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Spatial Distribution of Colleges of Education and Effects on the Forest Ecosystem: A Case Study of College of Education Ikere, Nigeria

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Abstract – **Distribution of various Colleges of Education in Nigeria was examined. The list of Colleges of Education in the country was obtained from National Commission for Colleges of Education (NCCE) and their respective coordinates were obtained. Satellite imagery of Ikere forest reserve was obtained from Google earth while the sketch map was obtained from Ekiti State Department of Forestry (ESDF). Photographs of some parts of the forest reserve were taken. A set of 50 questionnaire was administered by the old staff of the College of Education, Ikere – Ekiti.**

The coordinates of various Colleges of Education obtained were loaded into ArcGIS to represent their locations on the map of Nigeria. Federal Colleges were represented with points, state colleges were represented with asterisks while private colleges were represented with upward arrows. All the attribute data obtained for Ikere forest reserve were used to generate a digital map showing the extent of all the various land use within the forest ecosystem. Various forest types were represented with polygons of different shapes and colours. Roads of different types were represented with lines of different sizes. Photographs of some parts of the forest reserves were hotlinked to reveal the actual status on the land. Administered questionnaire was coded and analyzed appropriately.

It was discovered that the Colleges of Education established by the State Government were more (56.63%) than those established by the Federal Government (26.51%) while the private ownership established the least Colleges of Education (16.87%) in the country. When the spatial distribution of Colleges of Education by geopolitical zones were examined, South West recorded the highest number (21.69%), followed by North East (20.48%), South South (15.66%), North Central (14.46%), in that order and the least was recorded in South East (13.25%). Forest in its natural status in Ikere forest reserve have been reduced to mere farmland, degraded land and encroached plantation of *Gmelina arborea and Tectona grandis*, which was not the case before the inception of the College. Old staff of College of Education Ikere Ekiti was responsible for the level of depletion of the forest reserve.

Keywords – **Colleges of Education, Forest Reserve, Georeference, Hotlink, Satellite Imagery.**

I. INTRODUCTION

Distribution of tertiary institutions in Nigeria has cut across all zones in the country. This is because over time, there is protracted difficulty in admission of students into higher institution of learning in Nigeria, which has provided opportunities to some Nigerians and governments to establish more tertiary institutions [15]. In 1999, the first Private institution was licensed in Nigeria under the President Olusegun Obasanjo's administration [12]. Over the years, the number of tertiary institutions established has been on the increase [15]. The establishment of these institutions may start from an existing structure but usually end up in or extend into forest or relocate into a virgin land. In the process, part or all the genetic resources and biodiversity within the forest ecosystem are displaced and taken over by structures of the said institution, which of course is a form of deforestation of the said forest ecosystem. Nigerian forest ecosystem comprises 5,103 plants species, 247 species of mammals, 123, 135, 109 and 247 species of birds, reptiles, amphibians and fish respectively while there are more than 20,000 different species of invertebrates [11]. Some of these species are endangered, threatened or extinct [11] and [23] as a result of deforestation. This study will bring out a case study of an institution which had over time taking over the gazette forest reserve in Ekiti state Nigeria. The study is aimed at comparing the Colleges of Education on various types of ownership, spatial distribution across the six geopolitical zones and evaluating the impact of the establishment of the Institution on the forest ecosystem over time.

II. METHODOLOGY

Method of data Collection

List of all the Colleges of Education in Nigeria was obtained from Nigeria Commission for Colleges of Education achieve. Acquisition of satellite imagery and sketch map of Ikere forest reserve, coordinates of 84 Colleges of Education across the country, coordinates of some places in the forest reserve were obtained using Hand-held Global Positioning System (GPS). Such places like T-junctions, settlements, major roads, and major hills that could be easily identified both on satellite images and land such. These were used to georeference the sketch map. Photographs of the forest reserve showing both the natural and artificial forest were taken. A set of 50 questionnaire were administered by old workers in the Colleges of Education, Ikere Ekiti to ascertain the influence of the College on Ikere forest reserve.

