



## EVOLVING A COMMUNITY PARTICIPATION MODEL IN FOREST RESOURCES

### MANAGEMENT IN EDU LOCAL GOVERNMENT, KWARA STATE, NIGERIA

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#### Abstract

The rate at which Forests Resources is being degraded worldwide due to anthropogenic activities is alarming and has impacted negatively on our mother earth in the areas of heavy down pour, flooding, drought, excessive heat, sedimentation and other environmental problems. This research aimed at evolving Community participation Model in Forests Resources Management in Edu Local Government, Kwara State, Nigeria. Literatures reviewed were centered on Community Participation and Management of Forests Resources internationally, regionally and nationally. The gap was identified none of such have been done in the study area and the appropriate methodology used. Normalized Difference Vegetation Index (NDVI) was used to detect changes in Forests Resources in the Study area between 1990 and 2018. Normalized Burn Ratios (NBR) was also used to show the rate of forests burning in the Study area. Structured questionnaires were employed to observe the methods used in the past in managing Forests Resources in the Local Government for thirty (30) years and better

alternative methods that could be employed to manage Forests Resources in the area. The result shows a reduction in Forests resources significantly. NDVI result shows (-0.26) which

#### KEYWORDS:

Evolving,  
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indicates a decrease in vegetation cover in the study area. The vegetation index Map of 2005 also shows there is further decrease in vegetation (0.58) (0.48) of 1990 and 2005 respectively. NDVI values of (0.35) indicated a further decline in the vegetation of the area, 2005 -2018(0.48) (0.35) respectively. Edu Local Government Forests Burn area Change detection for 1990, 2005 and 2018 shows large positive (blue) and large negative (red) which

*indicated changes in the study area's forests (-0.5) and (0.5) ratios. The Communal Land tenure system used to manage Forest Resources in the area have not helped in preserving the natural vegetation in the area due to loss of family values. Government's revenue generation policies had encouraged cutting down of trees. Better alternative Community participation approach as revealed in the study will help. Planting of tree crops and establishment of forests by the State Government, Edu Local Government Department of Agriculture and Natural resources in collaboration with the communities through Traditional Institutions. Monitoring of loggers in the areas by the Communities in collaboration with the Staff of Ministry of Environment and Forestry, and*

*Department of Agriculture and Natural Resources. It is recommended that tree planting campaign should be done in all the media outfit in the State. Restructuring of school curriculum that will enabled students of all arms to be taught Geography. Privatising Forests resources to individuals will help in effective Management of the Forests resources.*

## **Introduction**

### **Background to the Study**

**C**onservation practices all over the world are changing from traditional management approach with emphasis on managing cultural resources in a way that ensures greater flow to all stockholders especially local community, The shift in emphasis is informed by the fact that the local communities are inextricable tied to their cultural resources used as a source of food, medicine, fuel or for monitoring ecological balance (Bisung, 2001)

The rapid loss of natural resources in developing countries became a subject of increasing international and national concern. This is reflected in the substantial increase in the interest accorded to environmental conservation by various governments, donors and conservation agencies. The level of interest in conservation as an environmental development problem required action (Flint 1990). Justification for community participation as viewed by International Union for Conservation of Nature (IUCN, 1990) provides that human culture must be based on respect for nature, and that the present generations have a social responsibility to conserve nature for the welfare of future generations. The view recognizes that mankind is part of nature and that all species have an inherent right to exist regardless of their material values to human.

The Government mission is that Nigeria's rich biological endowment together with the diverse ecosystem will be secured, and its conservation and management assured through appreciation and sustainable utilization by the year 2010. Nigeria

will be active in the international arena while at the local level infrastructural human and institutional capabilities will be developed to enable equitable sharing of biodiversity benefits over time.

### **Statement of the Research Problem**

Evolving Community participation and Management of Forestry Resources In Edu Local Government Kwara State is timely looking at the benefits that can be derived from it, Coupled with the rate at which the forestry Resources is being tampered with through various economic activities taking place in Edu Local Government.

