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IMPACT OF DEFORESTATION ON LAND DEGRADATION IN SHIRORO LOCAL GOVERNMENT AREA, NIGER STATE NIGERIA

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Abstract

The two dynamic but opposing forces that dominate the broad canvas of the history of degradation of environment in general and deforestation in particular are conservation and exploitation. This study examined the impact of deforestation on land degradation in Shiroro LGA, Niger state of Nigeria. The study utilized Landsat Image of year (TM 1998,ETM+ 2008,OLI 2018) responses from interview and questionnaire administered were analyzed. The results revealed that there were continuous changes among the various land use and land cover features, also that built up areas was on the increase from 946.9791(Km^2)to 1528.277 (Km^2) while forest cover was on the decrease from 2790.554Km^2 to 191.001 (Km^2) . The findings of the study also shows that agriculture expansion, livestock rearing, overpopulation, logging for fuel, urbanization and infrastructure development among others are the major causes of deforestation in the study area. The resultant consequence of deforestation in the study area are; reduction on crop yield and agricultural produce, exposure of top soil to erosion, decreased biodiversity, habitat loss, extinction of species, displacement of indigenous people, loss of soil macro and many more. Adaptation and mitigation strategies include training programmes on renewable energy technology to replace the use of forest produce for energy, increasing the area and standard management of protected areas, and increase the area of forest permanently reserved for timber production. It is recommended that afforestation, reforestation, tree husbandry and tree planting in the area should be encouraged, government should empower local farmers with available and sustainable knowledge on forest management, forest extension services to the rural households that engage in forestry activities should be strengthened.