Method of data Analysis

After the acquisition of satellite images from Google earth and existing map of the forest reserves, the following procedures were adopted in digitizing the forest reserves: Image processing, which involved geo referencing clipped map and colour enhancement in such a way to be able to digitize various sections and features of the forest reserve. This was followed by categorization. At this level, the

satellite images were categorized into various sections using different colours; Vectorization, which involves the conversion of the raster data to vector by digitizing; Map production, which involved scanning of the hard copy map and georeferencing it while the boundaries were digitized. The digitized boundaries were superimposed on the satellite an image after which clipping was done. Various land use within the forest reserve were digitized as polygons with different distinct colours. Lines of different thickness and colours were used for roads. Coordinates obtained for each College of Education in the country were loaded into ArcView to show their respective locations in the country. Points were used to represent various federal colleges of education, arrows were used to differentiate private colleges while asterisks were used to represent state colleges. Descriptive statistics was used to illustrate the distribution of various colleges of Education according to various geopolitical zones and ownership. Analysis of variance was carried out to determine if there are significant differences in the distribution of Colleges of Education by ownership and geopolitical zones in the country. The administered questionnaire was coded and analyzed appropriately.

III. Results and Discussion

The summary of the distribution of Colleges of Education in Nigeria with respect to various types of ownership and variuos geopolitical zones is presented in Table 1. The table reveals that a total of 47 colleges are own by various State Governments, which accounted for a 56.63% of the total Colleges of Education in the country. This of course, recorded the highest number of Colleges of Education in the country. The Federal Government of Nigeria accounts for the ownership of 22 Colleges of Education across the country, which accounted for a 26.51% of the entire Colleges of Education in Nigeria. However, the least number (14) is recorded by various private ownerships. This result is also illustrated in Figure 2. Going by the distribution of colleges by geopolitical zones in table 1, which is also illustrated in Figures 1 and 3, the highest occurrence of Colleges of Education was recorded in South West (18), followed by North East (17) and South South (13) in that order, which account for 21.69%, 20.48% and 15.66% of the entire Colleges of Education in the country. South East recorded the least with 13.25% occurrence while North West and Central have the same number (12, which accounted for 14.46%) of colleges each.

Southwestern part of Nigeria has over time been known to be more expose to education more than any other part of the country. This was evident during the era of former Premier of Western Region, Late Obafemi Awolowo, who introduced free education in the region dated back to 1955. This had led to increase in the number of secondary and primary schools in the zone more than any other part of the country. Up till the early 90's, most of the teacher in the secondary schools were mostly NCE holders. In essence, establishment of more Colleges of Education in southwestern zone of the country was to sufficiently produce more teachers with teaching qualifications to teach the students in the primary schools in the region. Oloniyo College of Education, Ibadan was the first College of Education established in Nigeria in 1965. This was exactly ten years after the introduction of free education in the zone. The college was primarily established to train teachers to teach the pupils in the primary and secondary schools in the zone.