The economic activities are as follows:

- i. Lumbering activities.
- ii. Urban schemes in Edu local Government.
- iii. Shifting cultivation/clearing of forest for farming.
- iv. Burning of firewood for charcoal for sale.

All these and many more pose a great danger to the environment which necessitates evolving or awakening community participation to better management of Forestry Resources in Edu Local Government for Sustainable development. The surrounding communities will pay for this directly or indirectly in the nearest future if urgent steps are not taken.

The Worldwide campaign and enlightenment against climate change vis a vis global warming, destruction of Forestry Resources are among the contributing factors. Reforestation and effective Management of remaining forests Resources are solutions to the problems which need to be embraced by all .Our attention is all focused on what to benefit from the environment not minding the techniques and methods to be adopted to achieve these goals which impact adversely on human and environment in time too close.

### **Aim and Objectives of the Research**

The aim of the study was to see how to evolve the community participation and management of forest resources in Edu Local Government.

- i. To find the level of destructions done to the forestry resources in Edu Local Governments between the periods of 1990 – 2018.
- ii. To assess the severity of forest burning in Edu local government between the periods of 1990 – 2018

- iii. To look at efforts put in place to protect forestry resources in the past and assess the level of success or otherwise in Edu Local Government.
- iv. To attempt to evolve alternative community participation approach in Edu local government.

### **Research Question**

To realize the stated objectives, the following questions were proposed:

- i. What is the depletion of forest like in the last three decades between 1990 – 2018?
- ii. How severe is forest burning in Edu local government?
- iii. What better alternative community participation approach can be put in place to help to solve this problem?

### **MATERIALS AND METHODS**

1. Unsustainable land use and forests deterioration represent some of the most alarming long term threats to the world's forests especially in Africa. To overcome forest degradation, there is need to carry out a research so that the sustainable forest management will be promoted as forest conservation is of great importance. The present study centered on evolving a community participation model in forest resources management in Edu Local Government of Kwara State. The study used two approaches for data collection, namely remote sensing approach and field data collection on various activities that lead to destruction of forests in the study area. The present research used Landsat images downloaded from USGS Earth-Explorer, and the data from the interview of the population of interest in the study area to collect information from relevant sources and used to achieve the aim of this work. The research method adopted in this study followed two major steps: fieldwork (field data collection) and lab work (remote sensing and GIS analysis). The following softwares were used for preprocessing and GIS analysis; SPSS 20, ArcGIS10, and Microsoft Excel.

### **Data Collection for Objective One**

Objective one was to find the level of destructions done to the forestry resources in Edu Local Governments between the periods of 1990-2018. To explore objective one, this study used the Landsat imageries for 1990, 2000, 2010 and 2018 to detect

forest changes in Edu local government. For this objective which aimed at finding the level of destructions done to the forestry resources in Edu Local Governments, the Normalized Difference Vegetation Index (NDVI) were used as method for detecting any form of changes in Edu local government open forest. For instance, Sahebjalal and Dashtekian, (2013) stated that the created NDVI images could be used to identify the pattern of changes that had occurred between two different dates. The Edu local government open forest (NDVI map) maps were established for 1990, 2000, 2010 and 2018. The images were downloaded from USGS Earth Explorer website and the available Landsat images for the study area were used.

### **NDVI analysis**

Normalized Difference Vegetation Index (NDVI) has been in a lot of studies to detect vegetation change Agone & Bhamare, (2012) and Alhassan, Aishatu, Abdullahi & Rukkaya, (2014), stated that NDVI is a measure of vegetation vigor, which provides an effective measure of photo synthetically active biomass, and it is calculated as follows:

$$\text{NDVI} = (NIR - R) / (NIR + R)$$

2. Where NIR and Red are spectral reflectance values in the near infrared and visible red band respectively. After determining the four NDVI maps for the four years, the mapped NDVI change analysis and NDVI difference between 1990 and 2018 were done by comparing the four NDVI maps for determining the spatio-temporal changes in Edu local government. Open forest were detected by calculating the NDVI value and percentage change per year.