Keywords: *Deforestation, Degradation, Environment, extinction, mitigation*

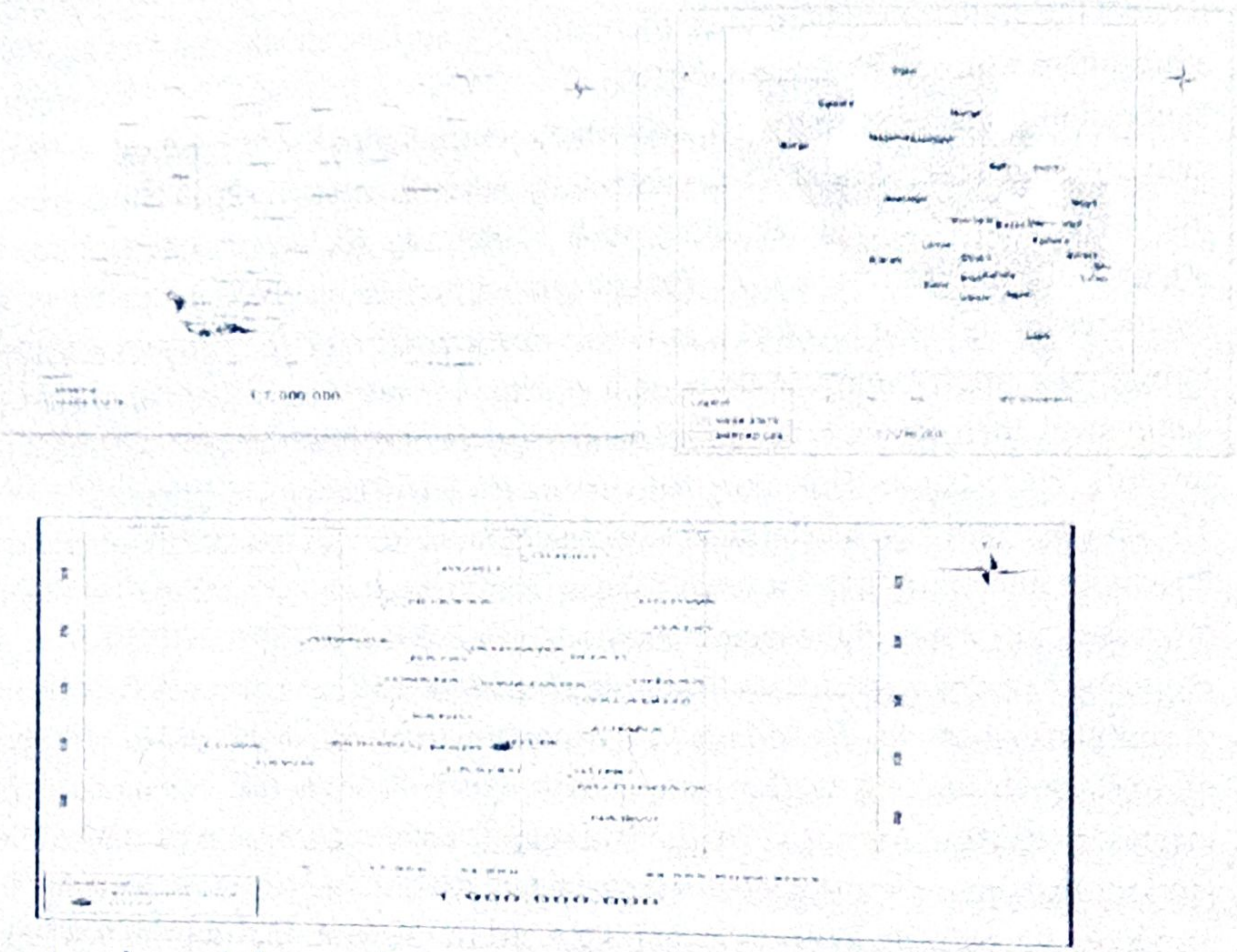
INTRODUCTION

In the current dynamic world, environment is increasingly becoming a center of analysis for the development of third world countries. The two dynamic but opposing forces that dominate the broad canvas of the history of degradation of environment in general and deforestation in particular are conservation and exploitation. Conservation is more of demanding with rewarding future while exploitation is an easy task compromising the needs of the future generation. The tension between them is symbolized with the struggle between life and death. More inevitably, deforestation renders the soil surface bare thus, increasing the surface albedo and making the earth atmosphere warmer. (Adebayo, 2010).

Deforestation is essentially an important phenomenon in ecological relationship between man and spatial environment. Man influences forest both directly and indirectly. Man's various activities such as farming and wood harvest have direct impact on land. For instance, evidences abound that charcoal production has been on the increase while the forested area is reducing drastically. The indirect influences are through the intervening variables such as man's perception of the forests as a vital component that enhance the peoples' livelihood and their lackadaisical behaviour towards reforestation. This has greatly increased forest ecology depletion.

The changes that man has brought to plant communities has led to various changes in the environment, e.g. it has modified the soil, influenced climate, affected geomorphic processes and changed the quantity of some natural water (Adebayo, 2010). A lot of problems have been created by the removal of vegetation such as accelerated leaching of soil nutrients down the soil profile beyond the reach of plants caused by exposure of soil which has led to the loss of ions like potassium (k), calcium (Ca), and magnesium (Mg) (Adebayo, 2010). The consequences of forest exploitation on soil nutrient and environment cannot be overstated. Over-exploitation of available forest resources for meeting the ever increasing demand for food, fuel and fiber which has led to loss of soil nutrients and environmental degradation is a worrisome development (Gabriel and Ayuba, 2006). The removal of trees without sufficient reforestation has resulted in damage to habitat, biodiversity loss and aridity. It has adverse impacts on biosequestration (process of capturing and storing of atmospheric greenhouse gas carbon dioxide by biological process) of atmospheric carbon dioxide. Often, critical limits are exceeded causing irreversible damage to the forest. Without the regenerative function and protecting influences of trees and their root systems on land, heavy rains on the cleared lands cause erosion to erode the land, thereby causing loss of nutrients to the soil, degrade forest and produce devastating erosion and flooding which destroy highways, dams, bridges, settlements and farmlands (Adetunberu, 2000).

Animal lives are under pressure, facing threats that include habitat loss from forest clearance, agriculture, herding and hunting for food profit. The indiscriminate exploitation of forest cover has resulted to a degraded environment with reduction in biodiversity (Peter, 2002). Forest support biodiversity, providing habitat for wildlife, moreover, forests foster medical conservation. The exploitation of forest resources did



not go beyond the search for medicinal herbs, fuel wood, game and construction materials (Oroka, 2009) . The consequences of man's activities leading to the deforestation have, in turn, led to erosion, desertification, soil infertility, shortage of food and fiber, reduction in the potentials of trees for air purification and reduction in wood and non-wood products.

Figure 1: The Study area (Shiroro Local Government Area, Niger State)
Source: Department of Geography (Remote Sensing Unit) FUT Minna

REVIEW OF LITERATURE

Ogundele and Oladipo (2016), taking into consideration the fact that this environmental problem has been alarmingly on the increase in Nigeria requires a work

of this nature. These pressures are due to urbanization, overpopulation, execution of developmental projects, agricultural expansion, mining, bush burning, logging and fuel wood collection among others. For the nation to retain the forest resources that promote rural welfare, income and employment generation, urban and rural livelihood, poverty alleviation, and sustainable forest management, then attempt should therefore be made to guide against human activities that encourage forest depletion.

Olofin (2017) studied the Effects of Deforestation on Land Degradation in ekiti state, Nigeria. The study was designed to investigate the effects of indiscriminate exploitation of forest on land degradation in Gbonyin Local Government Area of Ekiti State, South Western Nigeria. The result of the laboratory experiment on the soil samples shows that soils from the forest lands had calcium concentration that ranges from 40.50g to 71.20g while it ranges from 15.51g to 22.50g in the deforested lands, potassium concentration in the forest lands ranges from 42.50g to 82.50g while it ranges from 18.90g to 22.60g in the deforested lands, magnesium concentration in the forest lands ranges from 75.50g to 48.38g while it ranges from 11.8g to 21.00g in the deforested lands of the study area. The percentage of soil organic matter in the forest lands ranges from 10.70% to 5.10% while it ranges from 1.50% to 0.10% in the deforested lands of Gbonyin Local Government Area of Ekiti State. The concentration of bulk density in the forest lands ranges from 0.10g to 1.80g while it ranges from 4.80g to 9.80g. The low concentration of soil chemical property and high soil bulk density in the deforested lands of the study area shows the impacts of indiscriminate exploitation of forest on soil chemical and physical properties. Based on the current findings, it was presumed that land degradation in the deforested lands of Gbonyin Local Government Area of Ekiti State was as a result of indiscriminate exploitation of forest and poor farming system in the study area as exhibited by the differences in soil properties recorded in forest and deforested lands of Gbonyin Local Government Area of Ekiti State.