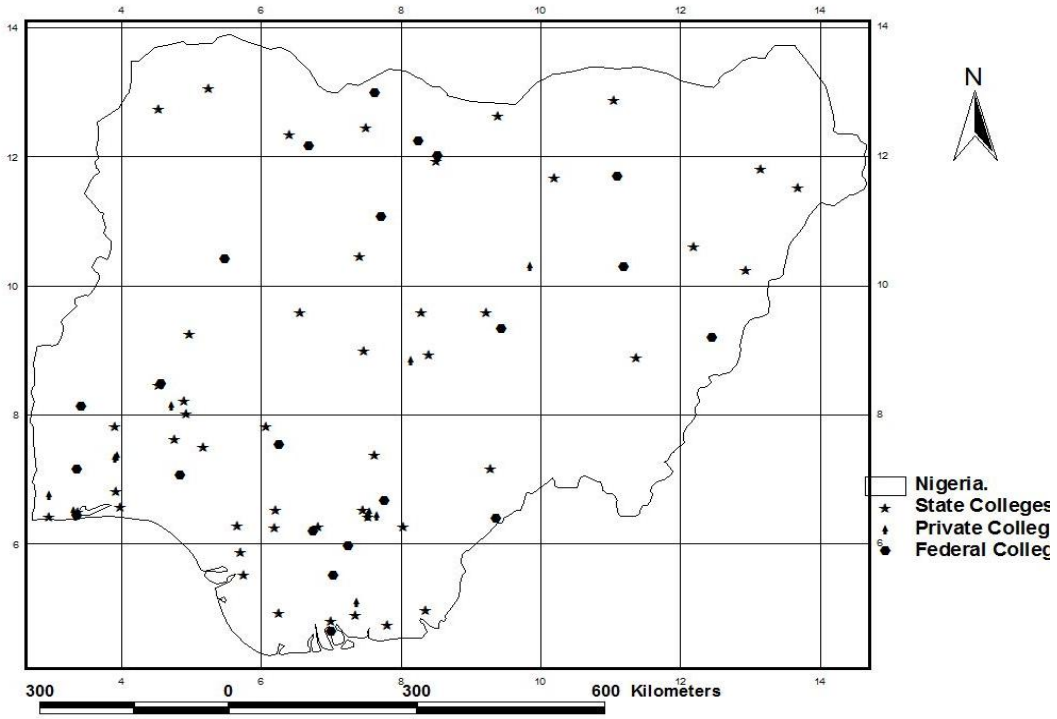

Fig.1. Distribution of Colleges of Education in Nigeria

Table 1: Summary of distribution of Colleges of Education by geopolitical zone in Nigeria

	Type of Ownership			Total	% Occurrence
	Federal	Private	State		
North East	4	3	10	17	20.48
South East	3	1	7	11	13.25
South South	5	0	8	13	15.66
North West	3	4	5	12	14.46
North Central	3	0	9	12	14.46
South West	4	6	8	18	21.69
Total	22	14	47	83	100.00

