

EMERGING PATTERN OF FOREST BIO-DIVERSITY IN SOUTH WESTERN NIGERIA: A SPATIO-TEMPORAL ANALYSIS OF FOREST RESERVES

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Abstract

The importance of forest resources in any given human society can not be over emphasized. This is so because, for any meaningful development to be achieved and sustained, it requires the harmonization of the forest bio-diversity for economic, socio- political as well as ecological balance of the society. For instance, both timber and non-timber forest products provide income, employment opportunities, etc for the generality of the people living within and around the forest reserves. Traditionally, access to certain forests is forbidden in order to conserve and to manage the forest to achieve forest resource sustainability. This is so because, it has been discovered that over the years, the rate of exploitation of these resources is unprecedented in the history of forest use in the southwestern part of Nigeria. This paper therefore set out to examine the traditional values of the forest, the changes that have occurred in the area of the forest in the state and the contemporary arrangement to curtail the spate of deforestation and its concomitant socio-economic effects on the people. To achieve the above, various relevant literature and theoretical models are examined. Also, both spatial and attribute data are examined to drive home the argument. Finally, a conclusion will be drawn with recommendations on new forest resources management strategies.

Keywords: Biodiversity, Forest Resources, Sustainable Development, Ecological Balance

Background to the Study

A growing body of evidences indicates that virtually all forests on the planet earth have been substantially influenced by man, for at least several thousand years. Studies by foresters, ecologists, historians and anthropologists on forests in the tropics, temperate and boreal regions conclude that forests and people have evolved together over thousands of years, with people planting the trees they prefer, using fire to burn forests to improve hunting conditions and managing forest fallows to maintain their agricultural fields (Forest Trend, 2004). For example, before the voyages of Christopher Columbus which brought North American resources to the attention of Europe, the people living in the eastern woodlands of the United States were a "potent if not crucial ecological factor in the distribution and composition of the forest" (Williams, 1989). While forest ecosystems are "natural", humans are an essential part of this "nature", hence building resilience into forest ecosystems requires building resilience into the human management systems, enabling them to adapt to changing conditions.

As Nigeria became internationally identified as a poor nation immediately after the introduction of structural adjustment programme in 1986, the scourge of poverty also became rampant and obvious among the people. The rate of poverty in the country increased from

43.0% in 1986 to 69.2% in 1997 (CBN, 1999). It was discovered that poor people, particularly the rural poor who represent about 69.3% of the total rural population in Nigeria depend on forest resources for agriculture and monetary income by gathering forest products for sale. The biodiversity which includes both flora and fauna, in many societies, also forms a very important part of the cultural heritage of the people. Several studies have attempted to estimate the extent to which poor people, particularly in the rural areas, depend on forest resources for their livelihood (Cavendish, 1999a). Cavendish (1999a) also reveals that poor households in Zimbabwe derive up to 40.5% of their aggregate household income from forest resources. Poor rural households in Nigeria are also expected to derive up to that percentage of their total income from natural resources. Thus, the main focus of this research work is to examine the impact changing forest pattern would have on the livelihood patterns and overall development of people living within and around reserves in south western part of Nigeria.

Problem Definition

According to a report published in 1992 by Federal Environmental Protection Agency (FEPA), Nigeria possesses more than 5000 recorded species of plant, 22,090 species of animals, including insects, 889 species of birds, and 1,489 species of micro-organisms. It is also estimated that 0.4% of the plants species are threatened and 8.5% endangered, with 0.14 of the animals and insects threatened and 0.22% endangered.

Natural and man-made threats, socio-cultural problems as well as direct and indirect consequences of socio-economic development have contributed to the erosion of bio-diversity at all levels. Within the last 25 years, it is believed that about 43% of the forest ecosystem has been lost through human activity (FEPA, 1992). Nigeria's population growth rate of more than 3.5% and increasing poverty level (especially in rural areas) has put severe demands on the country's natural resources. There has also been a general institutional weakness and lack of technical capacity to effectively tackle the nation's environmental issues, including threat to biological diversity.

Though forest and its various diversities are of great importance in the ecological, economic and social interactions of tropical peoples, growing human populations and development pressure put these forest habitats at serious risk. In line with the above fact, it becomes necessary to carry out an inventory investigation of the forest resources in order to be able to ascertain the level of species diversity taking into consideration the effects of human interference in forest development due to urbanization rate. Also, large tracts of land in the tropics have been set aside for conservation, but even if these areas were adequately protected from conflicting uses (which many are not), reserving forests alone cannot guarantee the protection of tropical biodiversity.

