Assessment of Farmers' Perception of Land Degradation and Coping Strategies in Yobe State, Nigeria

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ABSTRACT
The study was conducted between December 2019 – February 2020 in Nguru, Potiskum and Gujba Local Government Areas of Yobe state, Nigeria with sole aim of assessing farmers’ perception of land degradation and coping strategies in the state. Descriptive Survey design involving both quantitative and qualitative methods using structured questionnaire and Focused Group Discussions was adopted. A total of 110 farmers were sampled using Purposive and Convenient techniques. Respondents’ demographic data revealed that the majority of the respondents were uneducated male youth with good years of experience in farming practicing non-mechanised rain fed commercial farming with vast farmlands. Crops commonly grown were corn (Zea mays), groundnut (Arachis hypogaeae), maize (Zea mays), beans (Phaseolus vulgaris), sesame (Sesamum indicum) and sorghum (Sorgum bicolor) and commonly observed forms of land degradation included wind erosions, soil nutrient depletion, loss of soil fertility, loss of vegetation cover and break down of soil structure. Other forms of land degradation peculiar to some of the studied places were bio-invasion and salinization in Nguru and serious water erosion in Potiskum. The most common unsustainable farming practices identified included deforestation, bush burning, mono-cropping, increased tillage, continuous cultivation, indiscriminate use of fertilizer and other agro-chemicals. The farmers’ perceptions on the causes of land degradation were not more different and included deforestation, bush burning, natural causes, continuous cropping etc. while its indicators according to the farmers’ perceptions included loss of soil fertility, poor crop yield etc. The farmers also believed that the major impacts of land degradation were reduced crop yield which translates into increased poverty among farming communities. With regards to the possible solutions to land degradation, the farmers believed that measures such as shifting cultivation, reforestation, stopping bush burning, mulching, use of organic manure, application of inorganic fertilizer etc. were adopted by the farmers. Besides, to cope with the impacts of droughts and delayed rains, the farmers usually practice early planting and use of improved seeds especially drought resistant seeds. Based on the outcome of the study, it was concluded that despite being fully aware of the environmental impacts of some farming practices such as bush burning, farmers in these areas still engage in many unfriendly farming practices probably due to poverty, culture or ignorance. Hence, it was against this background that a strong recommendation was proffered that special laws and regulations should be enacted to tackle human induced agricultural land degradation.

Key words: Farmers’ Perception–Land degradation–Yobe state.

INTRODUCTION:

The general importance of agriculture cannot be over emphasized. It plays a vital role in the growth of communities...
and states as a source of income and as a source of food and raw materials to man. It is also a source of employment for very large populations of people especially in developing countries. Many nations and communities largely depend on agriculture as their main revenue earner. Approximately 70% of the people in developing countries directly depend on agriculture as a means of living (www.farminportal.co.za). The high percentage of people depending on agriculture as main source of livelihood might be as a result of none development of non-agricultural activities to absorb the fast growing population. However, in developed countries this is not the case.

Although agricultural activities were largely affected by the discovery of crude oil in the early 70’s in Nigeria, it still remains the main occupation to a very big population of the people especially in rural areas with over 75% of the people living in rural areas directly depending on agriculture as their main source of livelihood (www.yokebay.com). Agriculture still contributes immensely to the Nigeria’s Gross Domestic Product (GDP). For instance, GDP from agriculture in Nigeria increased to 5,408, 978.92 Naira in the third quarter of 2019 from 3,857705.59 Naira in the second quarter of the same year (www.tradingeconomics.com) while in 2018 agricultural contribution to the Nigeria’s GDP stood at 21.2% (www.statista.com). Thus, the development of the agricultural sector in Nigeria which is the most populous nation in Africa and probably the seventh most populated in the world becomes necessary in order to be self-reliant and be able to feed the fast growing population that is expected to reach 200 million people now.

However, the development of agriculture in many parts of the world especially in the developing world is being hindered by a number of both natural and anthropogenic factors. Cumulatively, these make man’s survival on earth a very difficult one due to degradation of natural resources such as land. Land degradation can have significant impact on agricultural practices especially crop production since the sustainability of agriculture cannot be maintained when land is degraded. According to the International Encyclopedia of the Social & Behavioural Sciences (2001), land degradation is defined as the temporary or permanent decline in the productive capacity of the land, and the diminution of the productive potential, including its major land uses (e.g. rain-fed arable, irrigation, forests) its farming systems (e.g. smallholder subsistence), and its value as an economic resource. This definition failed short of considering the causes of land degradation as well as its impacts on land biodiversity. A more comprehensive definition was given by Oldeman, (1994) who defined it as the decline of land’s capacity to sustain agro-forestal and other biotic production and diversity due to human activity. Oldeman’s definition also failed short of considering decline in productivity that is due wholly to natural causes, and restricted land degradation to anthropogenic effects only. Certainly, land degradation has been confirmed to be caused by both natural and anthropogenic factors.