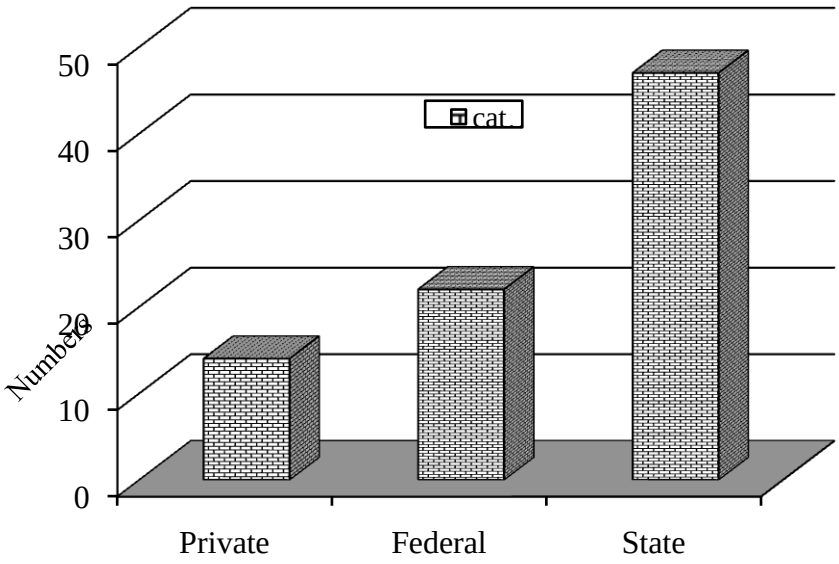

Fig.2. Distribution of Colleges of Education in Nigeria by ownership

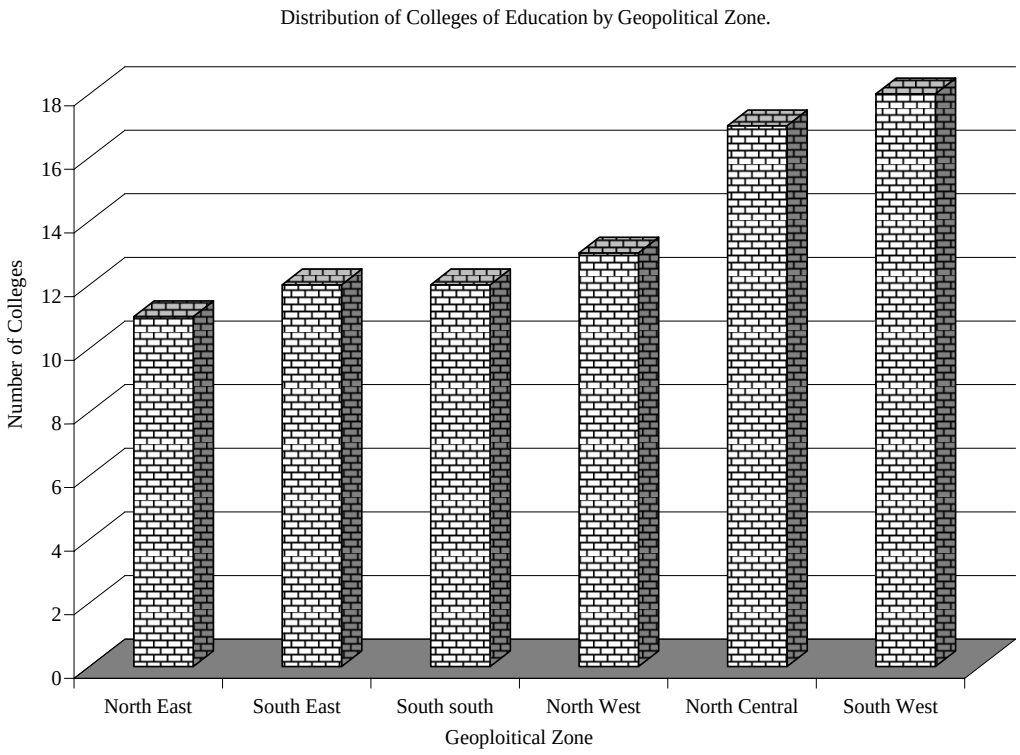

Fig.3. Distribution of Colleges of Education by geopolitical zones

In spite of contributions of the states and federal governments to the establishment colleges of education in south west, private ownership contribution recorded the highest value in the country for the same reason given above. It is in no doubt from the administered questionnaire that Biafra war, which lasted for about a year, between 1973 to 1974 must have been responsible for the least number of colleges of education recorded in the southeastern part of the country. The zone recorded the least in ownership by federal (3), state (10) and private (1). After the civil, there was no money to rehabilitate all what has been damaged as a result of the war whereas other regions have gone ahead of them in terms of development.

The result of the analysis of variance carried out for the distribution of colleges by geopolitical zones and type of ownership is presented in tables 2 and 3. The result showed that there are significant differences among the geopolitical zones as well as the type of ownerships.

Table 4 showed the extent of various land use in Ikere forest reserve while the digital map of the reserve is presented in Figure 4. From the table, 37.52% of the entire land area originally gazette in 1954 for natural forest has over time been converted to natural vegetation, degraded land, farmland and bee keeping. Only 62.20% of this land area is covered with plantations of *Gmelina arborea* and *Tectona grandis*. About 40% level of encroachment recorded in this forest reserve, which is a little less than the area covered by *Gmelina arborea* and *Tectona grandis* plantations (Figure 4) was as a result of the fact that the College of Education Ikere –Ekiti was sited less than a kilometer away from the forest reserve. Responses from the questionnaire administered revealed that at the inception of the College between late 70's and 80's, over 70% of the College staff was seriously farming due to delay in the workers' wages, which could accumulate for more than 6 months before they were paid. Another reason given for concerted farming at that time was that the wages was very small. The reason obtained above is similar to report of [10] that the people who are poor in the rural area tend to over exploit the forest products and bring about not only depletion of the forest ecosystem but also land degradation as a result of their activities on the land.

Table 2: ANOVA of distribution of Colleges of Education across six geopolitical zones in Nigeria

Geopolitical Zones	Sum of Squares	df	Mean Square	F	Sig.
Geopolitical Zones	53.58	10.00	5.36	2.22	0.04
Error	103.92	43.00	2.42		
Total	157.50	53.00			

Table 3: ANOVA showing type of ownership of various Colleges of Education in Nigeria

Ownership Type	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.37	10	2.34	7.96	0.00
Within Groups	12.63	43	0.29		
Total	36.00	53			