Literature has shown that till date, no effective indicators have been developed which provide solid measures of ecological or genetic sustainability. While forest management may include a variety of measures intended to minimize the impact of extraction on the biodiversity of the forest (such as directional felling, cutting and diameter and volume limits on harvest), they are generally based on guesses about what levels of extractive activity might prevent damage to both the resources and the economic returns. There is, as yet, no clear evidence of their effectiveness in conserving biodiversity. The lack of measurable indicators for estimating the impacts of different management options on important variables for biodiversity is a problem in developing countries in general and Nigeria in particular.

Objectives of the Study

The aim of this study is to examine the emerging forest reserve coverage and its implication on Development in South west Nigeria. In order to actualize this goal, the following objectives are addressed:

1. To examine the emerging forest reserves coverage in terms of area and specie types between 1985 and 1995.
2. To examine the effects of the emerging pattern on the livelihood patterns of the inhabitants in the study area.

Significance of Study

The exploration and use of forest resources are central to any meaningful, pragmatic and dynamic forestation and conservation policies, thus, if forestation and conservation planning programme are tailored towards sustainable development of environmental resources, then a thorough understanding of the effects of the use and conservation of floral diversity on rural livelihood of the community around forest will be crucial to the formation and design of sound public policies on forest resources management. Since rainforest ecosystem is the building block upon which life sustenance hinges, especially in the rural areas with distinct values and aspirations towards their environment, a study interested in analyzing this situation is one in the right direction in order to draw the attention of government and its agencies to the phenomenon.

From another perspective, a research of this nature will in no small measure enhance inter-disciplinary, cross-cultural research endeavor among scholars of resources management in general and forest resources studies in particular, because there is no singular discipline, no matter how sharp its scientific tools of analysis, that can solve the ever-increasing and multifarious problems plaguing our forest resources. As a result the cross-fertilization of ideas in complex studies of this nature is very invaluable in advancing the frontiers of knowledge about a fragile forest ecosystem which sustains human life.

It is also realized that previous studies have been anchored on the general forest clearance without due consideration to the types of floral species that are mostly degraded by human ecological activities and the effects on the livelihood. Finally, this study is timely, as increased and almost explosive rate of human influence on the dipterocarp forests of South Western Nigeria during the last two or three decades is posing a very serious threat to their viability and survival in their natural form beyond the next few decades. It is hoped therefore, that this work will go a long way in assisting people of the study area to understand, appreciate and conserve viable sample of their forest species and be able to manage them sustainably for the generations yet unborn.

Literature Review

'Resource', according to Haggett (1975), is defined as that portion of the total stock, which could be used under specified technical, economic and social conditions. On the other hand, Zimmerman (1951), in his classical definition stated that "resources are not, but they become; they are not static but expand and contract in response to human wants and human action". Resource management, on the other hand implies the controls on the amount, quality, timing, availability and the general direction of resource development. According to O'Riordan (1971) and Omara-Ojunga(1992), resource management may be defined as a process of decision – making whereby resources are allocated over space and time according to the needs, aspirations, and desires of man within the framework of his technologies, inventiveness, his political and social institutions and his legal and administrative framework.

The review of existing and current literature in this research bring the existing issues on the problems and strategies of biodiversity management in general and forest resources biodiversity in particular especially in developing countries into the context of resource management. In line with the above submission, resource biodiversity management studies take the physical environment as first basic departure point, the human attributes as the second departure point and the interaction between the physical and human attributes as the third basic departure point. The Physical attributes are discussed under various ecological approaches that dominated environmental studies during the 19th and early part of the 20th centuries while the human attributes are usually examined under various ethnological approaches. Glacken (1967) identified three Western intellectual responses to nature and management of resources. These are the views of nature as something that dominate; something to be dominated by; and something to live in harmony with.

There are various and diverse research works on resource diversity study in general and forest diversity management in particular, because of the multi-disciplinary nature of the resource which revolve around social, physical and ecological sciences to mention a few. Previous theories presume that users of common property resources are incapable of organizing viable resource diversity management strategies to avoid over harvesting (Hardin, 1968). Currently, however, researchers increasingly argue that common property can also be a viable resource diversity management system. They noted that groups of people are demonstrably capable of crafting rules and following harvesting patterns that encourage sustainability in forest use under a range of conditions, especially when user groups and forest territories are stable and clearly defined. While social and economic change can destabilize these resource-diversity management systems, a supportive policy environment, new technologies, better information and increasing scarcity can also create invigorating new possibilities for collective action leading to viable common property management. Furthermore, many groups with long histories of forest use and forest culture have a wealth of cultural institutions upon which to draw in adapting to change (Berkes et al.,1989; Ostrom, 1999; Ostrom et al., 1999). The common property systems offer an intriguing social context in which to seek forest-conserving management systems with global implications for carbon mitigation, biodiversity conservation, and rural development. Community forest management provides a setting that potentially overcomes many of the social obstacles facing conventional concession forest management. In a common property situation, forest management for timber production provides the means and incentives for communities to develop and strengthen local enforcement capabilities (Klooster, 2000a and b; Frumhol and Losos, 1998). It also provides security of operation and operational control, so that forests are not converted to other uses following logging; and low-impact logging techniques are correctly applied.

