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Spatial Distribution of Nigerian Universities Offering Forestry Education using Geographic Information System

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ABSTRACT

The importance of forested areas to provide food, medicine and shelter and to maintaining a healthy environment cannot be overemphasized. Hence, handy information on the universities that offers forestry education is necessary. The study used a geographic information system to spatially distribute Universities in Nigeria that offer Forestry Education. The list of all the universities registered as awarding Forestry Degrees in Nigeria were obtained online from the National University Commission (NUC) register and Joint Admission and Matriculation Board (JAMB) brochures. The corresponding coordinates of the universities were obtained using hand-held Global Positioning Systems and from satellite imagery. Quantum Geographic Information System was used to develop the universities spatial distribution. Only 31 out of the 34 universities identified as awarding forestry degrees were on the NUC list. Moreover, 61.8% of all of these universities were owned by the Federal Government, 32.4% by State Governments and only 5.9% were privately owned. Out of the universities recognized by NUC, the South-West geopolitical zone had the highest number (8), followed by South-South (7), North-West (5), North-Central (4), North-East (4) and South-East (3) with least. Non-uniformity was observed in Educational bodies offering studies in forestry, hence the government should invest more in forest research and education.

Keywords: Forestry education, Geographic information system, JAMB, National University Commission, Spatial distribution, Remote sensing

1. INTRODUCTION

Forestry is the science and art of planting trees, managing, utilizing and conserving natural and artificial forests and associated resources for the benefit of human and the environment. Forests provides man with food, shelter and medication. Hence, play significant role in conserving soil and biodiversity, maintenance of ozone layer, water and nutrient cycling, provision of bio-energy, carbon sequestration, air purification and erosion control [1].

A forester's job according to [2], has drifted from the conventional planting and managing trees and forests for timber to application of several skills not to only meet the growing demands for forest products but also, to solve diverse environmental problems. Forestry boundaries of are being extended to include trees management in landscapes outside forests. Foresters need to be equipped with knowledge and skills in diverse areas ranging from silviculture, engineering, biotechnology, biometrics, ethnomedicine, geography, sociology, computer among others to meet the emerging complex social, economic and environmental issues.

In Nigeria, Forest Assistants training were traced to 1939 in Zaria and at Ibadan in 1941 and Yaba, Lagos in 1942. Later followed by establishment of Forestry Department at the University of Ibadan in 1963 [3]. Despite the aged history of forestry in Nigeria, its education has noticed a decrease compared to other career fields of study. [1] reported that enrolment into forestry departments in Nigerian universities by candidates has decreased while there is tremendous increase for the so-called more lucrative courses. Although, the number of universities established in Nigeria (both private and publicly owned) has been on the increase [4]. [3, 5] reported about 40 Universities offering courses in Agriculture, Forestry and related disciplines. However, the number of the universities recently increased.

Remote sensing and Geographic information system have been successfully incorporated into forestry education and have been used over the years for estimation of tree biomass and carbon stock [6], forest inventory and mapping [7], digital elevation model [8], land use and land cover dynamics [9] among others. Therefore, this study aimed at using geographic information system to spatially distribute Universities in Nigeria that offers Forestry Education, with a view to providing handy information on their location, types and accreditation status.

2. MATERIALS AND METHODS

2. 1. Study area

The study was carried out in Nigeria, West Africa. Nigeria lies between the latitudes 4° 16'N to 13° 52'N and longitudes 2° 49'E to 14° 37'E (Figure 1), with total land area of 923,850 km² and highest elevation of 2,419 m above sea level. Nigeria is divided into six (6) geopolitical zones, namely; South-east, South-west, South-south, North-central, North-east and North-west. Nigeria has over 250 ethnic groups with distinct languages. Hausa, Igbo and Yoruba are the most prominent language, with English as the official language [10].