Figure 4 showed the land used map of Ikere forest reserve while the hotlink of some features are presented in Figure 5. From the figures, the green portion indicates the natural vegetation, dirty green portion represents the various farmland, off-whilte represent the degraded land, ashe colour represents the rock outcrops. The photographs of these four other land use other than the plantation within the forest reserve is presented in Figure 5. It has been discovered that the plantation of *Gmelina arborea* and *Tectona grandis* have been partly degraded and partly encroached upon between 80's and early 90's majorly by workers of the College of Education, Ikere –Ekiti before taken over by the neerby community dewellers as revealed by the administered questionaire. The forest ecosystem in the study area has been seriuosly depleted. Some of the reasons for disappearing of tropical forest are population pressure and infrastructural development as stated by [24]. This has lead to consequent disappearing of the economic resource and biodiversity in the forest ecosystem [8], [10]. The plantation of *Gmelina arborea* and *Tectonal grandis* has been cropped sevelrally leaving only some coppieces for natural regeneration without any management operation [5]. He agued further that the growth characteristics of *Gmelina arborea* and *Tectona grandis* plantations in the forest reserve were different from what was obtained by other researchers for plantations of the same species at similar age [1], [2], [3], [4], [7], [13], [14], [16], [17], [18], [19], [20], [21]. The cropping in the plantation has been a continious one since 80' without proper documentation of how each of the age series have been felled [5]. [9] and [22]. pointed out that there number of factors responsible for the growth of tree with regeneration ability other than the type of species in question, which also determines the growth characteristics displayed by the tree species as has been argued by [5] on the anomalies behavior of the growth characteristics of *Gmelina arborea* and *Tectona grandis* plantations in the forest reserve. Non-availability of record of felling in the forest reserve is one of the major set backs affecting forestry sector in Nigeria over time. There are no enough data or information and where there is, it is very obsolate [6].

Table 4: Extent of various land use in Ikere Forest Reserve

Land use	Size km^2	% Size
Natural vegetation	3.76	26.5
Degraded Land	0.22	1.58
Gmelina and *Teak* Plantation	8.82	62.15
Bee Keeping	0.09	0.63
Farm Land	1.25	8.83
Forest Camp	0.04	0.32
Total	14.19	100