Methodology

The researcher embarked on reconnaissance and ground truth survey to the study areas to have on- the -spot –assessment, and get familiar with the forest environment, and sampled villages within and around forest reserves in the study area. The study makes use of both spatial and non-spatial data. Ayeni, (2003) defines spatial data as any data that occupies space in terms of having a specific location according to some geographical referencing system. This location may be a point location, it may be linear in nature or it may be an area with a defined boundary. On the other hand, non-spatial data refers to the attributes of spatial entities.

The spatial data used in the study is the landsat MSS 1984 and SPOT MSS 1994 satellite images on the scale of 1:250, 000. These images are Radar mosaic/Slam mosaic produced by World Bank for FORMECU, Abuja. These images were used because of the spectral information of the study area they contain. Besides, they are the only available images the researcher can lay his hand upon as at the time of the study. They were used to assess changes in forest reserves coverage over time.

In order to determine the effects of the forest bio-diversity on the economic livelihood of the people living within and around forest environment, the analysis of data gathered by the use of livelihood assessment methodology involving quantitative analysis, interpretation, cross-checking and synthesis is inevitable (Ashley and Hussain, 2000) . This becomes inevitable due to the nature of the objectives of the study and it is therefore desirable that the analysis follows a well-articulated procedure.

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Study Area

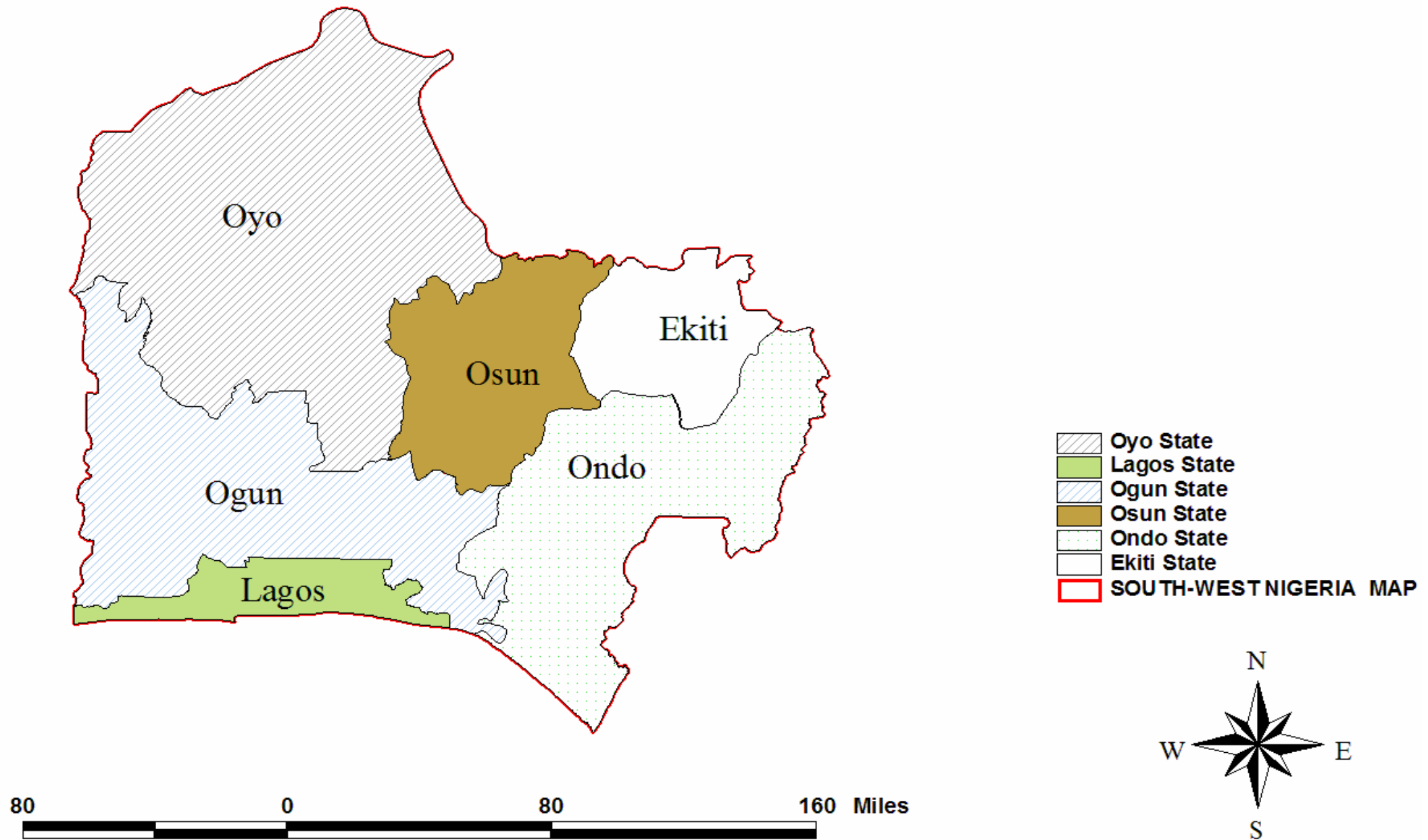


Fig.1 Study Area

Study Area, Location and Bbackground Information