2. 2. Data collection and analysis

The list of all the universities registered as offering Forestry Education (Degree) in Nigeria were obtained from National University Commission (NUC) register and Joint

Admission and Matriculation Board (JAMB) brochure [11, 12]. Coordinates of universities were obtained using Hand-held Global Positioning System (at mean accuracy of 8 m) and Google earth satellite imagery for universities that could not be assessed at the time of the research. Descriptive statistics such as frequencies, tables, percentages and graphs were used to analysis data gotten from JAMB and NUC lists.

Quantum Geographic Information System (QGIS) was used for mapping Nigeria and dividing the country into its geopolitical zones. The universities coordinates obtained were saved in text (tab delimited) file format in spread sheet (Microsoft Excel) and loaded into the QGIS to indicate their respective locations. The Coordinate Reference System (CRS) was set at WGS84. Distinct symbols were used to indicate Federal, State and Privately-owned universities.

3. RESULTS AND DISCUSSION

The descriptive statistics result (Table 1) revealed that a cumulative total of thirty-four (34) universities were enlisted on the year 2018 National University Commission (NUC) and Joint Admission and Matriculation Board's (JAMB) lists as universities that had departments of forestry. Consequently, only 31 (91%) of these universities were recognized by NUC. However, this amounted to 18.8% of legal universities in Nigeria.

On the other hand, the result showed that out of the 34 cumulative universities, 32 (94.1%) are on JAMB brochure. According to NUC (2018) Nigeria currently have 164 legal universities awarding degree in different academic fields. The reason for only few universities offering forestry education might be due to the public perception that forestry is a tedious and non- marketable course. [13] identified unpopularity of forestry and unfavourable public perception, lack of adequate knowledge/understanding of forestry, duration and rigour of forestry training and insufficient self-employment opportunities in forestry as some factors militating against forestry education. [1] in an independent research reported ignorance of how lucrative forestry profession is, fear of not getting job after graduation and the so-called "lucrative" courses like; medicine, banking, engineering as factors responsible for lack of interest in forestry.

However, the number of universities offering forestry education has increased compared to 20 and 24 universities as reported by [14] and [13], respectively, ten years ago. The locations of all the universities offering forestry education in Nigeria and their acronyms were displayed in Figure 1. Full definitions of universities' acronyms were listed in Table 2.

Table 1 showed that 61.8% of the universities offering forestry degree in Nigeria were owned by the Federal Government, 32.4% owned by the State Government and only 2 (5.9%) universities were privately owned. The percentages of these universities offering forestry in Nigeria (based on Geopolitical Zones) were displayed in Figure 2, with South-west and South-South having the highest (23% each) and North-Central, North-East and South-East having the least (12% each). [7] reported Nigeria civil war to be one of the reasons why some regions are ahead of others in terms of development; there was limited resources to rehabilitate things damaged during the war. Hence, the distribution of universities based on geopolitical zones as found and not found in NUC and JAMB lists was showed in Figure 3.