Ogunwale, (2015) trees in forested and agricultural landscapes are particularly important because they disproportionately provide high values of environmental services and biodiversity. The Government has over the years promulgated laws as regards forest conservation and protection but these laws are not enforced. The data were sourced through questionnaire and interview to test the participation of households in deforestation activities from the six geo-political zones of Nigeria. The Results of the qualitative analysis shows that poverty, awareness and lack of enforcement are important variables that affect greening the environment.

MATERIALS AND METHOD

The study investigated impact of deforestation on land degradation in Shiroro Local Government Area of Niger State. Questionnaire and interview were the primary source of data while the source of secondary data was Landsat image (Landsat ETM 1998 , Landsat ETM+ 2008, Landsat 8 OLI, 2018) to determine the trend of the degradation caused by deforestation in the study area, Data was collected using **Questionnaires** and **Landsat Image**. The questionnaire was administered using stratified random sampling approach while the satellite data were imported into ArcGIS 10.3 software in an image tif format for geometric correction. The analyzed data was presented in form of Tables, Figures and
charts. This is to create visual representation of the result.

Results and Discussions

(a) Analysis of Landsat imageries

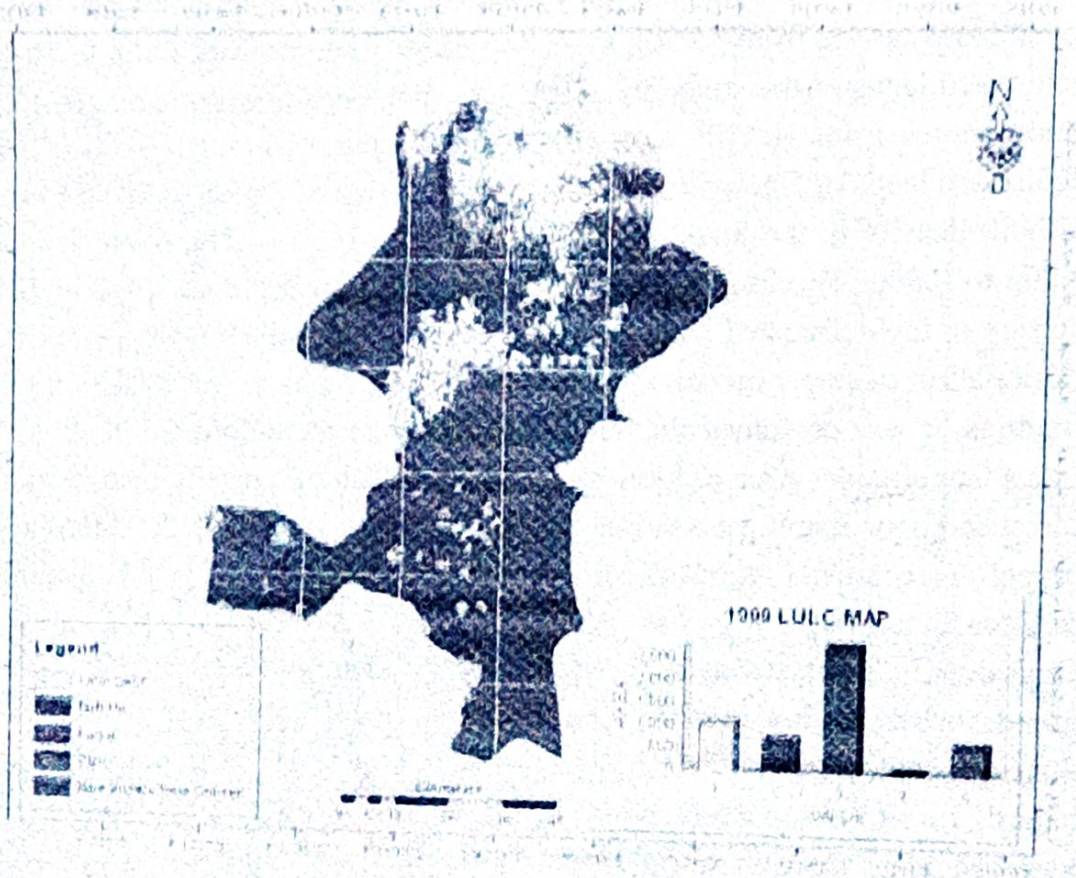


Figure 2: Classified 1998 LULC of the study area
(Source: Sayyad, 2019)

Figure .2 shows evidences of forest dominating the land surface which occupy about 2790.554 sqkm (52.70%) in the study area which is distributed all over the area, most

especially at the southern part of the study area. Another features which occupy a major area is bare surface and rock outcrop accounting for 946.9791sqkm (17.88%) of the total land area. Most of the bare surface and rock outcrop lands were located majorly in the northern section of the study area. This is followed by built up area which accounted for 814.2624 square kilometer (15.38%) were typical found across the north western, north eastern, and south western section of the study area. All of this analysis indicates that settlements present in the study area as at 1998 are very few. Also, farmland covers a percentage of 12.92% of the total land area which is approximately 683.9181sqkm. Finally, water body covers a total land area of 59.778 square kilometer (1.13%). The total land area of the study area is 5295.491 square kilometer.