South West Nigeria, comprising Lagos, Ogun, Oyo, Ondo, Ekiti and Osun states, is the most developed area of its size in the country. It is also known as the south west geopolitical zone of Nigeria. The area lies between longitude 2 31 and 6 00 East and latitude 6 21 and 8 37 N (Agboola,1979) with a total land area of 77,818km² and a projected population of 28,767,752 in 2002 (NPC, 1991). The study area is bounded in the East by Edo and Delta states, in the North by Kwara and Kogi states;in the West by the Republic of Benin and in the South by the Gulf of Guinea. It has 85 constituted Forest Reserves with a forest area cover of 793,266ha (FDF,1998).

Table 1: South Western States and their Land Areas

States	Total Land Area km²	No of Forest Reserves	Area of Forest Reserves (Ha)	No of Local Gov
Osun	9,491	11	92,242	30
Ondo/Ekiti	20,451	37	329,288	17& 16
Ogun	16,086	16	195,790	20
Oyo	27,848	19	169,173	33
Lagos	3,939	03	6,873	20

Source: (FDF, 1998)

Physical Characteristics

The climate of Ogun State is tropical in nature and characterized by wet and dry seasons. The temperature ranges between 21c and 34c while the annual rainfall ranges between 1250mm. The wet season is associated with the southwest monsoon wind from the Atlantic Ocean, while the dry season is associated with the northeast trade wind from the Sahara desert. In general, the climate is cooler and drier than it is in corresponding areas in the Eastern States. The main features are as high but uniform temperature, heavy rainfall decreasing to moderate in the north, a high relative humidity and intense cloud cover. The short dry season, which lasts from late July to early September (popularly known as August break), is much longer than in other parts of southern Nigeria and, this drier period tends to become less marked from south to north.

Results and Discussion

TABLE 2: Forest Types and Sizes in South West Nigeria – (1985 -1995)

<i>TABLE SHOWING SOUTH WEST FOREST TYPES</i>		
Forest Type	Area Size @ 1985	Area Size @ 1995
Disturbed Forest	946998.85	251871.37
Forest Plantation	626465.62	17966.81
Forested Freshwater Swamp	785010.32	28951.56
Riparian Forest	611202.75	47080.92
Teak -Gmelina Forest	1197802.85	773762.5
Undisturbed Forest	1772985.96	5567696.98
Total	5940466.35	6687330.14