### **Data collection for objective two**

Objective two was to assess the severity of forest burning in Edu local government between the periods of 1990 – 2018. To explore this objective, the study used Land sat imageries for 1990, 2000, 2010 and 2018 to detect the changes caused by forest burning in Edu local government open forest. For this objective aimed at assessing the level of destructions done to the forestry resources by way of burning in Edu Local Government, the Normalized Burn Ratios (NBR) were used as method for detecting any form of changes in terms of burning in Edu local government open forest. For instance, Tengfei Long et al, (2019) stated that the created NBR images were used to identify the pattern of changes in terms of burning that had occurred

between two different dates. The Edu local government open forest (NBR map) maps were established for 1990, 2000, 2010 and 2018. The images were downloaded from USGS EarthExplorer website and the available Landsat images for the study area were used.

### **NBR analysis**

The Normalized Burn Ratio (NBR) is an index designed to highlight burnt area in large fire zones. The formula is similar to NDVI, except that the formula combines the use of both Near-infrared (NIR) AND Shortwave Infrared (SWIR) wavelengths. Healthy vegetation shows a very high reflectance in the NIR, and low reflectance in the SWIR portion of spectrum.

To benefit from the magnitude of spectral difference, NBR used between NIR and SWIR bands, according to the formula shown below. A high NBR value indicates healthy vegetation where a low value indicates bare ground and recently burnt areas. Non-burnt areas are normally attributed to values close to zero.

$$\text{NBR} = (\text{NIR} - \text{SWIR}) / (\text{NIR} + \text{SWIR})$$

Where NIR and SWIR are spectral reflectance values in the near infrared and shortwave infrared band respectively. After determining the four NBR maps for the four years, the mapped NBR change analysis and NBR differences between 1990 and 2018 were done by comparing the four NBR maps to determine the burn severity in Edu local government open forest.

### **Data Collection for Objective Three**

Objective three is to attempt to evolve alternative community participation approach in Edu local government. The questionnaires were adopted to accomplish this objective and the questionnaires were translated into the local languages by interviewers especially for the respondents that could neither read nor write.