Figure 3: Classified 2008 LULC of the study area
(Source: Sayyad, 2019)

Figure.3 shows that, as at 2008 the LULC statistics of the study area indicates that forest land areas has decrease drastically within the ten –years (10) time period from 2790.554 sqkm (52.70%) in 1998 and now accounted for about 191.001 (Km^2) (36.24%). Farm land on the other hand increased from 683.9181sqkm (12.92%) to 1915.402 (Km^2) (36.17 %) which is an indication of increase and expansion in agricultural practices over the years.

In addition, built up has also continue to increased further as settlement increase, to most different section of the study area mostly western and southern part of the area. Settlement increased to 892.7847 (Km^2) (16.86%) in 2008 an indication of increased in population over time and space. Also, bare surface and rock outcrop covers

589.3407 (Km^2) (11.13%) in 2008. Finally, water body remain relatively stable at 60.012 (Km^2) (1.3%) in 2018.

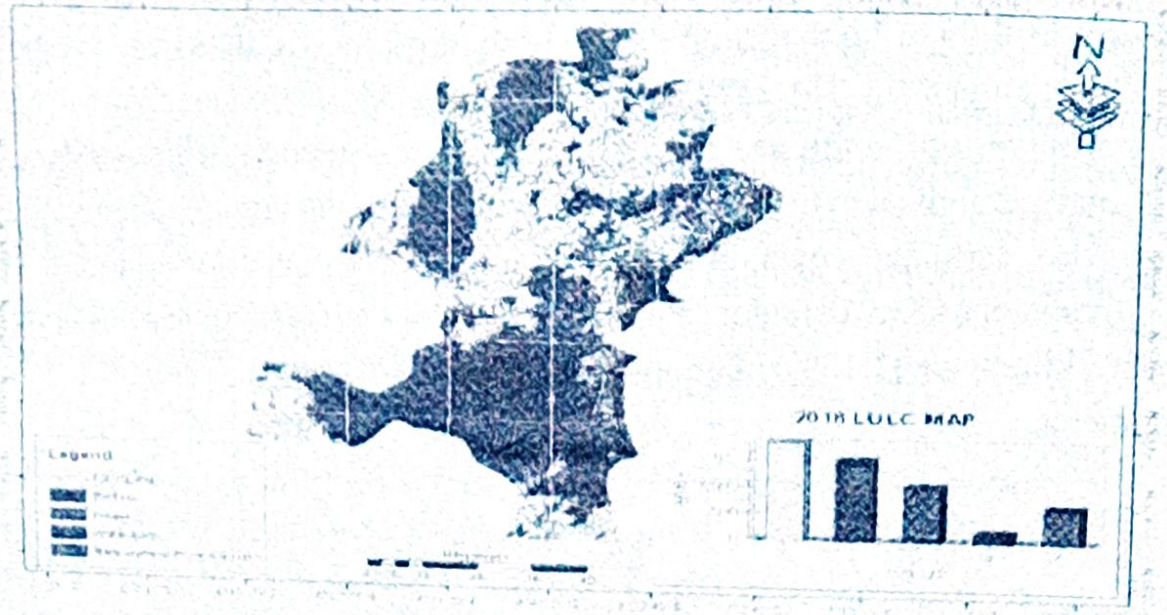


Figure 4 Classified 2018 LULC of the study area (Source: Sayyad, 2019).

The 2018 satellite image analysis of the study areas reveals that there is continuous expansion of built-up area on the study area. The expansion encroached on the forest mostly towards southern section and other land cover types. Figure 4 shows that in 2018 Settlement areas covers a total of 1528.277 (Km^2) (28.96%) of the total area which is made up both residential, commercial, and other land use areas. Similarly, farm land also decreased slightly from 1915.402 (Km^2) (36.17 %) in 2008 to 1872.788 (Km^2) (35.49%) in 2018 which may be attribute to the influx of people leading to increasing population pressure on the available resources.

forest on the other hand has decreased further to 1037.56 (Km^2) (19.66 %), in 2018 from 191.001 (Km^2) (36.24%) in 2008, which is attribute to conversion of the area to other land uses as well as increased land for farming.

Also, bare surface and rock outcrop which covers 589.3407 (Km^2) (11.13%) in 2008 increased slightly to 662.2326 (Km^2) (12.55%) in 2018 . Water body on the other hand increased 175.4604 (Km^2) (3.33%) in 2018. This increase may be due to deforestation which clear the way for the satellite to capture the water body.