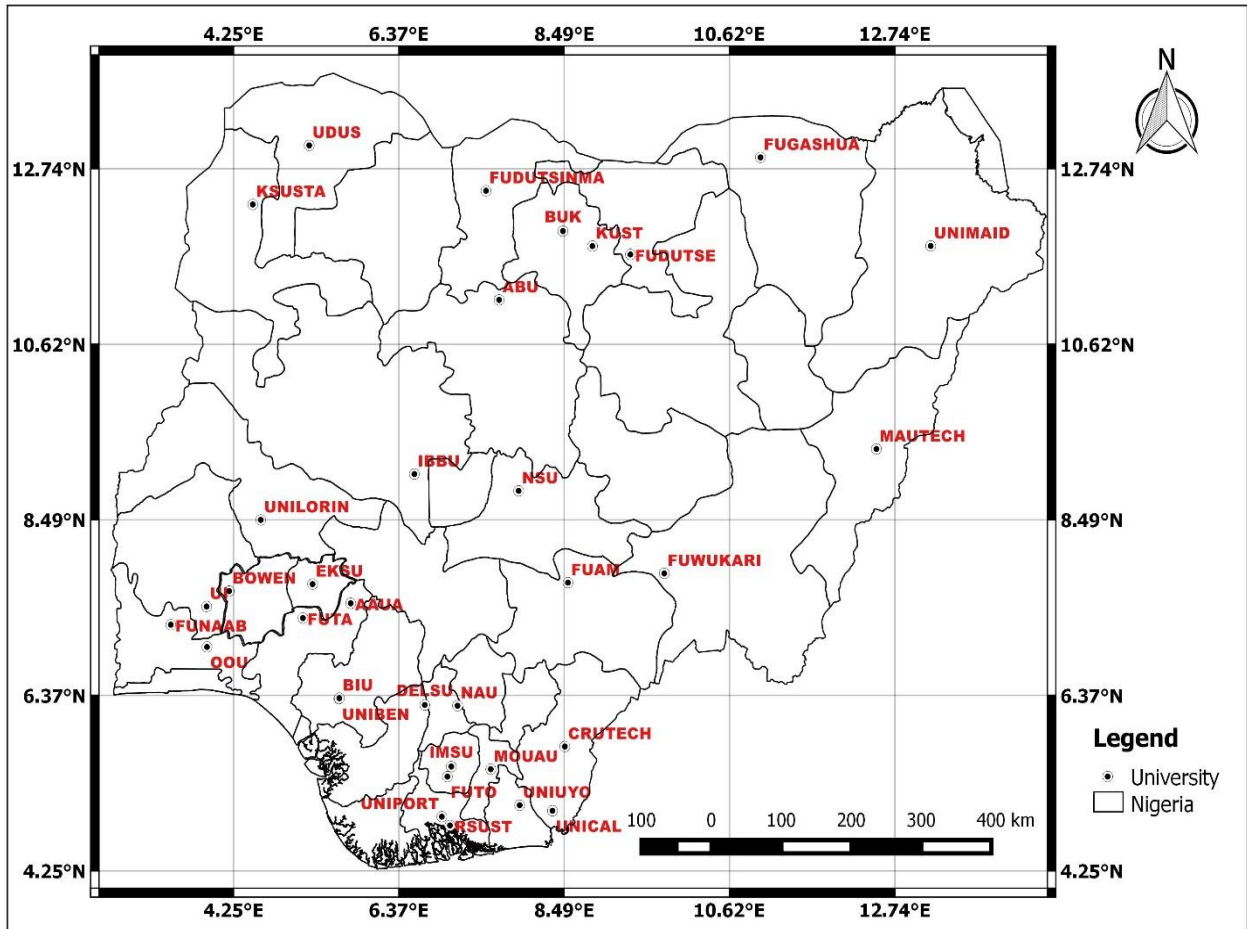


Figure 1. Distribution of Universities enlisted with Department of Forestry in Nigeria

Table 1. Summary statistics of Universities enlisted with Department of Forestry in Nigeria

Geopolitical Zone	University Status							
	Total number	NUC		JAMB		Ownership		
		On list	Not on list	On list	Not on list	Federal	State	Private
North-Central	4	4	0	3	1	2	2	0
North-East	4	4	0	4	0	4	0	0
North-West	6	5	1	6	0	5	1	0
South-East	4	3	1	4	0	3	1	0
South-South	8	7	1	8	0	4	3	1

South-West	8	8	0	7	1	3	4	1
Frequency	34	31	3	32	2	21	11	2
Percentage (%)	100	91.2	8.8	94.1	5.9	61.8	32.4	5.9

Where NUC = National University commission and JAMB = Joint Admission and Matriculation Board