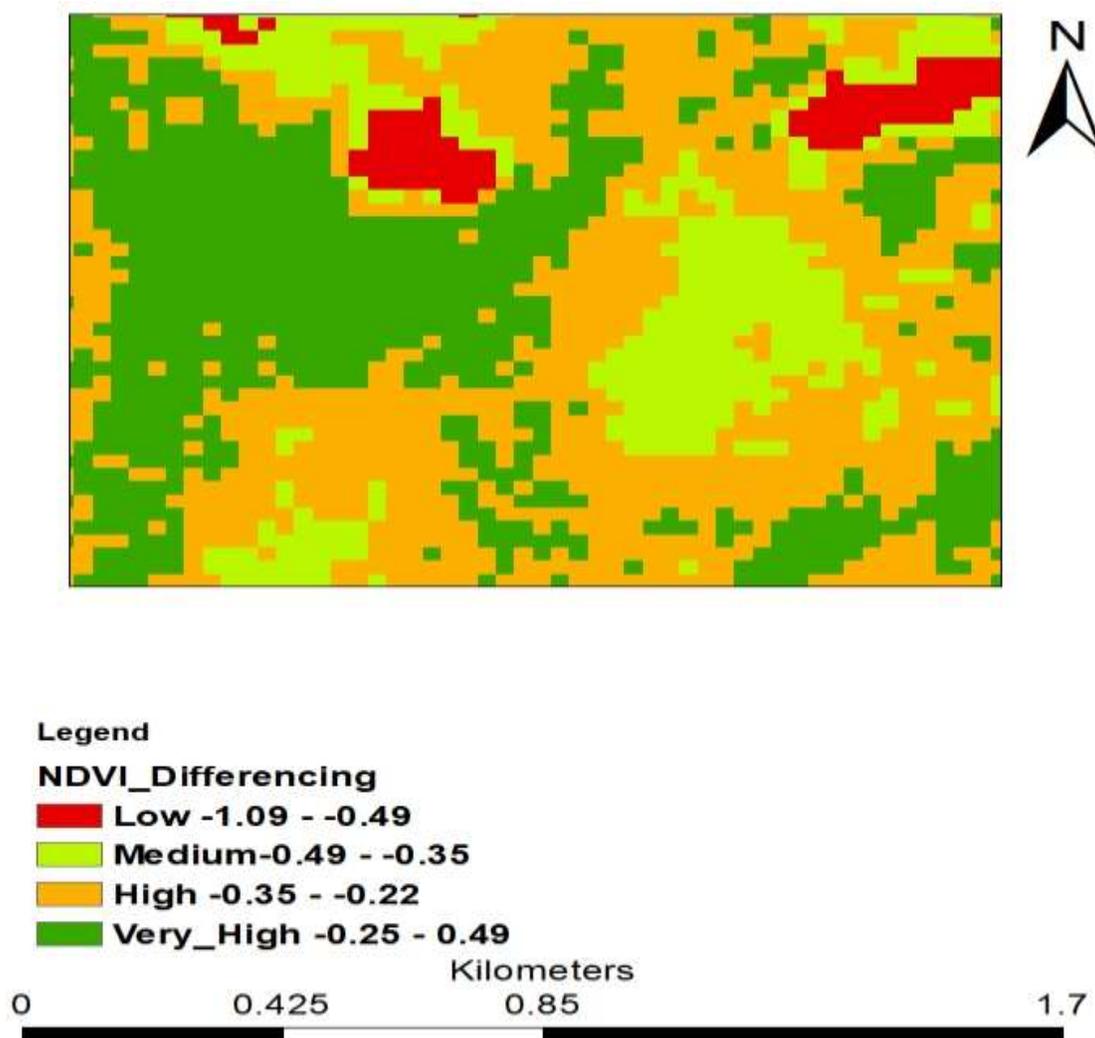
### **Results**

#### **Edu Local Government Forest change detection during 1990, 2005 and 2018**

Figure 1 shows the different NDVI changes of Edu local Government Forest during the period of 1990, 2005 and 2018. The changes occurred in all classes but important changes have occurred in 2018 in all classes. The category of very high NDVI density has decreased from 0.56 in 1990 to 0.48 in 2005. Similarly, the

category of very high NDVI density has drastically decreased from 0.48 in 2005 to 0.35 in 2018. The category of high NDVI density has also decreased from 0.32 in 1990 to 0.21 in 2005 and it has decreased (0.14) a lot in 2018. From figure 1, the most important reduction in Edu local government greenness occurred in 2018 in all classes.

Figure 1: NDVI differencing (2018 NDVI- 1990 NDVI)



### Edu Local Government Forest Burn Area change detection during 1990, 2005 and 2015

Figure 2 shows the different burn ratio changes in Edu local Government Forest during the period of 1990, 2005 and 2018. The large positive (blue) and large negative (red) values indicate changes in the Edu local government forest with -

0.5 and 0.5 ratios, while the values close to zero represent little to no change and their ratios are -0.25, 0 and 0.25. The area with 0 index indicates area where there is no change, -0.25 and 0.25 represent the areas where there is little changes but ratio -0.25 indicates the area with changes from little burn to vegetation (regrowth) while the area with ratio 0.25 indicates areas with vegetation to little burn. The large positive blue ratio 0.5 indicates areas with burn in Edu Local Government forest while the large negative red ratio -0.5 indicates an area with tick forest.