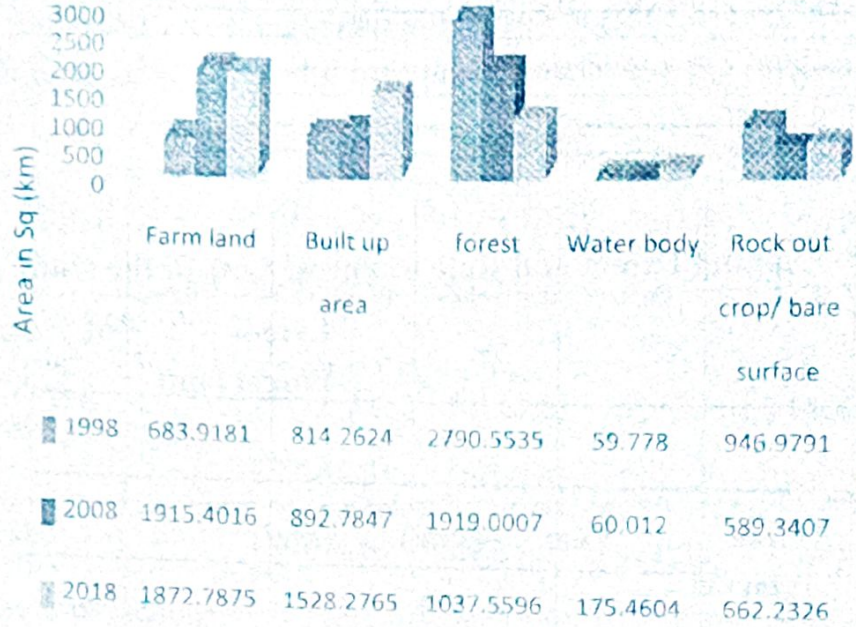


Figure 5 : LULC change chart across the three decades

Figure 5. shows the LULC change chart of the three decade under consideration, it reveals that there were continuous changes among the various land use and land cover features. The chart further reveals that built up areas was on the increase while forest cover was on the decrease. An indication that there is high rate of deforestation activities carried out by the residents in the study area while farm land and water body area is generally on the increased.

4.1.2 Trend Analysis of Forest decline in the Study Area

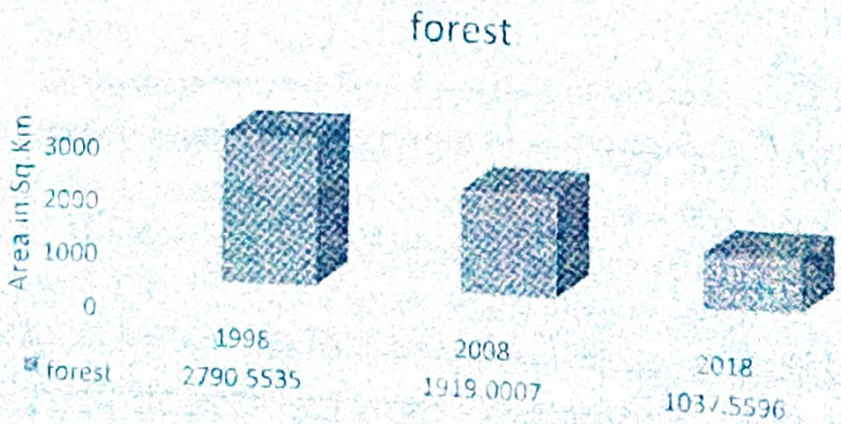


Figure 6: Trend Analysis of Forest decline

Figure 6. shows the period of 1998 - 2008 covering 10 years, forest decrease to 871.553 (16.46%). However, from 2008 -2018 covering 10 years, forest decrease further to 1037.56 (16.57%) almost at the same rate (Figure 4.5). this is an indication of continuous land use conversion mainly from forest to other land use like farming, residential and other
activities.

Table 1: The Spatial Extent and Rate of Forest Loss in the study area

Forest land			Extent of Forest land		Rate of Forest land loss
Period	**Time interval**	**Year**	**(km²)**	**(km²)**	**%**	**Km²/Year**
1998-2008	10	1998	2790.554	871.6	31.23	8.72
2008 - 2018	10	2008	1919.001	-881.4	-45.93	-8.8
1998 – 2018	20	2018	1037.56	-1753	-10.87	-62.82

Furthermore, table 1 shows the spatial extent and rate of forest decline in the study area, it reveals that the rate of forest loss is 8.72, -8.8, -62.82 for 1998, 2008 and 2018 respectively.

(B) Causes of Deforestation in Shiroro Local Government Area

Table 2: Causes of Deforestation in Shiroro Local Government Area

Items	SA (%)	A (%)	SDA (%)	D (%)	I(%)
Agriculture expansion	232(73.2)	47(14.8)	22(6.9)	8(2.5)	8(2.5)
Livestock ranching	104(32.8)	141(44.5)	22(6.9)	23(7.3)	27(8.5)
Overpopulation	224(70.7)	73(23.0)	20(6.3)	0(0)	0(0)

poverty	195(61.5)	97(30.6)	19(6.0)	6(1.9)	0(0)
Logging and fuel	189(59.6)	73(23.0)	13(4.1)	28(8.8)	14(4.4)
Overgrazing	149(47.0)	97(30.6)	6(1.9)	65(20.5)	0(0)
Hunting	16(5.0)	163(51.4)	44(13.9)	68(21.5)	26(8.2)
Mining	35(11.0)	185(58.4)	26(8.2)	71(22.4)	0(0)
Urbanization and infrastructure	222(70.0)	81(25.6)	0(0)	14(4.4)	0(0)
Industrialization	39(12.3)	43(13.6)	95(30.0)	140(44.2)	0(0)
Corruption	172(54.3)	66(20.8)	29(9.2)	34(10.7)	16(5.0)
Political cause	142(44.8)	78(24.6)	4(1.3)	47(14.8)	6(14.5)
Land rights, land tenure and inequitable and resources	179(56.5)	99(31.2)	16(5.0)	23(7.3)	99(56.5)
Climate change	185(58.40)	57(18.0)	7(2.2)	33(10.4)	35(11.0)