Depending on the degree of its intensity, land degradation manifests itself in many forms. The major forms being soil erosion, increased sediment loading of water bodies, loss of soil fertility, salinization, reduced ground cover, breakdown of soil structure, reduced soil water retention capacity, soil nutrient depletion as well as reduced carrying capacity of pastures. Besides, other different forms of land degradation may also exist depending on the geographical locations of areas. For instance, in semi-arid zones, desertification leading to wind erosion and drought are the main natural causes of land degradation leading to erosions, breakdown of soil structure, loss of soil fertility, loss of vegetation cover and so on while in coastal areas flooding, waterlogging and salinization might be the major causes. Another form is bio-invasion by invasive species such as Typha domingensis which tend to degrade the land by invading farmlands and irrigation fields. The invasion of the Hadejia-Nguru Wetlands in Nigeria is a very good example of land degradation caused by bio-invasion while in areas with increased oil exploration activities; land degradation caused by oil spillages is the most common.

Many unsustainable agricultural related practices especially in dry areas of Sub Saharan Africa such deforestation, bush burning, indiscriminate use of agro-chemicals, overgrazing and over cultivation may lead to land degradation which manifests in different forms. For instance, deforestation, bush burning and overgrazing expose the land to harsh environmental conditions which sometimes serve as catalysts for rapid degradation of the land. Whichever form it may assume, the main concern over land degradation is its significant impact on agricultural activities and food security.

There is a growing global awareness that land degradation is as much a threat to environmental well-being as more obvious forms of damage, such as air and water pollution (Conacher, 2001). It occurs slowly and cumulatively and has long lasting impacts on the environment as well as the people around especially rural people who become increasingly vulnerable. Usually, the source of land degradation is usually local, but its impacts often extend to considerable distances from the source site. It can impact large areas and many people and has both on-site and off-site effects. The on-site effects of land degradation include the lowering of the productive capacity of the land, causing reduced outputs (crop yields) or the need for increased inputs while the offsite effects may include changes in the water regime including decline in river water quality, sedimentation of river beds and reservoirs, eutrophication of water bodies, overblowing or sand deposition and so on.

In addition, the impacts of land degradation can be mild, moderate or severe depending on the scale and extent of the problem. Studies in 1997 showed that 64 per cent of Kenya’s land area was potentially subject to moderate desertification and about 25 per cent were vulnerable to severe to very severe desertification (www.na.unep.net). According to Eswaran et al., (2001), the productivity of some lands has declined by 50% due to soil erosion and desertification. Yield reduction in Africa due to past soil erosion may range from 2 to 40%, with a mean loss of 8.2% for the continent. In South Asia, annual loss in productivity is estimated at 36
Inappropriate farming practices as well as Boko Haram insurgency possibly sparked by land degradation, food security and stability in food pricing.

Currently, due to the ever increasing decrease in land resources, competition over land resources had led to incessant Farmer-Herdsmen clashes in many parts of the state. Such clashes usually erupt when herdsmen encroach into farmlands to graze their livestock as a result of which enormous destructions are inflicted on the farmers. In most cases, this led to deadly clashes leading to casualties on both sides, killing of animals, destruction of food crops and other infrastructure etc. In most cases, the eventual consequences of such clashes significantly affected food security through loss of crops, destruction of farmlands, under cultivation among others all of which serve as obstacles for agricultural sustainability. Besides, the menace of Boko Haram insurgency is also having a toll on agricultural production in the state as a result of displacements and killings of farmers, destruction of farmlands and farm produce etc.

In a report by the Yobe State Agricultural Development Programme (YSADP, 2017), agricultural buoyancy of the state seems to be at stake due to fall in agricultural productivity especially in the field of crop production. The report attributed a number of both natural and anthropogenic factors to this ugly scenario. A Daily Trust report of 19 April, 2019 stated that, Yobe state faces enormous challenges as a result of drought, soil degradation and desert encroachment, a development which precipitates a poor harvest, leaving farmers who constitute over 80% of the population of the state in anguish. The report further stated that, the late arrival of rains restricts farmers in the state from going to farms on time. The result has been that of serious threats to food security and stability in food pricing.

Further exacerbating the menace of land degradation in the state are the unsustainable and environmentally devastating farming activities being engaged by the farmers. As in many parts of Nigeria, peasant farmers form bulk of the farming communities in the state many of whom happen to lack the privilege of western education. In their quest to boost their agricultural productivity, majority of the farmers engage in certain unsustainable farming practices which further degrade the land. For instance, it is very common

2 STATEMENT OF THE PROBLEM:

Yobe state is essentially an agrarian state in the north eastern part of Nigeria with nearly 80% of its local population employed in the agricultural sector. Crops such as maize, sorghum, millet, groundnut, cowpea, cotton, sesame and beans are produced in large quantities in the state. In addition, wheat, rice and vegetables such as pepper, tomatoes, onion, okra etc. are cultivated along the Fadama wetland areas and basins of rivers. In terms of livestock production, Yobe state happens to be one of the largest producers of livestock in the country in addition to being the largest producer of Gum Arabic. However, despite its position as one of the food baskets of the country, over the few recent years, the state has witnessed significant decline in its food production capacity attributable to harsh weather conditions, inappropriate farming practices as well as Boko Haram insurgency.

