International Journal of Research in Agriculture and Forestry
Volume 7, Issue 1, 2020, PP 1-9
ISSN 2394-5907 (Print) & ISSN 2394-5915 (Online)

Impact of Land-Use Practices on Vegetation Cover in Apa Local Government Area, Benue State, Nigeria

Ikyaagba, E.T*, Jande, J.A and Eche, A. P

Department of Social and Environmental Forestry, University of Agriculture, Makurdi, Nigeria

***Corresponding Author:** Ikyaagba, E.T, Department of Social and Environmental Forestry, University of Agriculture, Makurdi, Nigeria, Email: ikyaagbater@gmail.com*

ABSTRACT

This study was conducted to determine the types of land use activities prevalent in Apa Local Government Area of Benue State, as well as their impact on vegetation cover of the study area. The land use practices considered were those associated with agriculture and urbanization. Six classes including forest, grassland, cultivated area, urban area, bare surfaces and water were considered for assessment and classification of images by carrying out field work and using topographical maps. The magnitude of change of forest area for 20years between 1988 to 2008 showed that forest decreased by -175.40. km^2 representing a change (49.99%) of the total change for the period. Forest had the highest annual rate of change of 9.99% while farm land had the least annual rate of change of 1.18%. The period witnessed an increase in other vegetation and built up area. The land increased by 50.26 km^2 representing 14.33% of the total change, while built up increased by76.35 (21.76%). These changes could be attributed to the urbanization, increase in commercial activities and increase in population, agricultural activities and amongst others. Result of the 10 years' period analysis between 2008 - 2018 witnessed a slowdown in the decrease of the forest reserve as -12.37 km^2 representing 7.06% this was less than 49.99% between 1988 to 2008. The magnitude of change of farm land increased to 20.80.km^2 (11.87%) from (5.91%) in the preceding period. The magnitude of change in vegetation areas also decreased to-47.26 km^2 (26.97%).

Keywords: *Land use; Vegetation cover; Urbanization, Agriculture*

INTRODUCTION

Forest biodiversity is now being viewed more against the background of sustainable development which offers opportunities for poverty reduction, human well-being and the livelihood and socio-cultural integrity of people, particularly, in developing countries (Balmford *et al.*, 2001; Oteng-Yeboah, 2004; Butler, 2005).

Apart from the direct benefits of forest to man items of food, health care shelter and clothing, it provides several beneficial environmental services such as creation and preservation of quality environment, protecting watershed and carrying out photosynthesis. It also has profound influence on the local water resources and plays an important role in the carbon-dioxide budget of the global atmosphere (Khalil, 1995; Nwoboshi, 2000). Maintaining healthy forest can play a significant role in climate change mitigation.

Despite the fact that forest is at centre of livelihood in Africa, it is poorly managed (Norris *et al.*, 2010). According to Bradshaw *et al.* (2009) and Convention on Biological Diversity (CBD, 2010) tropical biodiversity is in serious trouble basically due to human action. Especially land use change

Land use change has been considered by many scholars as the most important threat that drive serious change in rainforest biodiversity (Sala,*et al.*, 2000; Haines-Young, 2009; CBD, 2010; Sodhi, and Ehrlich, 2010), and these changes are directly linked to human population growth. As rainforest lands are being converted to ranches, agricultural land, urban areas and other human usages, habitat become unavailable for forest organisms. According to CBD (2010) habitat loss and degradation due to land use change formed the biggest single source of pressure on biodiversity worldwide. For terrestrial ecosystems, habitat loss is largely accounted for by conversion of wild lands to agriculture, which now accounts for some 30% of land globally. In some areas, it has recently been partly driven by the demand for biofuels (CBD, 2010).

It is estimated that more than half of the global landscape is now modified by anthropogenic activities to stimulate development and since the historic past, many natural resources have been heavily used or even depleted in the worst cases (Foley, *et al.*, 2005, Goldewijk, *et al.*, 2011). The impacts of this widespread LULC change

on the natural environment are multi faceted, including climate change, alteration of hydrological cycle, increased water extraction, impairment of water quality, degradation of soil nutrients, amplified surface erosion, and loss of biodiversity (Turner, *et al.*, 2007, Paiboonvorachat, 2008). Therefore, information on land use and 1 land cover, changing trends and optimal use of the land resources have become very vital for land use planning and effective natural resources management.

Therefore, there is an urgent need for proper geo-management of land and the concomitant availability of a detailed, accurate and up-to-date geo-information In most of developing countries especially Nigeria availability of relevant and current information about our environment and how it changes over time has been lacking (Ezeomedo, 2006) this problem therefore has consequently been Affecting the achievement of change detection and sustainable development, and as such requires research for accurate and timely information which is needed for environmental monitoring, planning and forecasting. Although series of works have been done in a conventional system to produce some information on the LULC in some parts of Nigeria especially in forest reserves (Mohammed, *et al.*, 2013, Ikusemoran, and Olokor, 2014), but not much studies have been done using Remote Sensing and GIS technique in its mapping and analysis of forest vegetation and other land use and land cover in the Benue state. Therefore, the application of GIS using remote sensed data for land use land cover analysis Apa Local Government area and its environs would definitely enhance the available data for a sustainable development.

