critically low in Mali since 1970 drought. Production has dropped by 50 -80% compared to the situation in 1930 and loss per year in income is estimated at US\$ 5.7 million .In Senegal, ground-nut production has fallen to 800 kg per hectare since 1991, In many parts of Africa, desertification induces hunger related disasters are still recorded. In eastern Africa, some 13 million people still rely on food assistance because of the lingering effects of last year drought, coupled with conflict in some parts, the situation is particularly severe in Eritrea, Ethiopia, Kenya and Sudan, where drought have sharply reduced food production and killed large number of livestock. (FAO, 2001). Most worrisome is the possibility that climate change is expected to increase frequency, duration and severity of droughts in many parts of the world. Such changing conditions add to already stressing land use globally and especially in the world's fragile dry lands. This may lead to an accelerated rate of land degradation and desertification which, in turn, is likely to increase poverty.

According to the UNEP's assessment (1992), 1.9 million ha of irrigated crop land (or 18% of the total area), 48.86 million ha of rain-fed crop lands

(or 61% of the total area) and 995.08 million ha of rangeland (or 74% of the total area) in Africa are affected by desertification at moderate or higher level. Three distinct areas of the continent are at most-risk; the Mediterranean Africa, the Sudano-sahelian region and Kalahari-Namibian region in the southern Africa. One third of Africa is affected by desertification and 73% of the total agriculturally used dry land is degraded. Recurrent drought is a fact of life throughout dry land of Africa; virtually every year there is drought in some part of the continent majorly affecting large portions of dry lands. Such disasters occurred in 1968-73, 1982-85 and 1990-91 causing many countries of Africa to experience substantial food shortage. With each drought cycle, desertification increases (Darkoh, 1998).

Nigeria the most populous black nation of the world is losing 1,355 square miles of cropland and rangelands due to desertification each year. This problem affects each of the 11 states of the northern Nigeria. Nigeria loses approximately 320,000-351,000 hectares of land per year, which causes mass displacement of local communities in the North. At least 35 million people are facing threat of hunger and economic problems due to present scale of desertification. Shehu (2014) laments that the worst hit by this situation are some states in the North-East. The situation in Yobe State indicates that, productive and mass land occupied by the dunes in the state has increased from 25000 hectares to more than 30,000 hectares with its attendant negative impact on food and livestock production. More than five million livestock in Yobe State are under serious threat due to the deterioration of pastures occasioned by seasonal droughts and desert encroachment. A report by Adamawa State Ministry of Agriculture in 1994 indicated that more than 15,000 hectares of land in the state suffered from serious desertification related problems.

Respondents' Perception on Control Measures against Desertification

With respect to perception of the concept of desertification, its impacts as well as its control measures in the study area, majority of the

respondents (74.5%) agreed that they are fully aware of what desertification stands for and its negative consequences as it affects their lives and the environment but unfortunately, they also agreed that they have not stopped all forms of deforestation such as fuel wood harvesting, over grazing etc (78.7%). Considerable number of the respondents (73.1%) did also agree that the local communities do not engage in any tangible reforestation activities in order to stop desertification except that some few local people do plant trees which usually die off as a result of insufficient water and high ambient temperatures. Besides, the local communities do not in any way agree that desertification can be caused by anthropogenic factors but instead, attributed it in whole to the will of nature.

Similarly, with regards to governments' efforts towards combating desertification and ameliorating its adverse impacts on the local communities, majority of the respondents 95.4% and 84.6% agreed that the efforts of governments at all levels as well as that of other stakeholders towards combating desertification in the area are nothing to write home about and that the governments do not make any sort of intervention with the aim of ameliorating the social and economic hardships caused by desertification on the local communities in spite the fact that uncountable number of the local people especially crop and livestock farmers had totally lost their sources of livelihoods or have migrated to other better places within or outside Yobe state. However, it was discovered that governments do embark on certain programmes such as tree planting campaigns in many rural areas prone to desertification, establishment of shelter belts as well as organization of programmes aimed at raising local people's awareness on the concept of desertification and its impacts and enlightening them on simple control measures.

Furthermore, though they did agree that they do not engage in any serious control measures against desertification, the local people believe that aforestation and sustained irrigation fields are two good strategies for combating desertification.

Establishment and maintenance of shelter belts was also believed to reduce the impact of desertification in the study area. Perhaps, the local people's lukewarm attitude towards reforestation activities could be because the government has not massively engaged them on being aware of government programs on drought and desertification thus, the inability of the people benefiting from such program or being able to ask questions when necessary actions are needed contributed to their negative attitudes. According to Olagunju (2015), government is yet to raise enough awareness on drought and desertification, which he further said will provide people with the understanding of the causes and consequences of the phenomena so as to stop all possible actions that encourage the situation thus prevent further degradation of the soil.