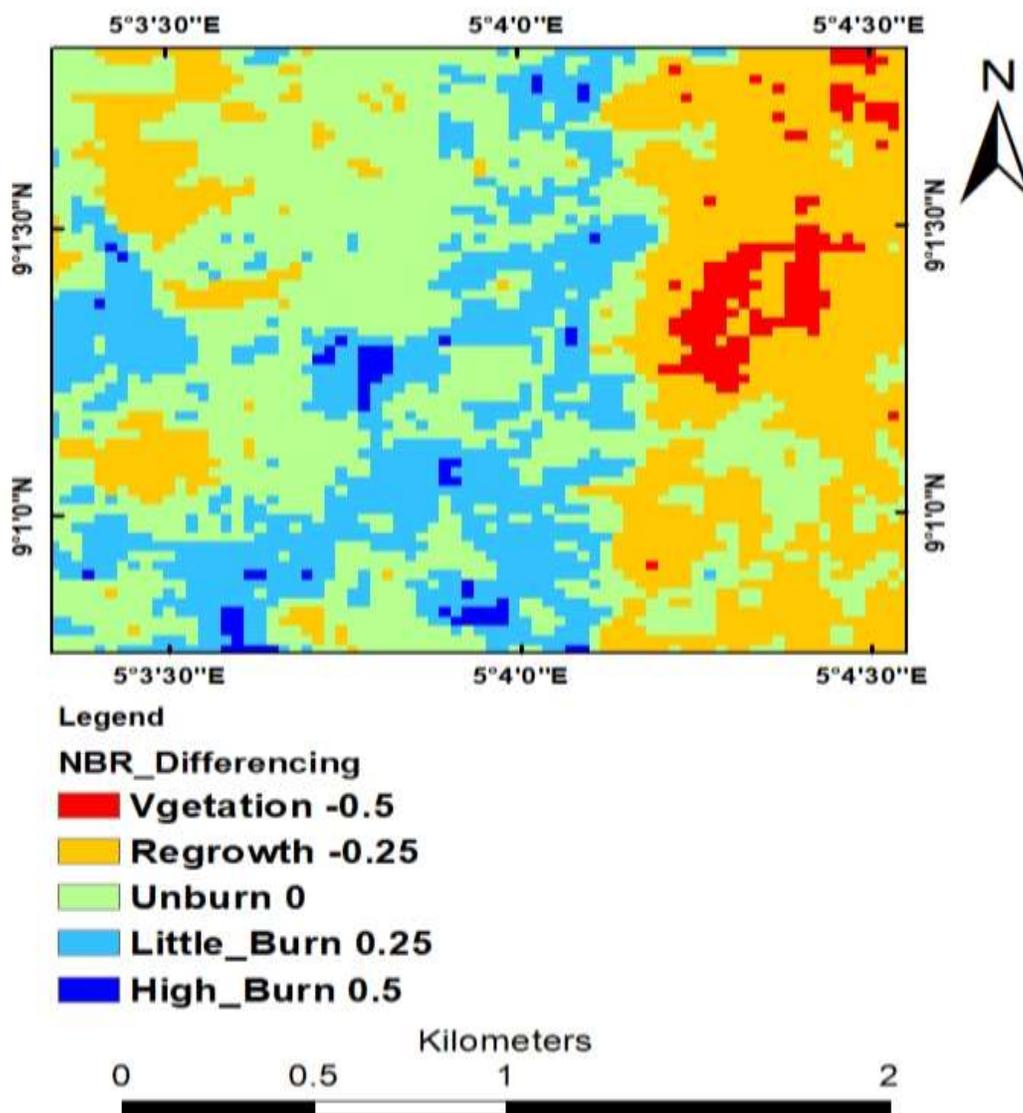


Figure 2: NBR differencing (2018 NBR- 1990 NBR)

### Planting of trees /aforestation

From Figure 3, (245) 98% of the respondents strongly agree that culture of replacing the cut down trees should be imbibed in the community to reduce its loss of forest resources. 2% (5) of the respondents agree that communities should imbibe replacing lost trees, 0% strongly disagree, 0 % also disagree.