MATERIALS AND METHODS

Study Area

Apa is a Local government in Benue state, Nigeria with an estimated population of 130,600 people. The local government is located in the Northwestern part of Benue State. It is bounded to the North by Agatu local government, to the West by Gwer West, to the South by Otukpo and to the West by Omala local government of Kogi State. The study area lies between latitude 7º 48´ 30"N and longitude 7º 48´ 30" E

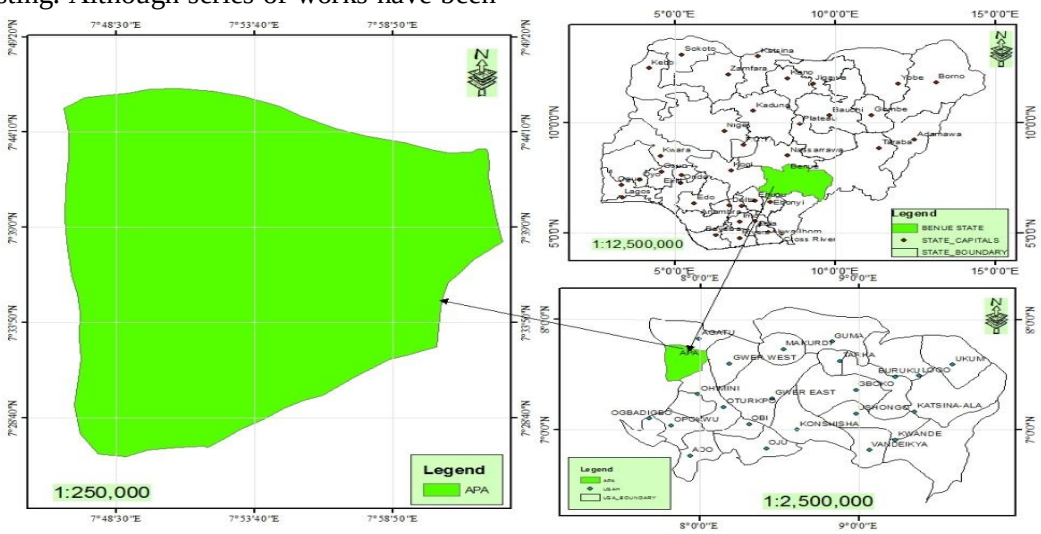

Figure1. *The Study Area (source: Nigeria Shapeile from ArcGIS 10.1)*

Identifying and classifying of land use and land cover of the study area was achieved through the use of three multi-date Landsat satellite imageries TM 1988, Enhanced Thematic Mapper (ETM+) 2008 and operational land imager (OLI) of 2018 was used, Pre-processing operations was perform, the images were used for the classification of the LULC. The study area was extracted from the scene, and a supervised classification method was carried out based on level 1 classification of Anderson *et al* (1976) (i.e. built up, water bodies, agricultural land, forest and vegetation).

Study Design Field Survey and Material Used

The data forms the field survey for this study was collected through primary data obtained from direct field and visual observation. The instrument for primary data was obtained from lands at TM (1986) and Landsat ETM+ (2012) imageries and state forest authority through the divisional forest office. The materials used include compass application on Samsung galaxy phones (SM-G355H) and digital camera.

Sampling Procedure and Data Collection

During field visit, the northern, southern, eastern and western sides of Apa Local Government

area were determined with a compass, on the spot assessment of the use activities and impact were made and a Digital camera was used to capture images of the various land use practices of interest as well as vegetation cover and degradation during field visit.

The help of Divisional forest office (DFO) was enlisted for the field visit.

At the Divisional forest office, verbal interviews were conducted with the DFO and forest officers.

Remote Sensing of Land Use and Land Cover Change

Data sources

Secondary data was the main source of data used for remote sensing aspect of this study. Satellite images of Apa and its environs for mapping of land use/cover change were acquired for 1986 and 2012 respectively. Landsat TM satellite image was acquired for 1986 and Landsat OLI image was acquired for 2018. The 1988 image was obtained from Global and cover facility (GLCF) and earth science data interface.