Probably due to its geographic location, Yobe state is being confronted by wide scale land degradation attributable to natural factors such as soil erosion, desertification, drought etc. that continue to threaten the sustainability of agriculture. Generally, sustainable agriculture seeks to integrate three main objectives namely; a healthy environment, economic profitability, and social and economic equity. For many years, the state had battled desert encroachment, wind erosion, deforestation, flood, drought, seasonal and delayed rainfall, pests and diseases infestations, bioinvasion and so on. Out of the 17 Local Government Areas that make up the state, about 8 are seriously threatened by serious land degradation due to desert encroachment to the extent that some communities had to relocate or migrate to other places considered to be more fertile. The major problem of land degradation in these areas is loss of soil fertility which had rendered many farmlands useless. For example, in Yusufari LGA, a farming town of nearly 1400 inhabitants called Kaskar had to relocate in whole two times in thirty years due to wind erosion and desertification that led to complete loss of soil fertility (M. Babagana et al., 2018). Similarly, many farmlands had to be abandoned by farmers in many other towns and villages not only due to loss of soil fertility sparked by desertification but also due to accumulation of sand dunes that make movement of people and vehicles very difficult. Despite its huge economic importance to the communities living around it as well as the Nigerian state, Hadejia-Nguru Wetlands on which more than 1.5 million people largely depend for survival through agricultural activities is at the verge of disappearing due to invasion by Typha species (Typha domingensis).

Certainly, the impacts of land degradation in the Yobe state does not only affect agricultural sustainability alone but had also led to serious social unrests among different communities who depend on land resources for survival. Currently, due to the ever increasing decrease in land resources, competition over land resources had led to incessant Farmer-Herdsmen clashes in many parts of the state. Such clashes usually erupt when herdsmen encroach into farmlands to graze their livestock as a result of which enormous destructions are inflicted on the farmers. In most cases, this led to deadly clashes leading to casualties on both sides, killing of animals, destruction of food crops and other infrastructure etc. In most cases, the eventual consequences of such clashes significantly affected food security through loss of crops, destruction of farmlands, under cultivation among others all of which serve as obstacles for agricultural sustainability. Besides, the menace of Boko Haram insurgency is also having a toll on agricultural production in the state as a result of displacements and killings of farmers, destruction of farmlands and farm produce etc.

million tons of cereal equivalent valued at US$5,400 million by water erosion, and US$1,800 million due to wind erosion.

Out of the global land area of 13.2 billion ha, 12% (1.6 billion ha) is currently in use for cultivation of agricultural crops (FAO). Thus, with the current growth rate of the human population, more land areas will be expected to be put under cultivation thereby exerting more pressure on the land resources. Consequently, without sustainable agricultural practices, the quest to feed the ever growing human population which is currently put at more than 7 billion people and estimated to be around 10 billion in 2050 through land cultivation can be catastrophic capable of causing serious land degradation. Land resources which provide the avenue for food production are being seriously affected by many agricultural practices as well as natural disasters leading to it degradation which ultimately lead to reduced agricultural productivity. Due to reduced agricultural productivity possibly sparked by land degradation, food security in many places is at risk of being threatened especially in the less developed nations with lesser technological development. Thus, there is a greater need to maintain the quality of natural resources to ensure sustainability in agriculture.
and normal for farmers to engage in deforestation and bush burning in the name of farm clearance, indiscriminately use agrochemicals especially fertilizers and increase tillage in the name of arresting nutrient depletion. Definitely, these acts further degrade the land which the farmers may or may not be aware.

It is against this background that this study was conducted with the sole aim of assessing the farmers’ perception of what land degradation actually means to them regarding its causes, indicators, consequences, coping strategies and solutions.

3 PURPOSE OF THE STUDY:
The main objective of this study was to assess and analyse farmers’ perceptions of land degradation and its impacts of food production in Yobe state.

4 OBJECTIVES OF THE STUDY:
The specific objectives of this study were to:

1. To assess the major forms of agricultural land degradation in Yobe state.
2. To examine the major farming practices of the farmers capable of causing land degradation
3. To assess the farmers’ perceptions of land degradation regarding its causes, indicators and consequences
4. To assess the farmers’ perceptions on the possible solutions to land degradation in the state.

5 MATERIALS AND METHODS:
The study which adopted Descriptive Survey method involving quantitative and qualitative approaches was conducted between the months of December 2019-February 2020. Data collecting instruments used were structured questionnaire, Focused Group Discussions as well as Observation methods. A total of 110 respondents sampled purposely and conveniently formed the study population. Quantitative data was analysed using Descriptive Statistics while data from the FGD was analysed using Content Analysis Method.