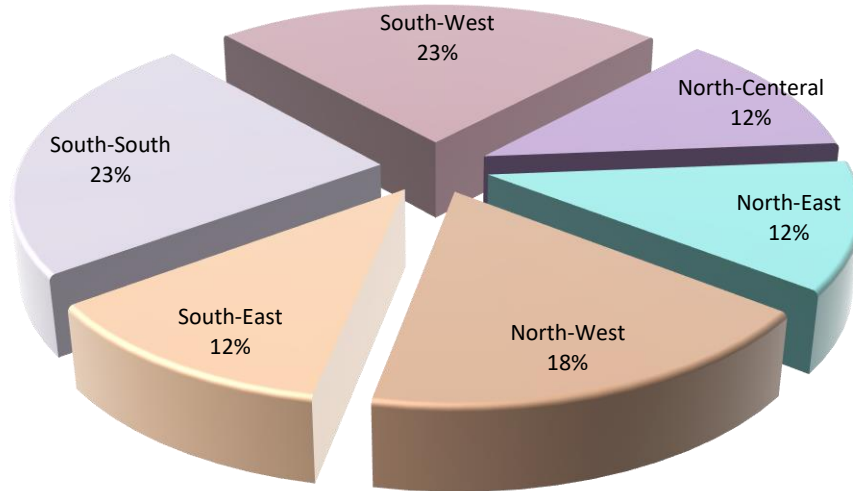


Figure 2. Pie-chart showing Departments of Forestry with Nigerian Geopolitical zones