Table1. *Specifications of Satellite Imageries Used*

Satellite	Path/Row	Sensor	No of Bands	Bands used	Date Acquired	Spatial Resolution
Landsat	187/55	TM	7	NIR,R, G (4,3,2)	29/01/1988	30m
Landsat	187/55	ETM+	8	NIR, R, G (4,3,2)	12/01/2008/ 11/01/2012	30m
Landsat	187/55	OLI	11	NIR, R, G (5,4,3)	16/02/2018	30m

Data preparation

ERDAS imagine 9.2 ArcGIS 10.1 and ILWIS 3.8.5 computer software used in data preparation and analysis. The Landsat image was downloaded using the path (p188r54. P188r56) interface covering Benue state. The downloaded image was unzipped to show the multiband. False colour composite of ERDAS imagine was used to generate the false colour composite using layer stacking, by combining near infrared, red and green which are band 4,3,2 together for both images. This is a very common band combination and is useful for vegetation studies, monitoring drainage and soil patterns and various stages of crop growth (Ghazani and Najibzadeh, 2014).

Data Analysis

Image Processing

Radiometric and geometric correction was performed for satellite image of the study area using ILWIS software. For the radiometric, the Darkest Pixel (DP) atmospheric correction method, also known as the histogram minimum method was used. As haze has an additional effect on digital numbers this correction value was subtracted from the digital number in the image. This method was applied to each individual band. The satellite image data. The correction process employs geographic feature on the image called ground control point (GCPs), whose position are known (sahabjalal and Heidari, 2011).

Image Classification

The study area consists of several features having different reflectance. There for six classes including forest, grassland, cultivated area, bare surfaces and water were considered for proper assessment and classification of image by carrying our fieldwork and using topographical maps. Supervised classification of image for the various classes was performed to produce land cover map from Landsat TM, ETM + and OLI image. Optimum index factor (OIF) method was used for selection of the best combination of ETM bands.

Results and Discussion

Analysis and Classified Land Use and Land Cover Map of Apa (1988, 2008 And 2018)

Land Use and Land Cover Analysis of 1988 Imagery

Figure 2 shows the landuse land cover change map of the study area for 1988, it reveals that forest was the dominant land cover features covering about 316.6191 square kilometer (39.26%) of the area. This can be found on every section of the map but more at the centre and towards the north east of the study area. This is followed by agricultural land which covers an area of 233.1378 square kilometer (28.91%) of the total land mass of the area. Most of the farmland lands were located majorly in the northern and southern section of the study area.

Also, other vegetation accounted for 150.2973 square kilometer (18.63%) were typically found across the north western, north eastern, and south western section of the study area. In addition, built up areas cover an area of 79.9677 square kilometer (9.92%). This is found majorly in the southern and north eastern part of the map

and in small patches at other section of the area, this land use indicates that in 1988 they were only few settlements in the study. Finally, water body covers a total land area of 26.4006square kilometer (3.28%) and these rivers start flowing from the northern and eastern section of the map to southern section of the study area. The total land area of the study area is 806.4225square kilometer.

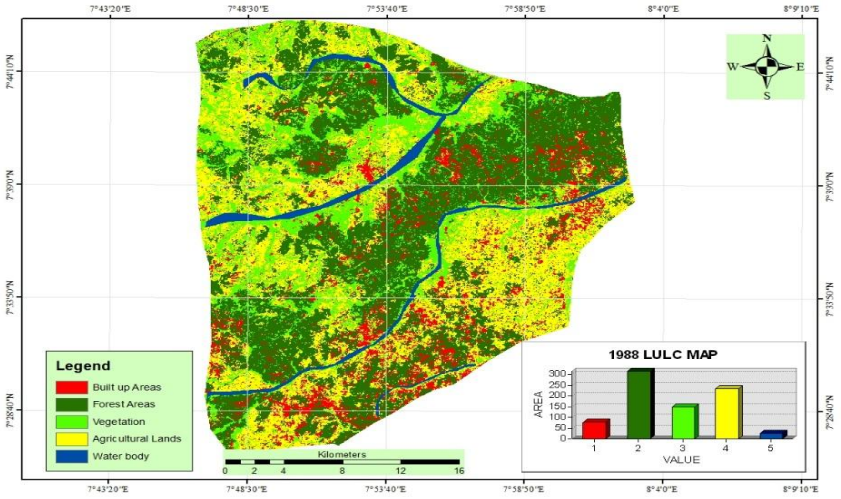

Figure2. *Classified 1988 LULC of the study area*

Source: *Author's Analysis, 2019.*

Analysis of 2008 Land Use and Land Cover Imagery

Figure 3 shows the land use and land cover (LULC) of the study area for 2008 which indicates that built up areas have increased within the twenty –years (20) time period from 79.9677 square kilometer (9.92%) in 1988 and now accounted for about 156.3201 (Km^2) (19.38%) this increase can be attributed to influx of people to the area as well as increase in population due to the presence of large markets where agricultural products are sold at a very reduced price. Forest on the other hand decreased from 316.6191 square kilometer (39.26%) in 1988 to 141.2163 (Km^2) (17.51 %) in 2008 which indicates that expansion in built up, deforestation and other developmental activities have reduced forest cover.