Study area:
One Local Government Area was selected for the study from the three senatorial districts in the study which included Nguru from zone C, Potiskum from zone B and Gujba from zone A. Nguru with a population of 111,014 lies within 11°52’37”N 10°27’19”E; Potiskum has a population of 86,002 and lies within 11°42’50”N 11°4’52”E while Gujba with a population of 11,359 also lies within 11°29’50”N 11°56’2”E

Temperature: The hottest season lasts for 3 months, from March to June, with an average daily high temperature above 101°F. The hottest month of the year is usually April, with an average high of 105°F and low of 81°F. The cool season lasts for 3 months, from December to February, with an average daily high temperature below 89°F. The coldest month is usually January, with an average low of 59°F and high of 85°F.

Precipitation: The wetter season lasts 4 months, from June to September. The chance of a wet day peaks are usually in August while the drier season lasts nearly 9 months from September to June. The smallest chance of a wet day is 0% on January 1.

Rainfall: The rainy period of the year lasts for 4 months, from June to October. The most rain falls during the 31 days centered around August with an average total accumulation of 5.4 inches. The rainless period of the year lasts for 7 months from October to May.

Wind: The windier part of the year lasts for 6 months, from October to April with average wind speeds of more than 8.0 miles per hour. The windiest month of the year is February, with an average hourly wind speed of 10.7 miles per hour. The calmest time of year lasts for 6 months, from April to October. The calmest month of the year is usually September with an average hourly wind speed of 5.3 miles per hour.

Topography: The topography is essentially flat, with a maximum elevation change of 43 feet and an average elevation above sea level of 1,138 feet. For instance, the area within 2 miles of Nguru is covered by grassland (34%), cropland (32%), sparse vegetation (12%), and shrubs (11%), within 10 miles by grassland (46%) and cropland (42%), and within 50 miles by grassland (51%) and cropland (39%).

6 RESULTS AND DISCUSSIONS:
Being the most populated area among the three places selected for the study, 40.9% of the responded came from Potiskum LGA while Nguru and Gujba had 31.8% and 27.2% respectively. As it is the case in many parts of Nigerian, male respondents were the dominant in the study constituting about 86.4%. This finding agrees with many reports made by many scholars including Amber et al., (2011); Andrew and Esteban (2010); Solomon (2017); and Gbemisola et al., (2015). Gbemisola et al., (2015) reported that, women production in agriculture in northern Nigeria is 28% less than their male counterparts. Educationally, majority of the responded lacked tangible qualifications as 41.8% of them had only Quranic education without any form of formal western education while 10.9% and 23.6% had only primary and secondary certificates only. Out of the 110 respondents, only 14.5% and 9.1% obtained post-secondary school qualifications but none was found to possess any post graduate certificate. These findings agree with many other reports by...
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Table 1. Respondents’ demographic characteristics

| Variables       | Frequency | Percentage |
|-----------------|-----------|------------|
| Location        |           |            |
| Nguru           | 35        | 31.8       |
| Potiskum        | 45        | 40.9       |
| Gujba           | 30        | 27.2       |
| Gender          |           |            |
| Male            | 95        | 86.1       |
| Female          | 15        | 13.6       |
| Age             |           |            |
| 15-25 Years     | 11        | 10.0       |
| 25-35 Years     | 12        | 10.9       |
| 35-45 Years     | 27        | 24.5       |
| 45-55 Years     | 41        | 37.2       |
| 55-65 Years     | 12        | 10.9       |
| Above 65 Years  | 7         | 6.4        |
| Educational Qualification |      |            |
| None            | 0         | 0          |
| Arabic          | 46        | 41.8       |
| Primary         | 12        | 10.9       |
| Secondary       | 26        | 23.6       |
| ND/NC           | 18        | 14.5       |
| HND/Bachelors   | 10        | 9.1        |
| Post Graduate   | 0         | 0          |
| Years of Experience |      |            |
| 1-5 Years       | 14        | 12.7       |
| 6-10 Years      | 14        | 12.7       |
| 11-15 Years     | 25        | 22.7       |
| 16-20 Years     | 12        | 10.9       |
| 21-25 Years     | 40        | 36.4       |
| 26-30 Years     | 10        | 9.1        |
| Above 30 Years  | 9         | 8.2        |

Table 2. Respondents’ occupational characteristics

| Type crop grown | Frequency | Percentage |
|-----------------|-----------|------------|
| Corn            | 79        | 71.8       |
| Maize           | 64        | 58.2       |
| Sorghum         | 51        | 46.4       |
| Beans           | 66        | 58.2       |
| Groundnut       | 97        | 80.0       |
| Sesame          | 47        | 42.7       |
| Rice            | 34        | 31.0       |
| Vegetables      | 24        | 21.8       |
| Cassava         | 12        |            |