SA= Strongly Agree, A= Agree, SDA= Strongly Dis-agree, DA= Disagree I= Indifferent

Table 2.reveals the participants response on major cause of deforestation in Shiroro Local Government Area. From the results obtained, 232 (73.2%) of the respondents strongly agreed to the point that agricultural expansion it a major cause of deforestation in the study area as farmers has to clear a large portion of land for farming activities, while 22(6.9%) disagreed to that assertion, 104(32.8%) of the respondents strongly agreed that livestock ranching is a major cause of deforestation as it deals with cultivation of large piece of land for rearing of livestock as such clearing of land is necessary. On overpopulation 224(70.7%) strongly agreed that overpopulation contributes to deforestation such that when there is influx of more people in the settlement there is more pressure on the available resources and it tends to be over stretched, while 20(6.3%) are against that view, the trend continue as the respondents have a strong holds on their responses as pertaining to poverty
195(61.5%) strongly agreed that poverty is a major cause of deforestation in the area as farmers venture into wood and charcoal business which results in felling of trees while 19(6.0%) strongly disagreed to that fact, on logging and fuel 189(59.6) strongly

agreed due to the fact that economic trees are usually cut down for saw mill and used as fuel without replacing them, while 19(6.0%) strongly disagreed, for overgrazing 149(47.0%) strongly agree to this assertion as overgrazing exposes the topsoil to land degradation while 65(20.5%) disagreed, hunting 163 (51.4%) agreed as hunting has resulted to bush burning and destruction of soil macro and micro-organism while 71(22.4%) disagreed as they believe that hunting has been in existence for decades and has no effect on the forest and the environment, on corruption 172(54.3%) strongly agreed with activities such as illegal logging and timbering to smuggling of forest products while 34(10.7%) disagree, on political cause 142(44.8%) nearly half of the participants strongly agreed that politics play a part in deforestation while 47(14.8%) disagree, Land rights, land tenure and inequitable and resources 179(56.5%) strongly agree while 23(7.3%) disagree, finally climate change is also stated to be part of major cause of deforestation with 185(58.40%) strongly agree and 33(10.4%) strongly disagree. On the other hand on industrialization 39(12.3) respondents strongly agreed while 140(44.2%) disagreed this indicates that industries and industrial activities are not on the rise in the area as such industrialization has a minimal effect on deforestation in the study area.