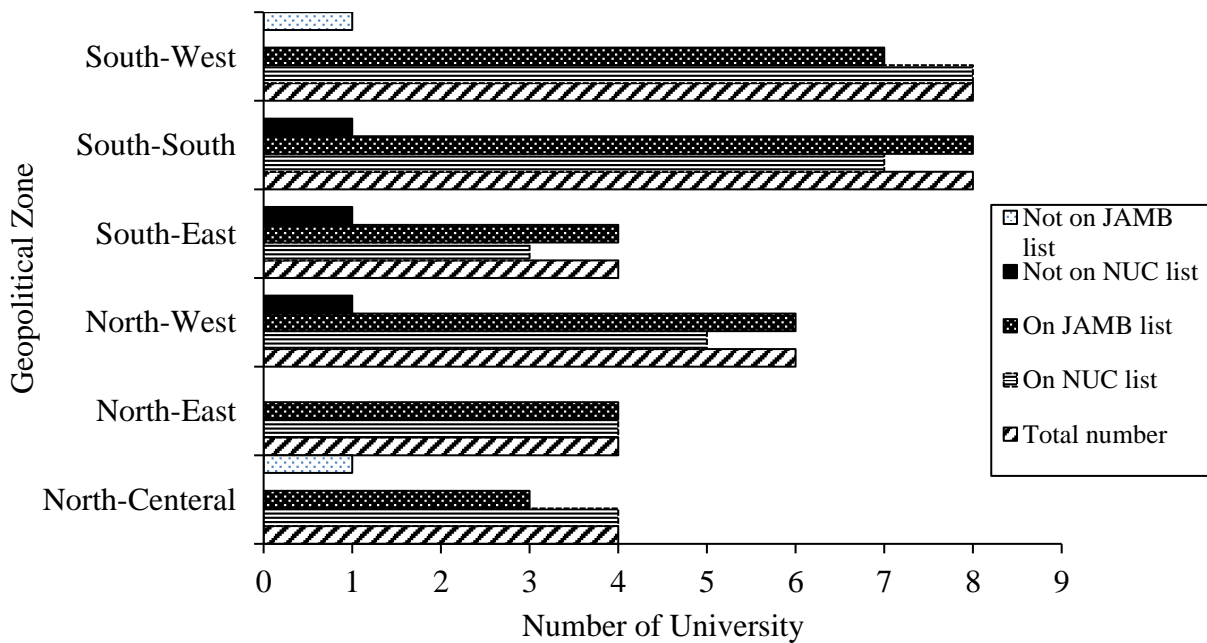


Figure 3. Distribution of Universities found and not found in NUC and JAMB lists

The result of the spatial distribution (Figure 4), for universities found in NUC register exposed that, South-west geopolitical zone of Nigeria had the highest number of universities (8) offering forestry (with 3 owned by the federal Government, 3 state Government and 1 private), Followed by South-South (7) and South-East had the list number of universities (3 owned by the Federal Government). However, the reason for having higher number of the universities awarding forestry degree might be due to the long time existence of forestry activities in the south west and the situation of Forestry Research Institute of Nigeria (FRIN). [5] traced forestry activities in Lagos (southwestern Nigeria) to 15th century by European merchants. Followed by the establishment of the Nigerian Forest Department (now FRIN) in 1951 and Department of Forestry (now Faculty of Renewable Natural Resources) at the University of Ibadan in 1963 [3, 15]. Also, the presence of the tropical rainforest in the southern part of Nigeria might also be the reason for increase of universities offering forestry towards the south.