With regards to the type of farming engaged by the farmers, 81.0% claimed to be commercial farmers growing crops both for personal consumption and for commercial purposes with only 28.2% being subsistence farmers. Crops usually grown for commercial purposes in these areas included sesame, rice, beans, groundnut and maize. Due to the poor nature of the majority of the farmers, only 25.5% of the respondents stated that they employ mechanized farming using equipment such as tractors while bulk of the farmers (74.5%) engage in manual farming making use of human labour throughout the farming activities from tilling, planting to harvesting which they complain of being so strenuous, time coming and less productive. Besides, as stated above, due to the short and delayed rainy season usually experienced coupled with the lack of water bodies, the majority of the farmers (81.0%) engage in rain fed farming except in few places where irrigation is made possible by the presence of wetlands, rivers and streams. Usually, rainy season lasts on 3 months in these areas normally between the months of July- September. Traditionally, mixed cropping is the most favourite type of cropping in these areas where farmers usually grow cereal crops such as corn, maize and sorghum along with crop such as beans, groundnut and sesame. About 80.0% of the respondents engage in mixed cropping. Usually mixed cropping gives farmers the opportunity to grow different crops on same piece of land thereby increasing productivity.

Meanwhile, farm sizes owned by the farmers were also encouraging which means that the farmers had enough farmlands to produce more crops but could not do so because of poverty and lack of government intervention. More than 70.9% of them claim to own farm sizes of between 1 – 9 hectares of land with only 21% stating that their farmlands were less than 1 hectare. Besides, the farmers stated that they usually save more than half of the amount they realize from the sales of their harvests for the next labour intensive
farming season as a result of which they still remain within the circle of poverty.

**Major forms of land degradation observed in the areas:**

Land degradation manifests in different forms depending on geographical location all of which pose a serious threat to agricultural activities. Although this phenomenon was also reflected in this study, some forms of land degradation remain common to all the study areas. The forms of land degradation that were found to be common in all the places studied included wind erosion, soil nutrient depletion, loss of soil fertility, loss of vegetation cover and break down of soil structure. Other forms of land degradation peculiar to some of the studied places were bio-invasion and salinization in Nguru and serious water erosion in Potiskum. These findings do agree with those made by Maiangwa et al., (2007) who found loss of vegetation cover, forest and woodland destruction, accelerated erosion etc. as the major forms of land degradation in North-West Nigeria.

**Major unsustainable farming practices identified**

It is obvious that many of the farmers engage in certain farming practices capable of devastating the land and causing further land degradation. This was gathered from the questionnaire and focused group responses from the respondents. The most common environmentally unfriendly farming practices identified included deforestation, bush burning, mono-cropping, increased tillage, continuous cultivation, indiscriminate use of fertilizer and other agro-chemicals. Other authors in the field have expressed same findings (B.M. Macaulay, 2014, Maiangwa et al., 2017). The table below shows the farmers’ responses in this regard (multiple responses).

| Practices                | Frequency | Percentage |
|--------------------------|-----------|------------|
| Deforestation            | 88        | 80.0       |
| Bush burning             | 76        | 69.1       |
| Continuous cultivation   | 102       | 92.7       |
| Indiscriminate use of fertilizer | 105  | 95.5       |
| Over use of agro-chemicals | 78     | 71.0       |
| Increased tillage        | 110       | 100        |

About 80.0% of the farmers agreed to have engaged in deforestation aimed at clearing land for cultivation. However, they stated that they engage in such acts only when a new land is being cleared for cultivation. Although 69.1% of the respondents agreed to engage in bush burning, only 33.7% of them were aware of its devastative consequences. According to them bush burning was an annual event aimed at clearing farm lands for cultivation and to ease tillage. Both bush burning and deforestation expose land to harsh environmental conditions such as erosion.

Certainly, the relationship between increased tillage and soil nutrient depletion is an obvious one however, farmers in these places practice tillage on yearly basis. All the farmers (100%) agreed to engage in increased tillage which leads to breakdown of soil structure leading to both wind and water erosion as a result of which soil nutrient can be easily washed away. According to the farmers, in most cases, farmers engage in tillage three times during each farming season with the aim of eradicating weed and increasing soil aeration and permeability to water. This could be the reason as to why 95.5% of them stated that they rely heavily on fertilizer application to increase yield; a habit to which most of the farmers were addicted to. Besides, could it be that the farmers were unaware of the benefits of shifting cultivation especially in boosting soil nutrient and fertility, 92.7% of them agreed to engage in continuous cultivation of same pieces of land for many years with very short period of fallow. This could possibly be a culture but not a necessity warranted by lack of enough land to cultivate because the respondents’ occupational characteristics revealed that they had enough farmlands to cultivate. Certainly continuous cultivation of same piece of land seriously depletes soil nutrient which lead to loss of soil fertility while shifting cultivation allows the soil to replenish with time. Since soils in the Sudano-Guinean zone tend to be thin and not very fertile, diminished fallowing often causes yields to fall off substantially because land is given less time to recover between cropping cycles (Southgate et al., 1990 cited in Mainangwa (2007), According to Lal and Okigbo (1990) cited in Maiangwa (2007), 5 -7 years period is required to restore soil fertility.