In addition, agricultural land increase from 233.1378 square kilometer (28.91%) in 1988 to 253.863(Km^2) (31.48 %). This increase can be attributed to increase demand for food. Also, other vegetation cover increased from150.2973 square kilometer (18.63%) in 1988 to 200.5578 (Km^2) (24.87%) in 2008. This increase may be attributed to deforestation activities in the area. Finally, water body covers an area of 54.5004 (Km^2) (6.76%) in 2008.

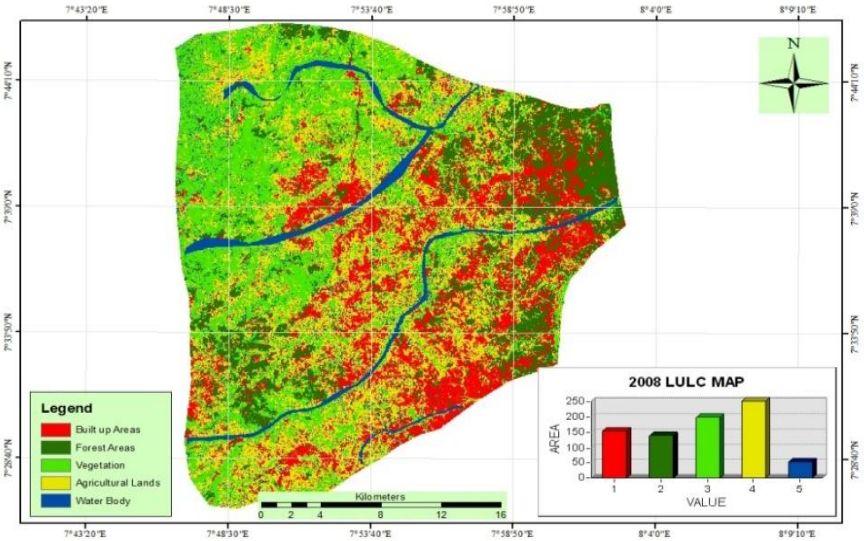

Figure3. *Classified 2008 LULC of the study area*

Source: *Author's Analysis, 2019*

Analysis of 2018 LULC Imagery of the Study Area

The analysis of 2018 satellite image of the study areas reveals that there was continuous expansion of built up area on the study area. The expansion encroached on other land use category mostly towards eastern and southern section of the area. Figure 4 reveals that in 2018 Settlement areas covers a total of 223.0812 (Km2) (27.67%) of the total area which is made up both residential, commercial, and other land use areas. There was an increase of built up areas by 143.1135 (Km2) (17.75%) in the thirty years' period.

Similarly, forest land also continues to decreases from 141.2163 (Km^2) (17.51 %) in 2008 to 128.8458 (Km^2) (15.98%) in 2018 which may be attribute to the continuous influx of people in the area leading to increased deforestation activities as well as pressure on other available vegetation resources.

Agricultural land on the other hand increased further to 274.6674 (Km2) (34.06%) in 2018, which can be attribute to the conversion of vegetation, forest as well as other land uses to agricultural land to meet the increase demand for food supply in the area as well as other people coming to the area, also with the present government encouragement to farming. Furthermore, vegetation covers an area of 153.2961 (Km^2) (19.01%) in 2018 while Water body decreased26.4537 (Km^2) (3.28%) in 2018.

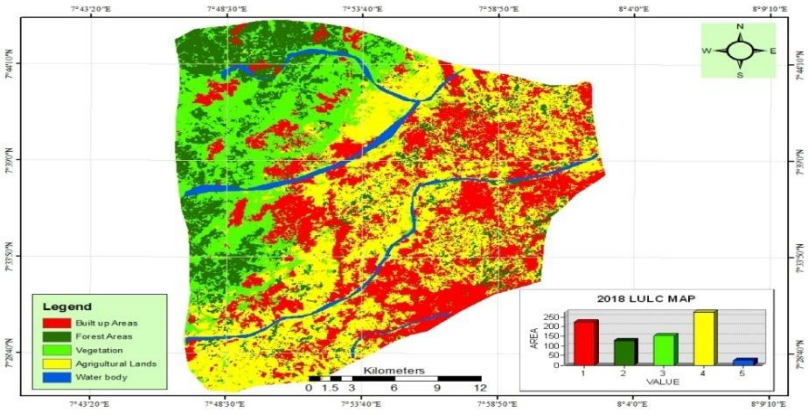

Figure4. *Classified 2018 LULC of the study area*

Source: *Author's Analysis, 2019.*

Trend of Deforestation in the Study Area

Figure 4.4 shows the changes that have occurred among the various land use and land cover classes over space and time across the study area. From the chart, it can seen that built up areas and agricultural lands was on the increase due to conversion of other land use and land cover category to settlement area as revealed on figure 5 due to influx of people to the area for one socio – economic activities or the other while forest and vegetation are on the decline an indication of human activities on the area.