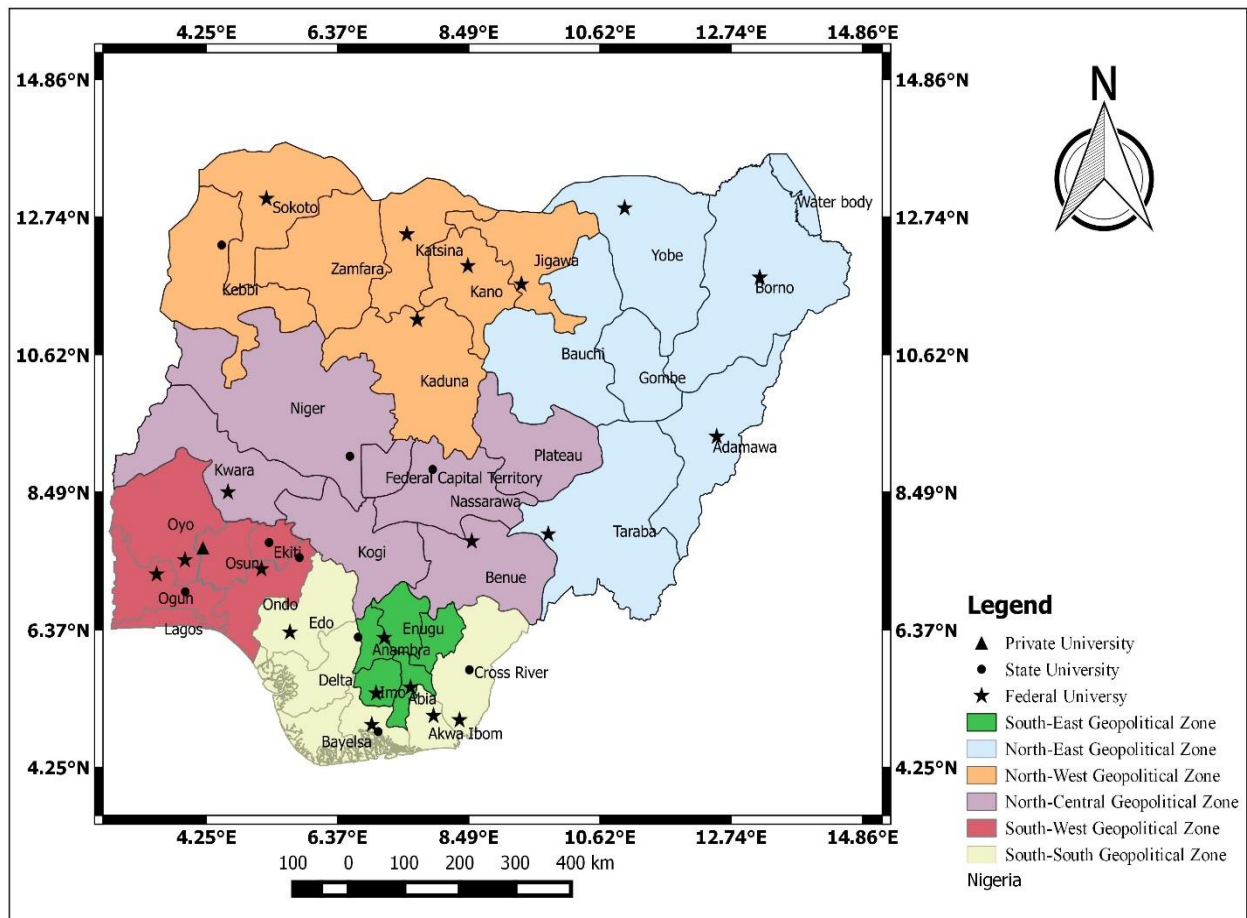


Figure 4. Spatial distribution of Universities found in NUC register

Based on Universities' ownership, North-West had the Highest number (5) of Federal Universities, North-East (4), South-South (4), South-East (3) and North-Central had only 2 Federal universities offering Forestry (On the NUC list). Furthermore, South-West and South-

South had the highest number of State universities offering Forestry (3 each). Hence, only South-West geopolitical zone had a privately own university authorised by NUC to offer forestry degree (Figure 4).

The research result on the comparison of the naming system of forestry department as registered in NUC and JAMB showed non-uniformity. Only 14 out of the 34 universities forestry department nomenclatures were the same in NUC list and JAMB brochure (Table, 2). Three (3) universities were not found on NUC year 2018 online list as offering forestry (Benson Idahosa University, Edo State; Imo State University, Imo State and Kano State University of Science and Technology, Kano State) though their names appeared as forestry degree awarding universities in JAMB brochure. Furthermore, two universities (Ibrahim Badamasi Babangida University, Lapai, Niger State and Adekunle Ajasin University Akungba Akoko, Ondo State) were found on NUC list but not on JAMB brochure (Table 2). Thus, the researchers observed that departments of forestry in some universities for instance; University of Ibadan have metamorphosed over the years from its initial status as department to a faculty (Renewable Natural Resources) with several departments and Units but neither reflected online on the NUC list nor JAMB brochure.

Table 2. List of Universities with Forestry Department and their registration Status.

S/ N	Name of University	Abbreviation for the University	Name registered with National University Commission (NUC)	Name registered with Joint Admission and Matriculation Board (JAMB)	Ownership
1	Ahmadu Bello University, Zaria, Kaduna State	ABU	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
2	Bayero University, Kano, Kano State	BUK	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
3	Federal University Dutsin-ma, Katsina State	FUDUTSINMA	Forestry	Forestry and Wildlife	Federal Government
4	Federal University of Agriculture, Abeokuta, Ogun State	FUNAAB	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
5	Federal University of Agriculture, Makurdi, Benue State	FUAM	Forestry and Wildlife Management	Social and Environmental Forestry/Wild Life and Range Management/Forest Production and Products.	Federal Government

6	Federal University of Technology, Akure, Ondo State	FUTA	Forestry and Wood Technology	Forestry and Wood Technology	Federal Government
7	Federal University of Technology, Owerri, Imo State	FUTO	Forestry and Wildlife	Forestry and Wildlife Technology	Federal Government
8	Federal University, Dutse, Jigawa State	FUDUTSE	Forestry	Forestry and Wildlife Management	Federal Government
9	Federal University, Gashua, Yobe state	FUGASHUA	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
10	Federal University, Wukari, Wukari, Taraba State	FUWUKARI	Forestry and Wildlife	Forestry and Wildlife Management	Federal Government
11	Michael Okpara University of Agriculture, Umudike, Abia State	MOUAU	Forestry and Environmental Management	Forestry and Environmental Management (Forestry and Wildlife Mgt/Agro-Forestry/Toxicology and Environmental Mgt)	Federal Government
12	Modibbo Adama University of Technology, Yola, Adamawa State	MAUTECH	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
13	Nnamdi Azikwe University, Akwa, Anambra State	NAU	Forestry and Wildlife	Forestry and Wildlife	Federal Government
14	University of Benin, Benin-City, Edo State	UNIBEN	Forestry and Wildlife	Forestry and Wildlife	Federal Government
15	University of Calabar, Calabar, Cross River State	UNICAL	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
16	University of Ibadan, Ibadan, Oyo State	UI	Forestry	Forestry/ Forest Resources Management (Forestry and Resources Mgt./Forestry and Wild-Life/Forestry and Range Mgt.)	Federal Government