However, yearly tree planting campaigning which was employed by many vulnerable states to combat desertification especially in the north-east Nigeria that was very active some years back, has now been reduced to mere verbal political statements. Even when the trees are planted, they immediately die off due to poor maintenance culture. According to Nwokoacha (2017), in the absence of replacement for trees cut-down either officially approved by the forestry authorities or indiscriminate actions of the citizens, the activities of government at combating drought and desertification will obviously appear ridiculous. From the foregoing it is evident that the trees that are meant to protect the zone from the scourge of drought and desertification is not properly managed. Thus when there is no concerted effort at replacement of the trees or better still proactive action to keep at planting in other to beef up the environment against. The activities of the drought and desertification would rather be encouraged. Makinde (2005) submitted that communication is an essential ingredient for effective implementation of public policy. If awareness is not properly created on the activities of government, how then will the farmers get to know and be part of the tree planting exercise? This again can aid indiscriminate falling of the trees since the people are not involved.

Meanwhile, Nwokoacha (2017), stated that to effective and efficient control measures in combating desertification, the following factors must be considered; awareness of drought and desertification or the programs of government, host community's involvement in the tree planting exercise of government and awareness on laws prohibiting the cutting down of trees

CONCLUSION

In conclusion, this study was able to discover that demographically, characteristics of the local communities were diverse in terms of tribe and occupations. Able young married men were found to constitute the biggest portion of the respondents and majority of whom were engaged in occupations that were in one way or the other related to the environment or people's livelihoods. Overwhelmingly, it was discovered that the local communities lack the basic western education needed for efficient development which could enable them secure white collar jobs elsewhere so had to cling to the few occupations having very good environmental inclination such as farming, fuel wood harvesting and selling, fishing and so on.

Evidently, the socio-economic impacts of desertification in all the study locations with the exception of Gumshi were found to be high. Thus, with the unprecedented increase in the rate of deforestation activities such as logging coupled with the non chalet attitudes of the local communities towards controlling desertification and its impacts, continuous deforestation acts by the local people, lukewarm attitudes of the Government, increasing over dependence of the local communities on fire wood as the dominant source of domestic energy as well as the growing dependence of considerable number of the local communities on fire wood selling as a source of income, desertification can continue taking toll in these areas and its impacts both socially and economically can escalate. Consequently, all other businesses including farming, fishing, grazing and transportation can be seriously affected and their sustainability can be threatened. Such a situation can

force the mainly poor and illiterate local people to further engage in more environmentally devastating activities or even migrate to other places in search of livelihoods.

Recommendations

Based on the findings made by this study, the following recommendations are hereby proffered:

1. Many of the areas being threatened by desertification are mostly inhabited by poor rural communities who depend largely on the soil resources as their source of livelihoods and the increasing impacts of desertification further deteriorates resourcefulness of the land resources hence, resulting in diverse socio economic impacts. Thus, the first step in combating these adverse phenomena is to highly enlighten the local communities on the adverse impacts of desertification on the environment as well as their livelihoods. This can then be followed by: Hence,
2. Rural communities should be actively involved in any government or other stakeholders sponsored programmes to combat desertification.
3. Local farmers should be discouraged from environmentally devastating activities such as overgrazing, fuel wood harvesting and bush burning all of which contribute to desertification.
4. Agricultural Extension workers should be massively deployed to rural areas prone to desertification to train farmers on how to improve their activities amidst desertification induced problems.
5. Government should employ massive and effective programmes to combat the menace of desertification in all vulnerable areas such as the establishment of shelter belts, tree planting campaigns, establishment of vast sustainable irrigation fields etc.
6. Government should imbibe the spirit of proper maintenance culture in respect of all established desertification control programmes such as shelter belts and tree plantings.

7. Established deforestation laws should be made well known to the people and strictly adhered to.
8. Fuel wood harvesting especially in areas prone to desertification should be discouraged by the provision of more job opportunities as well as other sources of fuel such as kerosene.
9. Bore holes and other stable sources of potable water supply as well as other necessary infrastructure should be made available in all areas affected by desertification in order to ease their social sufferings
10. Rural people's productivity should be boosted by the government through financial assistance such as the provision of soft loans and acquisition of entrepreneurial skills like welding, carpentry, tailoring etc.
11. Most importantly, ecological Funds being allocated to all desertification prone states by the Federal Government of Nigeria should be judiciously used mainly for the purpose it is meant.

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