Similarly, in their quest to curb the menace of weeds, pests and diseases, 71.0% of the farmers stated they use other agro-chemicals such as pesticides without proper knowledge of its application, uses and side effects. The environmental consequences of such acts are quite obvious especially on land and water bodies. This could be a major threat especially in Nguru where a good percentage of the farmers engage in farming along the Nguru wetlands. It should be remembered that the Nguru wetlands is currently battling invasion by the stubborn macrophyte called *Typha domingensis* which has invaded a considerable part of the wetland making fishing a farming very much difficult or totally impossible for many farmers as a result of which many farming communities have relocated to other places (M. Babagana et al., 2018). In addition to invasion by invasive species, eutrophication could also ensue due to indiscriminate use of agro-chemicals along water bodies.

**Farmers’ perception of land degradation:**

In their response to what the concept of land degradation means to them, 95.4% of the farmers believed that it means loss of soil fertility. To them it is situation whereby agricultural land loses its ability to maximally support plant growth and guarantee good yield. According to the International Encyclopedia of the Social & Behavioural Sciences (2001), land degradation is defined as the temporary or permanent decline in the productive capacity of the land, and the diminution of the productive potential, including its major land uses (e.g. rain-fed arable, irrigation, forests) its farming systems (e.g. smallholder subsistence), and its value as an economic resource. Considering this definition, the farmers could be described as narrow minded in their belief of what land degradation means because their understanding of the concept entirely rallies round degradation of
agricultural land only not minding the degradation of other forms of land.

**Perception on causes and indicators of land degradation:**

The table below shows the farmers’ responses on the possible causes and indicators of land degradation (multiple response n=110)

| Causes                  | Frequency | Percentage |
|-------------------------|-----------|------------|
| Natural                 | 69        | 62.7       |
| Desertification         | 57        | 52.0       |
| Deforestation           | 24        | 22.0       |
| Continuous cultivation  | 99        | 90.0       |
| Divine retribution      | 78        | 71.0       |
| Bio-invasion            | 21        | 19.1       |
| Bush burning            | 19        | 17.3       |
| Erosions                | 98        | 89.1       |
| Climate change          | 13        | 11.8       |
| Overgrazing             | 43        | 39.1       |

**Indicators**

| Indicators                                      | Frequency | Percentage |
|------------------------------------------------|-----------|------------|
| Stunted plant growth                            | 110       | 100.0      |
| Decreased farm yield                            | 110       | 100.0      |
| Loss of soil fertility                          | 110       | 100.0      |
| Emergence of Guiera senegalensis                | 65        | 59.1       |
| Soil colour turning bright                      | 88        | 80.0       |

Surprisingly, some of the perceptions the farmers have on the possible causes of land degradation could be described to have some religious inclination. Yobe state is predominantly a Muslim state with majority of its indigenes being Muslims. Thus, 72.7% of the farmers believed that land degradation occurs naturally inconsiderate of human intervention while another 71.0% believed that it occurs as a divine retribution due to people’s piling sins. Nevertheless, land degradation can occur as a result of some natural forces such as desertification, proofs of human contribution to its occurrence are also evident. According to B. M. Macaulay (2014) about 80% of the inhabitants of northern Nigeria are farmers who require the use of land which if not properly managed may lead to over-exploitation of the natural resource and consequently degradation. This might further be exacerbated particularly when the farmers happen to be illiterate lacking any knowledge of proper land management systems. Similarly, despite the fact that deforestation has been strongly linked to land degradation in many parts of the world and that 80.0% of the respondents engaging in it, only 22.0% of the farmers believed that deforestation can cause land degradation. Maiangwa (2007) reported that all the 240 farmers sampled in his study used fire to burn agricultural residues on farmlands in an effort to clear land for cultivation while Andreae and Goldammer (1992) cited in Maiangwa (2007) reported that a large fraction of burning in the tropical countries takes place whenever and wherever there was plant material dry enough to burn.

Another common factor believed by the farmers to be the possible cause of land degradation is erosion (89.0%). Farmers in Potiskum had the notion that water erosion is the main cause of land degradation in the area causing the loss of soil nutrient while their counterparts in Nguru believed that wind erosion is the culprit. Certainly, the role of erosion in causing land degradation has been largely documented and reported by many other authors. However, majority of farmers in Gujba did not agree that erosion is an issue of major concern as far as land degradation is concerned. Verily, Gujba LGA has a sort of relatively thicker vegetation cover that the remaining two places studied making it less vulnerable to erosions.

In addition, bio-invasion by the stubborn *Typha dominantensis* was also cited by farmers in Nguru as a major cause of land degradation because of its ability to invade farmlands making them uncultivable. In Nguru LGA, thousands of farming communities rely heavily on the Hadejia-Nguru Wetlands for livelihood which has been heavily invaded by the invasive *Typha spp.* Most possibly, among the few educated respondents, 11.8% of the farmers believed that climate change is to be blamed for the increasingly degrading land. Definitely, impacts of climate change such as delayed rains, drought and high temperatures could have devastating effect on agricultural activities especially in the semi-arid zones of Africa where Yobe state is located. The role of overgrazing in causing land degradation was also highlighted by the farmers (39.1%) especially by making soil surface becoming bare without much vegetation as well as enhancing erosions. Overgrazing was observed to be more intense in Nguru and Potiskum where desertification and erosions have led to much decreased pasture due to which grazing by herdsmen has been intensified. Maiangwa (2007) had a similar result.