Trend Analysis of Forest Decline in the Study Area

The period of 1988 - 2008 covering 20 years, forest decrease to 187.7733Km^2 (23.28%). However, from 2008 -2018 covering 10 years, forest decrease further to 12.3705 (Km^2) (1.53%) (Figure 6). This is an indication of continuous land use conversion mainly from forest to other land use like farming, residential and other activities. Table 2 shows the summary statistics of each of the land use land cover category for the stated years 0f 1988, 2008 and 2018 including their percentage of change.

Table2. *Percentage of land use/land covers in Apa (1988, 2008 and 2018)*

LULC Class	1988		2008		2018	
	Area (km^2)	Area (%)	Area (km^2)	Area (%)	Area (km^2)	Area (%)
Built up Area	79.9677	9.92	156.3201	19.38	223.0812	27.67
Forest Area	316.6191	39.26	141.2163	17.51	128.8458	15.97
Other Vegetation	150.2973	18.64	200.5578	24.87	153.2961	19.01
Farm land	233.1378	28.91	253.863	31.48	274.6674	34.06
Water Body	26.4006	3.27	54.5004	6.76	26.4537	3.28
Total	**806.4225**	**100**	**806.4225**	**100**	**806.4225**	**100**

Source: *Author's analysis 2019*

The result of the study as presented in Table 1 indicates that built up area was 9.92 in 1988, 19.38 in 2018, and 27.67 in 2018. Similarly, forest area was 39.26 in 1988, 17.51 in 2008, 15.97 in 2018. Also, other vegetation was 18.64 in 1988, 24.87 in 2008, and 19.01 in 2018. The farm land was 28.91 in 1988, 31.48 in 2008 and 34.06 in 2018. Similarly, water body was 3.27 in 1988, 6.76 in 2008 and 3.28 in 2.