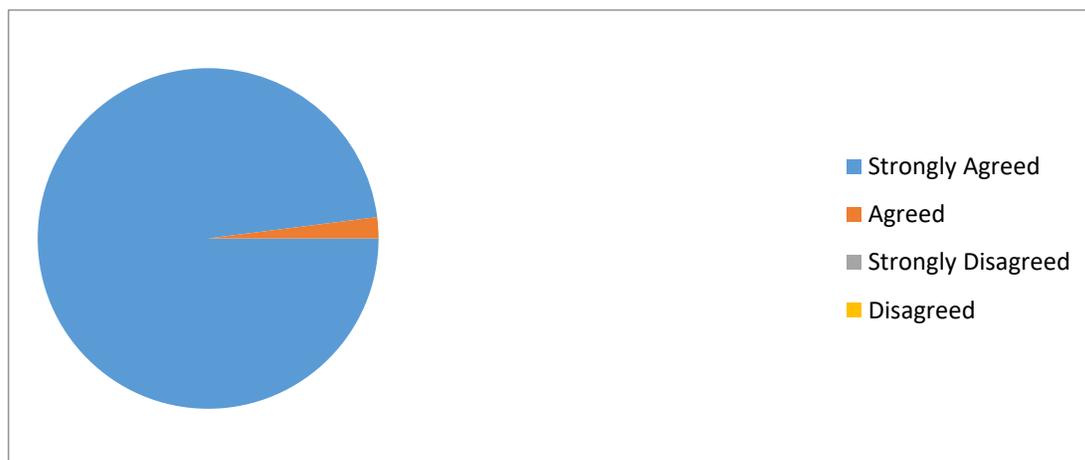


Figure 3: Planting of Trees /Aforestation

### Checking and monitoring of loggers

From Figure 4, 97.2% (243) respondents strongly agree that loggers should be closely monitored to allow systematic harvest of the forest. Only mature trees are harvested, 2.8% (7) of the respondents agree that forest resources should be closely monitored, 0% strongly disagree, 0% also disagree.