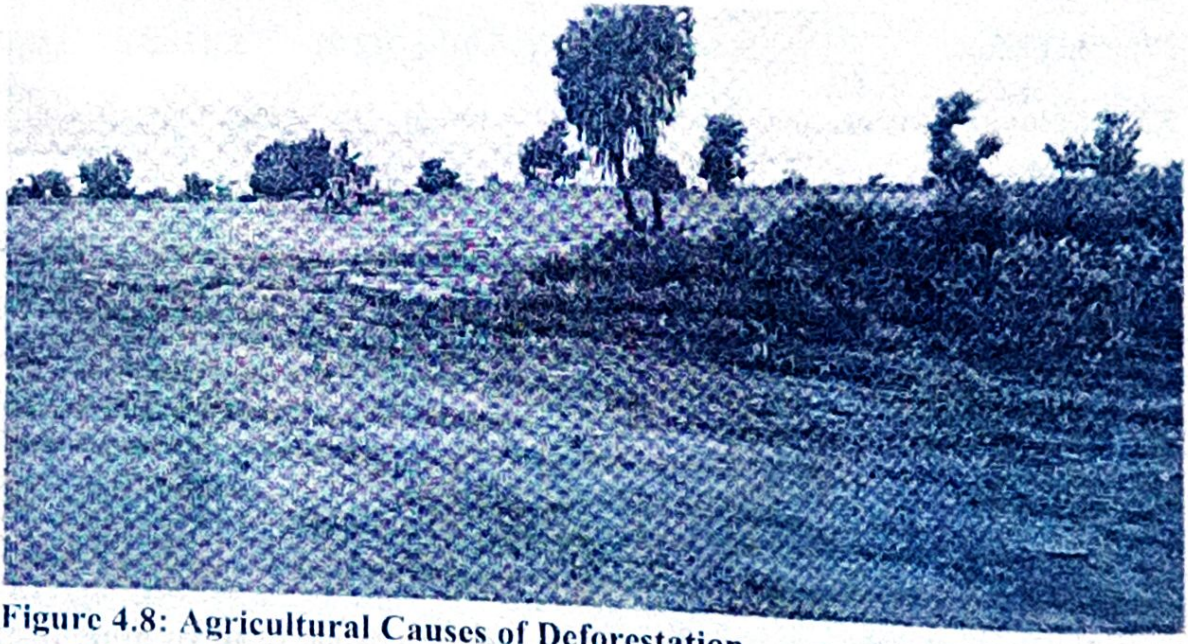


Figure 4.8: Agricultural Causes of Deforestation

(C) Effect of Deforestation on land degradation in Shiroro Local Government Area

Table 3: Effect of Deforestation in the Study Area

Items	SA (%)	A	SDA	D	I
Reduced crop yield and					

agricultural produce	218(68.8)	78(24.6)	0(0)	21(6.6)	0(0)
Exposure of top soil to erosion	206(65.0)	90(28.4)	0(0)	12(3.8)	9(2.8)
Decreased biodiversity	145(45.7)	155(48.9)	0(0)	0(0)	17(5.4)
habitat loss	231(72.9)	73(23.0)	6(1.9)	7(2.2)	0(0)
extinction of species	180(56.8)	116(36.6)	14(4.4)	0(0)	7(2.2)
Displacement of indigenous people	245(77.3)	33(10.4)	13(4.1)	26(8.2)	0(0)
Loss of soil macro and micro-organism	183(57.7)	79(24.9)	32(10.1)	2(0.6)	21(6.6)
Loss of medicinal plants and fruits	202(63.7)	88(27.8)	0(0)	7(2.2)	20(6.3)

SA= Strongly Agree, A= Agree, SDA= Strongly Dis-agree, DA= Disagree I= Indifferent

Table 3. shows the respondent responses on effect of deforestation in the study area. The result depict that 218(68.8%) of the respondents strongly agree on reduction of crop yield and agricultural produce as a result of deforestation in Shiroro local Government Area as most of the framers engage in activities such as bush burning, clearing land for nonagricultural practices and over grazing all of which reduce soil nutrient and reduce quality of crop yield while 21(6.6) disagree. 206 of the respondents which represent (65.0%) strongly agree to the exposure of top soil to erosion to be among the causes of deforestation and leads to degradation, they explain that activities such as bush burning and urbanization contribute a lot to this problems while 12(3.8%) disagree, 155(48.9%) agree to decrease in biodiversity as a contributor to deforestation while 0(0%) strongly disagree, 231(72.9%) which is more than half of the responses received strongly agree to the loss of habitat as part of causes of deforestation. The forest serves as a habitat for many micro and macro organisms and also serves as a cover for the top soil however, indiscriminate bush burning and tree felling has resulted in loss of these habitat and destruction of these habitats while only 7 which stands for (2.2%) of the respondents disagree with the assertion.180 (56.8) strongly agree to extinct of species as a result of continues hunting and tree felling while 14(4.4%) disagree. It was also revealed that the effect of deforestation leads to

displacement of indigenous people 245(77.3%) strongly agree with the statement as many people depend on the available resources from the forest as their primary source of food and business when such environment is tempered with the inhabitants tend to migrate to areas that would favour their survival and continues existence while 13(4.1%) strongly disagree. 183(57.7%) of the respondents strongly agree to the loss of soil macro and microorganism, this was based on the fact that the farmers engage in much of bush burning as such, they are destroying the soil organisms while 32(10.1%) disagree. finally 202(63.7%) strongly agree to the loss of medicinal plant and fruit due to increase in residential buildings, farming and hunting by the farmers, while 7(2.2%) disagree with the statement being that the medicinal plants have been existing since ages and are God gift to man and cannot be taken away by man.

(C) Mitigation and Adaptation Strategies to Land Degradation in the Study Area

Table 4: Mitigation and Adaptation Strategies to Land Degradation in the Study

Items	SA	A	SDA	D	I
Area					
Training programmes on renewable energy technology to replace the use of forest produce for energy	250(78.9)	40(12.6)	0(0)	27(8.5)	0(0)
Increasing the area and standard management of protected areas.	199(62.8)	70(22.1)	21(6.6)	7(2.2)	20(6.3)
Increase the area of forest permanently reserved for timber production	162(51.1)	139(43.8)	0(0)	0(0)	16(5.0)
Encouraging individual and community participation in viable afforestation and reforestation programmes	183(57.7)	125(39/4)	0(0.0)	9(2.8)	0(0/0)
Involvement of the local people in					

the designing, implementation and	168(53.0)	123(38.8)	0(0/0)	19(6.0)	7(2/2)
management of natural resource conservation programmes for combating desertification and ameliorating the effects of drought					
Intensifying cooperation with relevant inter and nongovernmental organizations in and mitigate the effects of	192(60.0)	111(35.0)	7(2.2)	7(2.2)	0(0.0)
combating deforestation and mitigating the effects of degradation					
Encouraging the development and adoption of efficient wood stoves and alternative sources of energy	190(59.9)	100(31.5)	0(0.0)	7(2.2)	20(6.3)
Inventorying degraded lands, and implementing preventive					
measures for lands that are not yet degraded or which are slightly degraded	150(47.3`)	142(44.8)	11(3.5)	7(2.2)	7(2.2)
Development of a National Action Program to Combat deforestation	229(72.2)	70(22.1)	11(3.5)	7(2.2)	0(0.0)