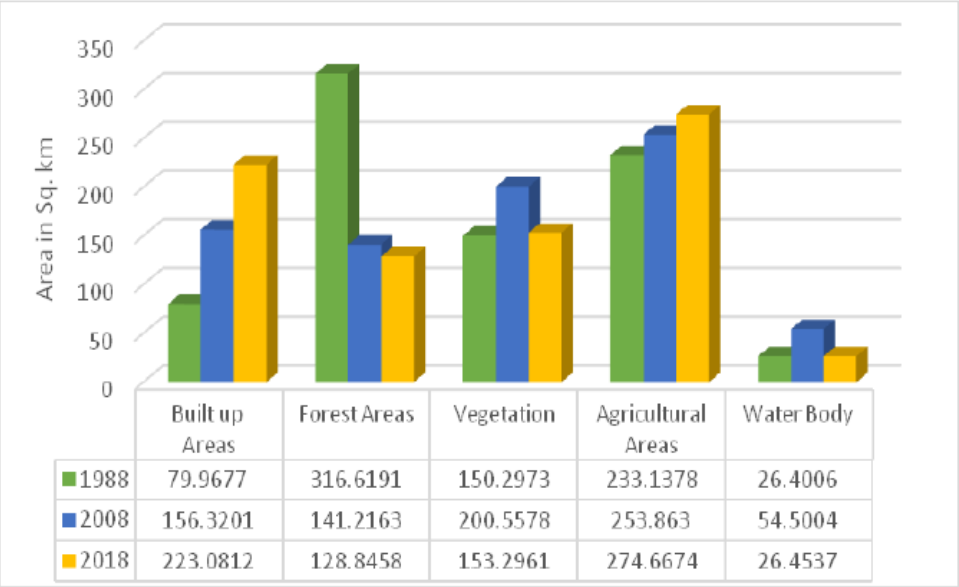

Figure5. *Land Use and Land Cover comparism chart among the various classes*

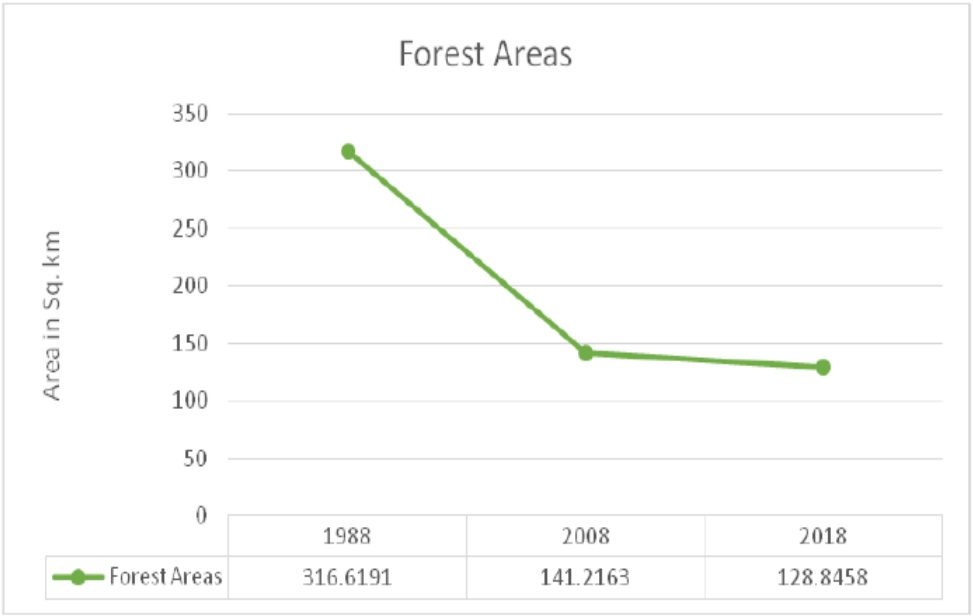

Figure6. *Trend Analysis of Forest decline*

Magnitude and Percentage of Change in Land Use/Landover between 1988 and 2008

The magnitude of change of forest area for 20years between 1988 to 2008 showed that forest decreased by -175.40.Km2 representing a change (49.99%) of the total change for the period as shown in Table 3 Forest had the highest annual rate of change of 9.99% while farm land had the least annual rate of change of 1.18%. This agrees with the findings of several authors (Jande and Amonjenu, 2018) who observed that natural vegetated areas in most Nigeria communities have been decreasing in recent years. The period witnessed an increase in vegetation and built up area.

The vegetation land increased by 50.26Sq.km representing 14.33% of the total change, while built up increased by 76.35 (21.76%). These changes could be attributed to the urbanization, increase in commercial activities and increase in population, agricultural activities and amongst others.

Table3. *Magnitude and Percentage of Change in Land Use/Landover between 1988 and 2008*

LULC Class	1988 Extent (km2)	2008 Extent (km2)	Magnitude of Change (km2)	Percentage of Change	Annual Rate of Change %
Built up	79.9677	156.3201	76.35	21.76	4.35
Forest	316.6191	141.2163	-175.40	49.99	9.99
Other Vegetation	150.2973	200.5578	50.26	14.33	2.87
Farm land	233.1378	253.863	20.73	5.91	1.18
Water body	26.4006	54.5004	28.09	8.01	1.60
Total	**806.4225**	**806.4225**	**350.83**	**100**	

Source: *Authors Analysis 2019*

Magnitude and Percentage Change in Land Use/Land Cover between 2008 and 2018

Result of the 10 years' period analysis between 2008-2018witnessed a slowdown in the decrease of the forest reserve as -12.37 Km2 representing 7.06% this was less than 49.99% between 1988 to 2008 (Table 4.3). This may be due to the differences in time duration between the years under consideration. Similarly, the built-up area increased by 66.76 km^2 representing (38.09%) of the total change. The increment was higher in the last 10 years compared to the first 20 years (between 1988 and 2008). This could be linked to the increased population of the surrounding areas. Also, it was reported by (Jibril and Liman, 2014) in Ilorin, Nigeria, (Jande and Amonjenu, 2018). They attributed the increase in the built up areas to city expansion there by converting forest land to other land use and land cover category.

The magnitude of change of farm land increased to 20.80.km^2 (11.87%) from (5.91%) in the preceding period. The magnitude of change in vegetation areas also decreased to-47.26.km^2 (26.97%). The water body area was found to lost 28.05 km^2 (16%) to other land use/land cover classes. These findings are consistent with the work of Ogunmola *et al.* (2014) who pointed out that forested lands in most of urban settings in Nigeria has been decreasing due to the commercial activities and urbanization. Jande and Amonjenu who have earlier found out that forest area in Apa were on decrease due to expansion in settlement.

Table4. *Magnitude and Percentage Change in LULC between 2008 and 2018*

LULC Class	2008 Extent (km^2)	2018 Extent (km^2)	Magnitude of Change (km^2)	Percentage of Change	Annual Rate of Change %
Built up	156.3201	223.0812	66.76	38.09	3.81
Forest	141.2163	128.8458	-12.37	7.06	0.71
Other Vegetation	200.5578	153.2961	-47.26	26.97	2.69
Farm land	253.863	274.6674	20.80	11.87	1.19
Water body	54.5004	26.4537	-28.05	16.00	1.6
Total	**806.4225**	**806.4225**	**175.24**	**100**	

Source: *Authors Analysis 2019*

Magnitude and Percentage of Change in Land Cover between 1988 and 2018

The magnitude of the change of forest for the 30 - years period from 1988-2018indicates that, the forest continues to decline as it lost -187.77(50.01%) to other land cover classes with annual rate change of (15%) (Table4. This implies that 11% of forest land is been lost annually in the area for 30 years.

This was greater than the annual rate of change reported by Jande and Amonjenu (2018) in the same study area. It was also higher that the rate reported by Oyinloye *et al.* (2010) in some state forest reserves in Southwestern Nigeria. Farm land increased by 41.53(11.06%) between 1988 and 2018 at an annual rate of 3.32% which was the third highest.