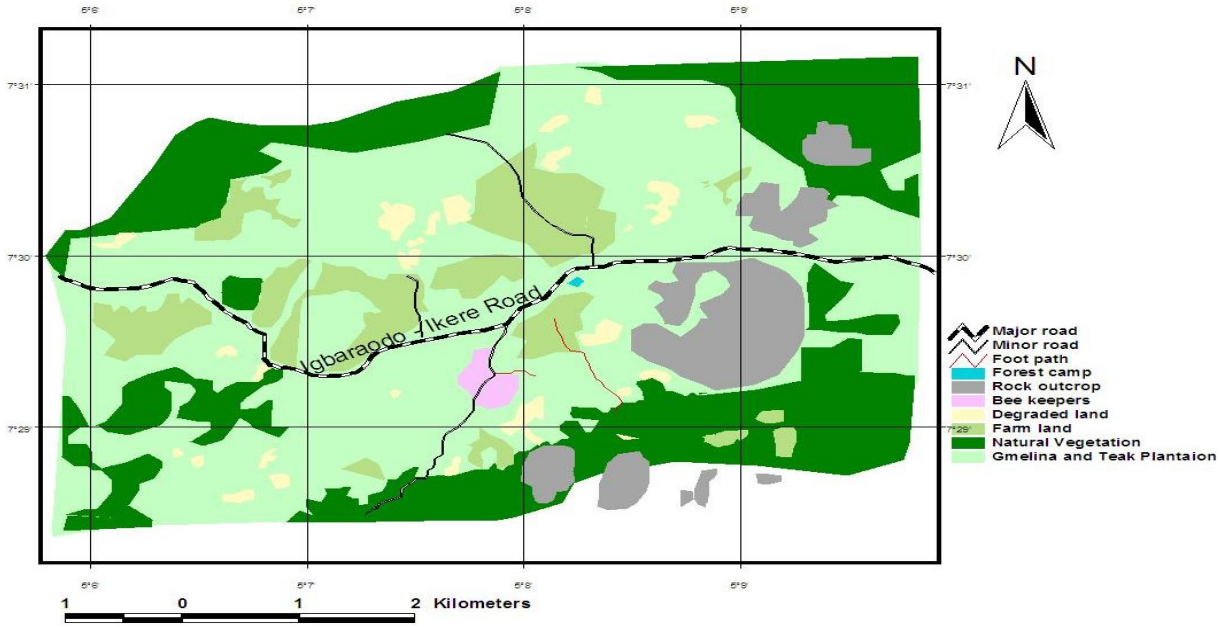

Fig.4. Digital land cover map of Ikere Forest Reserve

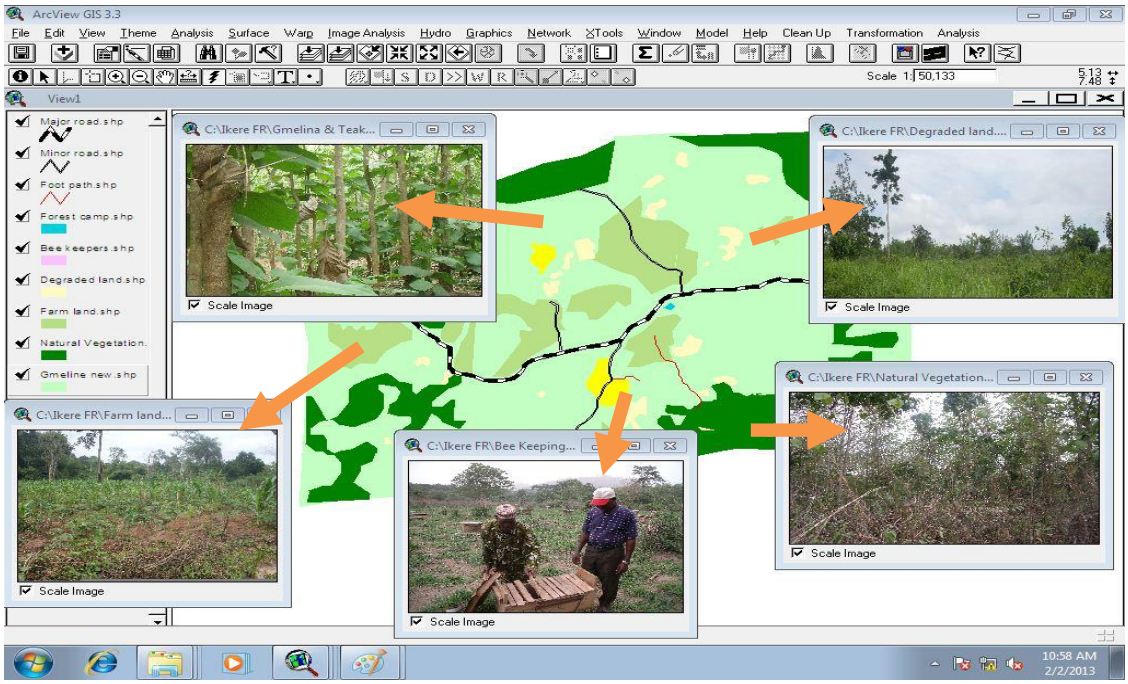

Fig.5. Hotlink of some land uses of Ikere Forest Reserve

IV. Conclusion

A total of 84 Colleges of Education have been established between 1965 and 2013 in Nigeria by Federal, States and privates individuals. State Government established the highest number, which accounted for 56.63% of the total number of colleges of education in the country while various private individuals established the least number (14). Going by the spatial distribution of the Colleges of Education across the six geopolitical zones in the country, southwestern part of the country has the highest number of colleges than any other parts. The least distribution was obtained from the south eastern part of the country while the North Central and North West have the same distribution of colleges of Education.

The forest reserve originally gazette for Natural forest have been depleted and converted to other forms like, natural vegetation and plantations of *Gmelina arborea* and *Tectona grandis*. Within the forest reserve are farmlands, degraded land as well as the bee keeping. Apart from the plantations established in the reserve by the government, all other form of land witnessed there are as a result of activities of the encroachers, which are majorly the staff of the College of Education Ikere –Ekiti as a result of their low income at that time. The natural form of the forest was intact prior to the establishment of the institution.

RECOMMENDATIONS

Establishment of College of Education is inevitable to be able to train teachers who will teach the pupils in the secondary and primary schools across the country but its establishment should not be in close proximity to the gazette forest reserve to preclude being encroached upon by the staff and others who as a result of the institution may be farming in the reserves.

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