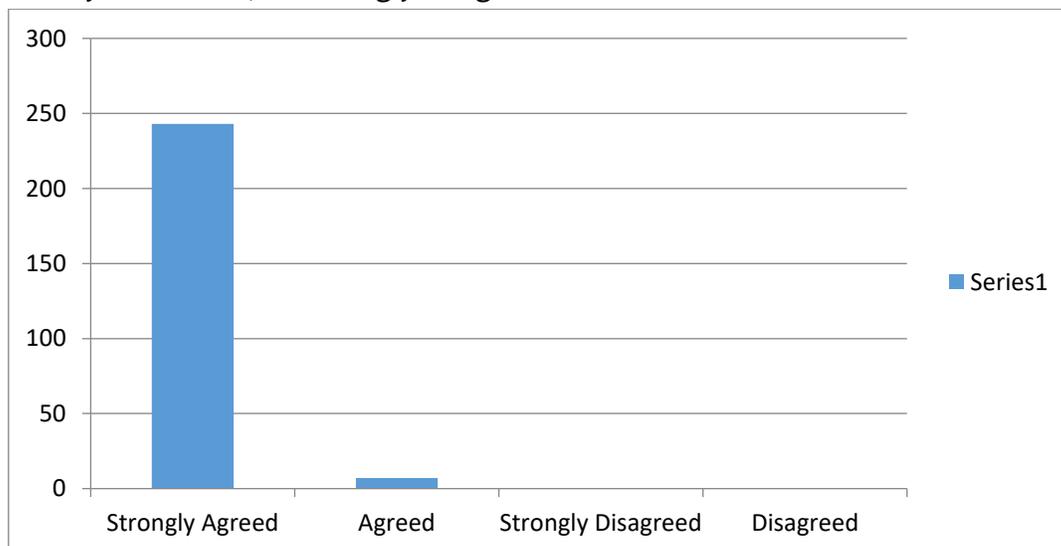


Figure 4: Checking and monitoring of loggers

### **Establishing tree crops and orchard**

From Table 1 90% (225) of the respondents strongly agreed that farmers should adopt planting tree crops (mango, cashew, guava and mixed cropping of both cash and tree crops to replace the lost vegetation in the local government) (25) 10% agreed to adopting planting of tree crops, when 0% strongly disagreed and 0% disagreed

**Table 1: Establishing Tree Crops and Orchard**

<b>Respondents Opinion</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Strongly Agreed</b>	225	90
<b>Agreed</b>	25	10
<b>Strongly Disagreed</b>	0	0
<b>Disagreed</b>	0	0

**Source: Field Work, 2019**

### **Discussion of Results**

The research carried out shows a decline in the forests cover as the objective is to find the level of destruction done to the Forest Resources in the study area between 1990-2018. It was discovered that Forests resources have reduced significantly as shown by NDVI Map of 1990, 2005 and 2018. Though since 1984 there are thick Forests present before 1990. The Vegetation index Map of the Study Area for 1990 shows negative value (-0.26) which indicates a decrease in vegetation cover when compared to 1984. The vegetation index map of 2005 also shows further decrease in the vegetation cover in 1990 (0.58) 2005 (0.48). This shows that between the intervals of fifteen years there is significant reduction in the forests cover in the study area. These can further increase the impact of climate change and global warming experienced. Vegetation index map of Edu Local Government for 2018 with NDVI value (0.35) indicating comparative dense vegetation shows there is significant decline in vegetation cover between 2005 - 2018 from (0.48) and (0.35) respectively. Meaning, there is sharp decline in the Forests cover between the intervals of another fifteen years. These reduction is due to increased Population and competition for the available space for farming set in due to agrarian nature of their work and fertile nature of the soil. The implication of this is that pressure is set in for the existing Forests and the biodiversity distorted. The surrounding town and villages experienced excessive

heat. Varieties of trees such as Mahogany tree Locust tree Shea butter tree are not in abundant again. The strong and hard roofing planks are difficult to get. Only white and soft trees of Melina tree is found due to indiscriminate harvest.

Edu Local Government Forests Burn area change detected during 1990, 2005 and 2018. The result shows deferent Burn Ratios in the Study Area .The large positive (blue) and large negative (red) indicates changes in the study area with (-0.5) and (0.5) ratios which indicates the areas affected most with fire severity. This shows that vegetation cover are exposed to burning through clearing of land for farming, cutting of trees for charcoal production and black smiths for farm implements and farm tools. The implication of this is vegetation takes longer time to regrow in the areas affected. The micro-organisms that support Biodiversity are completely eliminated which hindered quick regeneration.

Better alternative is community participation approach that can help reverse the trend as revealed in the study. Majority of the populace in the study area are farmers, both indigenes and the settlers, and virtually all the areas deforested were put to use for farming purposes. The study have revealed that majority of responses favoured planting of trees and establishment of afforestation in the study area. This shows general acceptability of this programme if introduced. This can easily be done as was done in the past through community and traditional institutions (Emirs, Etsus, village heads and family heads).Especially when they are reminded of looming danger ahead of the consequences of forests destructions. Traditional rulers are well respected in Nupe Kingdom, once the ideals is sold to the traditional rulers they disseminate and pass on the message and instructions to the generality of the people. They can instruct their subjects and those assigned with that responsibility to do so. Provision of tree seedlings, fund and incentives by the Government which are handed down to the farmers. This will go a long way in reversing the injury inflicted, when this trees are well nurtured in collaboration with State Ministry of Environment and Forestry and Department of Agriculture and Natural Resources Edu Local Government. The Staff of the Local Government are well acquainted with the people and terrain, and farmers seems to believe and comfortable with their kinsmen and relations that ruled out the doubt among the Community members. And can lead to high level of success.