With regards to the indicators of land degradation in the areas studied, the farmers’ perception was indifferent from the real manifestations or characteristics of a degraded land in general as 100% of them agreed that stunted plant growth, decreased farm yields and loss of soil fertility were the major signs of land degradation in the areas. This finding agrees with those of many other authors in the field. Besides, another 80.0% of the farmers also believed that a change in the soil colour losing its usual dark brown colour to a brighter one is another form of indicators of land degradation. Another sign of land degradation observable in the areas as stated by the farmers that might perhaps not been much talked about is the emergence of a spp. of shrub locally known as *Sabaru* (*Guiera Senegalensis*). According these farmers, proliferation of this shrub signifies significant loss of soil nutrient which perhaps favours its growth. However, this calls for further research to confirm.

**Perception on the effects and solutions to land degradation:**

Farmers’ perception on the effects of land degradation seemed to be double folded; one affecting the farming practice and the other affecting the farmers’ socio-economic status. The table below shows the farmers multiple responses in this respect.

Stunted plant growth and poor crop yield were the most common effects of land degradation according to the farmers’ perception (100%). This is obvious as numerous other
studies have confirmed that. Decrease in annual crop yield resulting from stunted plant growth which they attributed to land degradation usually forced them to spend a lot in purchasing fertilizers to boost yield. According to them this has become overwhelming. They believed that the poor plant growth arises from the loss of soil nutrient which always led to loss of soil fertility. In addition, the farmers also believed that land degradation posed some social risks which included migration (49.1%), conflicts (96.0%), food crisis (96.0%), as well as increased logging (76.0%). Definitely, wherever a decrease in crop yield prevails, food crisis must ensue resulting in significant drop in food availability. Berbier (2018) cited in Maiangwa (2007) puts it that first global assessments of land degradation indicate that the problem is worsening in some regions and increasingly linked to food insecurity. Basically, farming communities resort to migrate to other places due to their inabilitys to cope with the dwindling land resources and the looming food crisis. M. Babagana et al., (2018) reported that a whole town of Kaskar with a population of 3000 in Yusufari Local Government Area of Yobe state relocated two times in the last thirty years due to land degradation caused by desertification. Certainly, when land is degraded it loses its social and economic values due to decrease in land resources as a result of which communities that largely depend on it for livelihood are compelled into intense competition over the dwindling resources. Consequently, social crises such as Farmer-Herdsmen Conflict become order of the day. Just like many other places in Nigeria, Yobe state is also prone to such clashes with deadly consequences (M. Babagana et al., 2019).

Land degradation is also inherent with profound economic implications as perceived by the respondents. This agrees with reports by other authors (Maiangwa, 2007; M. Babagana, 2018). It was revealed by this study that 85% and 79% of the farmers perceived land degradation to result in increased poverty among farming communities as well as hike in food prices respectively. This is true because decrease in crop yield always translates to decrease in income which in turn translates also to increased poverty among farming communities and in the state in general. This agrees with the findings made by Kirui, (2016) that land degradation significantly increases the probability of household poverty by 35% in Malawi and 48% in Tanzania. Given that land is an essential input in farming, the impacts of land degradation and depletion of soil resources have profound economic implications for low-income countries and poor rural regions of the world (Barbier, 1998 cited in Maiangwa, 2007). Besides, 76.0% of the respondents did also state that, in their quest to cope with the increasing rate of land degradation induced poverty, some farming communities embark upon massive logging and fire wood harvesting in order to complement their sources of income. This amounts to deforestation which further worsens the situation of land degradation especially in already degraded areas.

The farmers’ perception on the solutions to land degradation revealed quite a number of strategies as indicated in the table above. Controlling both water and wind erosions received the highest response rate of 92.7% meaning that the farmers were very much concerned with the negative impacts of erosion on their agricultural lands. Obviously, erosion is taking a toll on the farmers especially with its strong link to soil nutrient depletion. Signs of rill water erosion are very prominent in many of the farmlands observed in Potiskum LGA. Same reports were made by several reports. Second to erosion control was shifting cultivation (90.0%). Although more than 92% of the farmers agreed to engage in the cultivation of same pieces of farmlands for many years, this outcome proved the farmers’ awareness of the negative effects of their actions. Arresting desertification also received an overwhelming agreement of 88.2% from the respondents as one other effective strategy for combating land degradation. Obviously, desertification numerous threats to agricultural activities especially in Nguru LGA where the menace of desertification can no longer be handled by the Yobe state government along but had to receive the Federal government’s support. This is one of the reason why an the Federal government of Nigeria entered into European Union to come up with a land reformation programme known as the North-East Arid Zone Agricultural Development Programme (NEAZADP) that been in operation in the state for so many years.