Table5. *Magnitude and Percentage Change in LULC between 2008 and 2018*

LULC Class	1988 Extent (km^2)	2018 Extent (km^2)	Magnitude of Change (km^2)	Percentage of Change	Annual Rate of Change %
Built up	79.9677	223.0812	143.11	38.12	11.44
Forest	316.6191	128.8458	-187.77	50.01	15.00
Other Vegetation	150.2973	153.2961	2.99	0.79	0.24
Farm land	233.1378	274.6674	41.53	11.06	3.32
Water body	26.4006	26.4537	0.05	0.01	0.03
Total	**806.4225**	**806.4225**	**375.45**	**100**	

Source: *Authors Analysis 2019*

This result of the magnitude of change between 2008 and 2018 (Table 5) indicates that 3.32% of forest land is being converted yearly for farming activities during the study period. In addition, built-up areas increased further by 143.11 (38.12%) at an annual rate of (11.44%) This research is in line with (Ogunmola *et al.*, 2014) who asserted that rapid population growth has remained the major factor that has prompted and continued to stimulate environmental resources degradation. Also, vegetation. Farm land and water was found to be 2.99 (0.79%) 41.53 (11.06%) 0.05 (0.01%) respectively with annual rate of change of 0.24, 3.32 and 0.03. The importance of can never be over emphasize because land is needed for farming, building of houses and other constructions, less is left to forest or fallow. The implication of this is that Forest will in no distant future be deforested and converted to different land use land cover classes which will lead to increased temperatures, decline in biodiversity and increased soil erosion and degradation.

CONCLUSION

This study shows that land use activities have directly resulted in varying degrees of vegetation cover degradation and fragmentation in Apa Local Government Area. Urbanization, as well as subsistence farming are drivers of vegetation cover degradation in Apa Local Government Area, in the form of deforestation and fragmentation. Mapping of land use/land cover change by remote sensing showed that, the period of 1988 - 2008 covering 20 years, forest decrease to 187.7733 km^2 (23.28%). However, from 2008 -2018 covering 10 years, forest decrease further to 12.3705 (km^2) (1.53%). This is an indication of continuous land use conversion mainly from forest to other land use like farming, residential and other activities were built and roads constructed within the period. It is clear that the surge in urbanization resulted in clearing of vegetation and demand for wood and timbre and this Mapping of land use/land cover change by remote sensing showed that during the 30 years period from 1988 to 2018, while cultivated area remained constant, built up area increased considerably from 37 km^2 to 89.km^2. This represents a 52.km^2 gain of land area.

This shows that there was a significant increase in urbanization within the period as a result of rise in population. Many houses accounts for the decrease in forest land from 34 km^2 to 12 km^2 in the period. The decrease accounted for a loss of 22.km^2 of forest land. Similar finding has been reported by Ogumola *et al*. (2014) who mapped land use/land cover change of Yelwa-haipang area of Plateau State between 1975 to 1986 and 1986 to 2012.Loss of naturally vegetated area in Apa Local Government Area and its environs is mainly due to human activities such as farming, urban growth and expansion and has resulted into land degradation like erosion, loss of biodiversity and forest fragmentation.

RECOMMENDATION

- It is recommended that government should mandate relevant agencies to ensure that forest loss due to urbanization is minimized, and replanting of cleared plantation trees be done.
- The local people should be sensitized on the dangers of indiscriminate and unsustainable vegetation destruction which majorly results from farming.
- To this end the department of Forestry should be beefed up with staff for proper monitoring of the forest reserve in the area its environs.
- Practice of agro forestry should be adopted.

REFERENCES

[1] Amor, D. (2008). Road impact on deforestation and jaguar habitat loss in the Selva Maya. Unpublished Ph. D. Dissertation. Ecology Department, Nicholas School of the Environment, Duke University.

[2] Amor, D. and Pfaff, A. (2008). Early history of the impact of road investments on deforestation in the Mayan forest. Working Paper, Nicholas School of the Environment and Sanford School of Public Policy, Duke University, Durham, NC, USA.

[3] Angelsen, A. (1999). Agricultural expansion and deforestation: modeling the impact of population, market forces and property rights. Journal of Development Economics 58: 185-218.

[4] Bawa. K. S., Nadkarni, N., Lele, S., Raven, P., Janzen, A., Lugo, A., Ashton, P. and Lovejoy, T. (2004). Tropical ecosystems into the 21st Century. Science 306: 227-230.

[5] Crutzen, P. J. (2002). Geology of mankind Nature 415: 23-23.

[6] DeFries, R., Asner, G., and Houghton. R. (Eds.) (20044). Ecosystems and land Use Change. (American Geophysical Union) Geographical Monograph Series, Vol. 1 53.

[7] Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S.,

Coe, M.T., Daily, G.c., Gibbs, H.K., Heikowski, J.H., Holloway, T., Howard, E.A., Kucharik, C.J., Monfreda, C., Patz, J.A., Prentice, l.c., Ramankutty, N. and Snyder, P.K. (2005). Global consequences of land use. Science, 309, 570-574.