It is also generally agreed that the loggers and charcoal makers should be monitored to reduced indiscriminate logging and cutting of trees in the study area. Forests resources are products of one community or the other and Communities share boundary with one another Each family members are well known measures

should be put in place to monitor the harvesting of trees to protect the remaining forests resources as measures are taking to reverse the already loss one. This could be done through collaboration with the Ministry of Environment and Forestry in the State in collaboration with Department of Agriculture and Natural Resources Edu Local Government. Once this is done with all seriousness will go a long way to check the illicit activities of the loggers.

3. Since there is Change of Government in Kwara State, urgent steps need to be taking to revoke licences given to individual. Revenue generation should not be more important than the life and property of generality of people and generation yet unborn. As any resources gathered now will be spend on ecological problems such as Flooding, erosion, sedimentation.

### **Summary of Findings**

Vegetation in the study area has greatly reduced due to anthropogenic activities such as farming, firewood fetching, logging, and charcoal production as shown in the study. Urbanization and building construction, commercial farming (BUA Sugar Company, Abiola Farms and Bacita Sugar Company and Zimbabwe Farm) have greatly impacted negatively on the vegetation of the area.

These changes have been depicted with the images of 1990, 2005, and 2018. These show that the local government has substantially lost vegetation and biodiversity. The rate at which fire and hunting in the study area leads to burning and loss of valuable vegetation resources is greatly high, as also shown in the Normalized Burn Ratio (NBR) 1990, 2005 and 2018.

From the study conducted, the communal land tenure system that is traditional method of forest resources management in the study area is a thing of the past. 85.6% of the respondents strongly disagreed that communal land tenure systems lead to effective Forest Resources Management. 12% of the respondents disagreed, only 2.4% of the respondents agreed that communal land tenure system leads to effective Forest Resources Management, 0% strongly agreed. This means that communal land tenure system practice contributed to forest resources degradation. Farms have been fragmented among the family members and those outside for crop sharing at harvesting period.

### **Conclusion**

The recent challenge of emerging environmental issues of Climate Change and Global Warming for the rapidly increasing population in Nigeria and pressure of

increasing demand on environmental forest resources has attracted attention nationally and internationally.

Community Participation Model and Management of Forest Resources can be used to monitor and reduce forest resources degradation. Though, Government failed to pay attention to incorporating community in their management plan in the past and doing that will do more good than evil. Collaboratory effort towards implementation of policies and programmes will be helpful. Replacing the lost vegetation in the study is a huge task as more forest is continuously affected; putting measures in place will help in mitigating its adverse effect.

### **Recommendations**

Generally, the effect of forest resources degradation is felt globally in Climate Change and Global Warming. The aggregate individual activities in our various Localities resulted into these challenges such as flooding, increase in temperature, sedimentation, desertification, and soil erosion, etcetera, hence, the need to correct the trend. The recommendations are:

1. **Planting of trees should be encouraged in the study area:** Tripartite efforts between State Government, Local Government and the Communities should be undertaken. Each Community should be made to provide land (fallow land) that can be used for this purpose, State Government should provide tree seedlings and other incentives and Local Government should monitor and ensure the survival of the programme .When this is done and sustained will help to correct the mistake of the past and reduced the impact of Climate Change and Global warming
2. **Planting of tree crops:** such as Mango Gwava Cashew Orange and citrus trees should be included in the establishment of Forests in the Study area. Apart from economic benefit that can be derived from this it will serve same purpose as afforestation.
3. **Tree planting campaign:** should be undertaken by the Government at both print and Electronic media, public and private owned Radio stations .This campaign should include the recent flooding events that ravaged communities, solutions to this problems as planting of trees and protection of existing forests resources. When this is done can help to change the narration.

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