17	University of Ilorin, Ilorin, Kwara State	UNILORIN	Forestry and Wildlife Management	Forestry and Wildlife Management	Federal Government
18	University of Maiduguri, Maiduguri, Borno State	UNIMAID	Forestry and Wildlife	Forestry and Wildlife	Federal Government
19	University of Port Harcourt, Port-Harcourt, Rivers State	UNIPORT	Forestry and Wildlife	Forestry and Wildlife	Federal Government
20	University of Uyo, Uyo, Akwa Ibom State	UNIUYO	Forest and Wild Life	Forestry and Wildlife	Federal Government
21	Usmanu Danfodiyo University, Sokoto, Sokoto State	UDUS	Forestry	Forestry/ Forest Resources Management (Forestry and Resources Mgt./Forestry and Wild-Life/Forestry and Range Mgt.)	Federal Government
22	Benson Idahosa University, Edo State	BIU	NOT ON NUC	Forestry and Wild Life and Environmental	Private
23	Bowen University, Iwo, Osun State	BOWEN	Forestry and Environmental Technology	Forestry and Environmental Technology	Private
24	Adekunle Ajasin University Akungba Akoko, Ondo State	AAUA	Forestry and Wildlife Management	NOT ON JAMB	State Government
25	Cross River University of Technology, Obubra, Cross River State	CRUTECH	Forestry	Forestry and Wildlife	State Government
26	Delta State University, Asaba Campus, Delta State	DELSU	Forestry and Wildlife	Forestry and Wildlife	State Government
27	Ekiti State University, Ado-Ekiti, Ekiti State	EKSU	Forestry and Wildlife	Forestry, Wildlife and Fisheries	State Government
28	Ibrahim Badamasi Babangida University, Lapai, Niger State	IBBU	Forest and Wildlife	NOT ON JAMB	State Government

29	Imo State University, Imo State	IMSU	NOT ON NUC	Forestry and Wildlife	State Government
30	Kano State University of Science and Technology, Kano State	KUST	NOT ON NUC	Forestry, Wildlife and Fisheries	State Government
31	Kebbi State University of Science and Technology, Kebbi, Kebbi State	KSUSTA	Forestry and Fisheries	Forestry	State Government
32	Nassarawa State University, Keffi, Nassarawa State	NSU	Forestry and Wildlife Management	Forestry and Wildlife	State Government
33	Olabisi Onabanjo University, Ago-Iwoye, Ogun State	OOU	Forestry and Wildlife	Forestry, Wildlife and Fisheries	State Government
34	Rivers State University of Science and Technology, Port Harcourt, Rivers State	RSUST	Forestry and Wild Life	Forestry/ Forest Resources Management	State Government

Source: [11, 12].

4. CONCLUSION

The study used Geographic Information System (GIS) to spatially distribute forestry degree awarding universities in Nigeria. The study concluded that universities offering forestry education were not proportionally distributed along the six (6) geopolitical zones of Nigeria, both in number and ownership. However, most of the forestry departments in Nigerian universities had different nomenclatures and are recognized within the universities by names different from that on the online registers of the National University Commission and Joint Admission and Matriculation Board. Furthermore, there was an increase in the number of forestry degree universities in the last ten years. Hence, only 31 out of 34 universities offering forestry in Nigeria were recognized by the National University Commission.

5. RECOMMENDATION

Based on the conclusion of the study, the following recommendations are drawn:

- (i). NUC and JAMB should ensure harmony of their registers as both are Federal government allied bodies, so as not to mislead students seeking admissions in to Nigerian universities.
- (ii). Universities should always update their departments' status and course information on NUC and JAMB registers online to reflect the realities of the exact courses offered in the university.
- (iii). Government and stakeholders should increase awareness level and number of higher institutions offering forestry.

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