Since a good number of the respondents had the notion that land degradation occurs as a result of people sinning against the almighty God, that perhaps may be the reason why 71.0% of them also believed that repentance is the another solution to the menace. Possibly this may be true since land degradation does also occur due to some natural factors such as drought and desertification, repentance may please the Lord. In line with this, the farmers (11.0%) also had a perception that by stopping the cultivation of fastidious crops such as sesame (Sesamum indicum) and watermelon (Citrus lanatus), the soil fertility could

| Variables                              | Frequency | Percent-age |
|----------------------------------------|-----------|-------------|
| Stunted plant growth                   | 110       | 100         |
| Poor crop yield                        | 110       | 100         |
| Increased poverty                      | 93        | 85.0        |
| Migrations                             | 54        | 49.1        |
| Conflicts                              | 96        | 96.0        |
| Food crisis                            | 96        | 96.0        |
| Hike in food prices                    | 87        | 79.1        |
| Increased logging activities           | 76        | 76.0        |
| Control erosion                        | 102       | 92.7        |
| Arrest desertification                 | 97        | 88.2        |
| Engage in shifting cultivation         | 99        | 90          |
| Stop deforestation                     | 23        | 21.0        |
| Stop bush burning                      | 9         | 8.2         |
| Eradicate invasive plant species       | 54        | 49.1        |
| Repentance                             | 78        | 71.0        |
| Stop planting soil nutrient depleting  | 12        | 11.0        |
| crops                                  |           |             |
| Control plant weeds                    | 54        | 49.1        |
be enhanced such that plant growth could be boosted to achieve good yield. However, this requires further research to confirm. In addition, it is also believed by the respondents that eradicating invasive spp. (49.1%) and controlling plant weeds (49.1%) could help in increasing soil fertility. Unsurprisingly, stopping deforestation and bush burning received the lowest acceptance rate from the farmers as measures to combat land degradation (21.0% and 8.2) respectively. Certainly, this was not an unexpected outcome specifically due to the fact that quite a good number of the farmers do not strongly believe that deforestation and bush burning could cause land degradation. However, a few farmers in Nguru do believe in the devastating effects of deforestation on the land.

Coping strategies:
To cope with the negative effects of land degradation on their agricultural activities, the farmers sampled in the study stated that they employ different measures aimed at mitigating the effects of erosion, loss of soil fertility, bio-invasion, drought, deforestation and plant weeds. Mulching and use of organic manure were some of the measures adopted by the farmers to mitigate the effects of erosion and loss of fertility. The common organic manure used was animal dung which is usually applied during the dry season before the onset of the rainy season. Besides, the farmers do also apply inorganic fertilizer in order to boost soil fertility which they do without proper knowledge of its application. Certainly, drought happens to be one of the natural causes of land degradation in all the areas studied. Rainfall is often much more delayed and lasts for only few months usually less than three months (June-August) as a result of which plants lack the required moisture for proper growth. Thus, in order to cope with this phenomenon, the farmers usually practice early planting and use of improved seeds especially drought resistant seeds. Consequently, sorghum and corn which do not require much rain are the most popular food crops grown in the areas and are the most stable food crops as well.

Despite the fact that farmers in Nguru employ different measures in order to cope with Typha invasion using methods such as manual clearance and chemical application, the invasive species always proved to be stubborn over powering the farmers control measures. Consequently, many farmland sizes have been heavily reduced by this invasive plant species thereby reducing the farmers’ productivity. Fishermen do also suffer the same fate.

7 CONCLUSION:
Although the majority of the farmers did not believe that some of their farming practices such as deforestation and bush burning could lead to land degradation, based on the findings made by this study, it can be concluded that farmers in the three local government areas studied are very aware of what land degradation means and its impacts on agricultural activities.

8 RECOMMENDATIONS:
In line with the outcome of the study, the following recommendations are proffered:

1. Some farming practices of peasant farmers who happen to constitute bulk of the farming communities in the country such as deforestation, bush burning and indiscriminate use of agro-chemicals are really environmentally devastating hence, there is a greater need for the formulation of laws and policies that will address such agricultural activities because most of the environmental laws and policies in Nigeria regarding land degradation are so vague and do not address agriculture induce land degradation. Thus, the need for laws and policies on agricultural land degradation is necessary.

2. Farmers should be made to understand the environmental impacts of some of their farming practices and be made to know that they are always the first victims of their actions.

3. Workshops and seminars should be organized to sensitize peasant farmers on how to cope with the impacts of climate change on agriculture especially through the adoption of SMART agriculture.

4. The issues of water erosion in Potiskum and Typha invasion in Nguru do really require urgent government intervention before they get out of hand.

5. More agricultural extension workers should be employed and be sent to train farmers on the use and application of inorganic fertilizer and other agro-chemicals as well as highlight the harmful effects of continuous cultivation and increased tillage to soil nutrient.

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