Degradation

Table 4. reveal the mitigation and adaptation strategies set or should be set in place on exponential growth of deforestation in the study area. The result discloses that Training programmes on renewable energy technology to replace the use of forest produce for energy with 250(78.9%) strongly agree while 27(8.5%) disagree and also 199(62.8%) strongly agree with the need to increasing the area and standard management of protected areas while 21(6.6%) strongly disagree. 162(51.1%) strongly agrre to the need for increasing the area of forest permanently reserved for timber production while 0(0%) disagree. It was disclosed that encouraging individual

and community participation in viable afforestation and reforestation programmes is a good adaptation strategies with 183(57.7%) strongly agree while 9(2.8%) disagree. Need for involvement of the local people in the designing, implementation and management of natural resource conservation programmes for combating desertification and ameliorating the effects of drought with 168(53.0%) of the respondents strongly agree while 19(6.0%) disagree. 192(60.0%) strongly agree to intensifying cooperation with relevant inter and non-governmental organizations in combating deforestation and mitigating the effects of degradation while 7(2.2) disagree. 190(59.9%) of the respondents strongly agree with the need to encourage the development and adoption of efficient wood stoves and alternative sources of energy while 7(2.2) agrees. Also inventorying degraded lands, and implementing preventive measures for lands that are not yet degraded or which are slightly degraded is highly important 150(47.3%) strongly agree whil3 7(2.2%) strongly agree. 229(72.2%) strongly on need for development of a National Action Program to Combat deforestation and mitigate the effects of Degradation while 7(2.2%) disagree.

Discussion of Findings

The findings revealed continuous changes among the various land use and land cover features. The chart further reveals that built up areas was on the increase while forest cover was on the decrease. There is high rate of deforestation activities carried out by the residents in the study area while farm land and water body area is generally on the increase. On the Trend Analysis of Forest decline, finding shows the period of 1998 - 2008 covering 10 years, forest decrease to 871.553 (16.46%). However, from 2008 - 2018 covering 10 years, forest decrease further to 1037.56 (16.57%) almost at the same rate. this is an indication of continuous land use conversion mainly from forest to other land use like farming, residential and other activities. On the Causes, Effect and Mitigation Strategies on Deforestation in the Study Area, from the result analysed in table 4.4, the residents explained that agricultural expansion, livestock ranching, overpopulation poverty, logging and fuel, overgrazing, hunting, corruption, political effects and climate change to be among the major causes of deforestation in the study area as farmers and other individuals engage in activities that lead to destruction of the forest resources. However, the residents declined to Land rights, land tenure and industrialization as a cause of deforestation in the area due to the fact that they lack industries and do not practice land tenure system as majority of the residents claim that the lands surrounding them are inherited and passed down from generation to generation. Table 4.5 outlines the Effect of deforestation by the respondents as they explained that deforestation greatly affect crop yield and agricultural produce, results

in the exposure of top soil to erosion, decrease biodiversity, loss of habitat, results to extinction of species, displacement of indigenous people, loss of soil macro and microorganism and loss of medicinal plant and fruits. Table 4.6 Table 4.6 reveal the mitigation and adaptation strategies set or should be set in place on exponential growth of deforestation in the study area. The result discloses that Training programmes on renewable energy technology should be used to replace the use of forest produce for energy, there's also need to increase the area and standard management of protected areas, need for increasing the area of forest permanently reserved for timber production, encouraging individual and community participation in viable afforestation and reforestation programmes is a good adaptation strategies, need for involvement of the local people in the designing, implementation and management of natural resource conservation programmes for combating desertification and ameliorating the effects of drought , intensifying cooperation with relevant inter and non-governmental organizations in combating deforestation and mitigating the effects of degradation, need to encourage the development and adoption of efficient wood stoves and alternative sources of energy. Also inventorying degraded lands and implementing preventive measures for lands that are not yet degraded or which are slightly degraded is highly important, need for development of a National Action Program to Combat deforestation and mitigate the effects of Degradation. The residents believe with this in place it would go a long way to enlighten the farmers and to tackle the menace of deforestation.

Conclusion and Recommendations

On the basis of this discussed findings of this research work, the facts have been clearly confirmed that there were continuous changes among the various land use and land cover features, also that built up areas was on the increase while forest cover was on the decrease. The various causes of deforestation in Shiroro Local Government Area are:- agriculture expansion, livestock ranching, overpopulation, poverty, logging and fuel, urbanization and infrastructure among other. It can be concluded from the result of the finding that their a significance of deforestation in the study such as reduced crop yield and agricultural produce, exposure of top soil to erosion, decreased biodiversity, habitat loss, extinction of species, displacement of indigenous people, loss of soil macro and many more.

From the result emanated it can also be concluded that mitigation and adaptation strategies are not effective in the study which has led to drastic reduction of forest land over the years. It is recommended that afforestation, reforestation, tree husbandry and tree planting in the area should be encouraged, government should empower local

farmers with available and sustainable knowledge on forest management, forest extension services to the rural households that engage in forestry activities should be strengthened.

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