[8] Foley, J.A., Ramankutty, N., Brauman, K.A., Cassidy, E.S., Gerber, J.S., Johnston, M..Mueller, N.D., O'Connell, C., Ray, D.K., West, P.C., Balzer, C., Bennett, E.M., Carpenter, S.R., Hill, J., Monfreda, C., Polasky, S., Rockstrom, J., Sheehan, J., Siebert. S., Tilman, D. and Zaks, D.P.M. (201 1). Solutions for a cultivated planet. Nature, 478: 337-342.

[9] Ghazani, M.F. and Najibzadeh, M. (2014). Application of Landsat ETM+ satellite imageries in forest cover mapping; case study Arasbaran protected area. Journal of Biodiversity and Environmental Sciences (JBES) ISSN: 2220-6663 (Print) 2222-3045 (Online)

[10] Hance. J. (2008). "Tropical deforestation is 'one of the worst crises since we came out of our Mongahav.com , A Place Out of Time: Tropical Rainforest and the Perils of thy face.

[11] Isbell. F., Calcagno, V., Hector, A., Connolly, J., Harpole, W.S., Reich, P.B., Scherer-Lorenzen, M.,Schmid, B. Tilman, D., van Ruijven, J., Weigelt, A.,Wilsey, B.J., Zavaleta, E.S. andLoreau, M. (201 1). High plant diversity is needed to maintain ecosystem services. Nature. 477: 199-UI 96.

[12] Jande, J. A., and Amonjenu, I. O. (2018). Land Use/Landcover Change Detection Mapping of Apa Local Government Area, Benue State, Nigeria. *Journal of Research in Forestry, Wildlife & Environment*, *10*(3), 69–80. Retrieved from http://www.ajol.info/index.php/ jrfwe jfewr ©2018 - jfewr Publications

[13] Kaimowitz, D. and Angelsen, A. (1998). Economic models of tropical deforestation. A review Center for International Forestry Research, Bogor Indonesia.

[14] Lambin, E.F. and Geist, H.J. (Eds.) (2006). Land Use and Land Cover Change. Local Processes and Global Impacts. Berlin, Heidelberg, New York: Springer Verlag.

[15] Lee, R. (2011). The Outlook for Population Growth. Science.333: 569-573.

[16] Mather. A. S. (1991). Global Forest Resources. International Book Distributors, Dehra Dun.

[17] Myers, N. (1994). Tropical deforestation: rates and patterns. In: The Causes of Tropical Deforestation. The economic and statistical analysis offactors giving rise to the loss ofthe tropicalforest, eds. Brown, K. and Pearce, D. pp 27-40. UCLPress.

[18] Myers, N. and Mittermeier, R. A. (2000). Biodiversity hotspots for conservation priorities. Nature.403: 853-854.

[19] Ogunmola, J.K, Gajere, E.N, Jeb, D.N, and Agene, I.J. (2014). Study of land cover change in Yelwa-Heipang area of Plateau State, north-central Nigeria: a Geoinformatics approach.The international archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XL-I, ISPRS Technical Commission I Symposium, 17 — 20 November 2014, Denver, Colorado, USA

[20] Oyinloye, R. O., Adesina, F.A. and Salami, A.T. (2010). An Assessment of the State of Forest Reverses in Southwestern Nigeria. Ife Research Publications in Geography 9(1): 155-175Ramankutty, N. and Foley, J.A. (1999). Estimating historical changes in global land cover: Croplands from 1700 to 1992. Global Biogeochemical Cycles, 13: 997-1027.

[21] Rockstrom, J., Steffen, W., Noone, K., Persson, A., Chapin, F.S., Ill, Lambin, E.F., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H.J., Nykvist, B., de Wit, C.A., Hughes,

[22] Ross. (1996). Conditionality and logging reform in the tropics. In: Institutions for Environmental Aid: Problems and Prospects, eds. Keohane, R. O. and Leve, M A. Pp 167-197. MITPress, Cambridge Massachusetts.

[23] Sands. R. (2005). Forestry in a Global Context. CABI Publishing.

[24] Tilman, D., Baizer, C., Hill, J. and Befort, B.L (2011). Global food demand and the sustainable intensification of agriculture. Proceedings of the National Academy of Sciences ofthe United States ofAmerica. 108: 20260-20264.

[25] Wilkie, D., Shaw, E., Rotberg, F., Morelli, G. and Auzels, P. (2000). Roads, development and conservation in the Congo Basin Conservation Biology 14: 1614-1622.

Citation: *Ikyaagba, E.T, Jande, J.A and Eche, A. P, "Impact of Land-Use Practices on Vegetation Cover in Apa Local Government Area, Benue State, Nigeria", International Journal of Research in Agriculture and Forestry, 7(1), 2020, pp 1-9.*