Source: Formecu, 1998

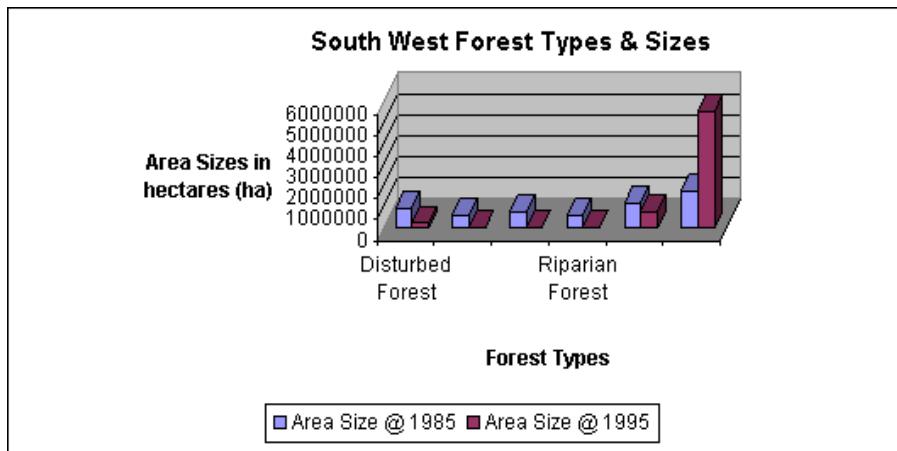


Fig 2: South West Forest Types & Sizes

In Table 2, there are six forest types in south western part of the country which are disturbed forest, forest plantation, forested freshwater swamp, riparian forest, teak/gmelina forest and undisturbed forest. The above listed forest types occupy varying parts of the study area with different sizes of land space between 1985 and 1995, depending on the various activities they are put to which brings about the drastic reduction in the sizes of the forest resources over the earth surface.

Table 2 above indicates that the largest forest type in 1985 is undisturbed forest types which by definition are climatic climax community i.e a virgin forest devoid of any human or natural interaction. This stood at 5,940,466.35 ha but later increased to 6,687,330.14ha in 1995. Though this positive change is strange, it could be attributed to the remote location of the forest affected by majority of which are located in remote villages of Ekiti, Osun, Ondo and few parts of Ogun, Oyo and Lagos state. Next to undisturbed forest is teak/ gmelina forest with area of 1197802.85 ha in 1985 which decreased drastically to 773762.5 ha in 1995. Reasons for the high rate of the reduction in the size of this forest type include the economic values of the forest type

which is being used for various wood and furniture fittings both at home and abroad as well as the fact that they are grown for commercial purposes, which means that majority of this has been harvested/logged between 1985 and 1995.

Generally, available data is in compliance with the literature in the area of drastic and monumental reduction in the sizes of forest types in space and time over the world as shown in the study area as a result of high demand for land, unprecedented rate of urbanization occasioned by increased population growth in the study area which has also increased the consumption pattern of both timber and non –timber forest products. The implication on biodiversity is such that, forest types with high economic value trees become more vulnerable to degradation than those forests with little or no economic value trees.

Table 3: Forest Reserves Sizes in South West Nigeria (1985 – 1995)

TABLE SHOWING FOREST SIZE IN SOUTH WEST		
State	Reserve_Area @85	Reserve_Area @95
Ekiti	39288.71	9956.41
Ogun	494711.6	20694.62
Ondo	1636528.05	199590.74
Oshun	834444.11	76978.37
Oyo	31885547.23	46688.64
Total	34890519.7	353908.78

Source: Formecu, 1998

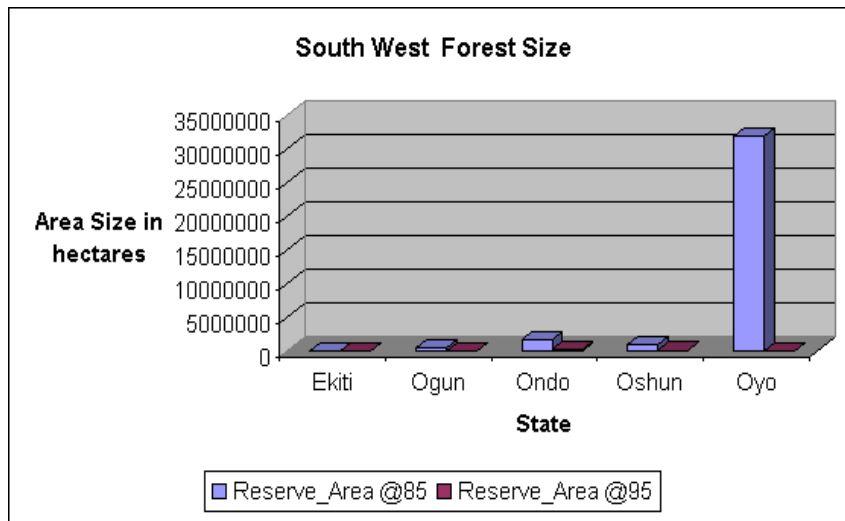


Fig.3: South West Forest Size

Talking about the spatial distribution of forest in the study area, Table 3 revealed, that Oyo state recorded the highest coverage in 1985 with 898,2647,6612m² followed by Ondo

state with 24021714860m² while Osun state is next to Ondo in size with 8188574136m² of forest resources. Ekiti state recorded the least coverage with 481,886,589.8m² of forest area.

In 1995, that is a decade later, ondo state recorded the highest forest area with 2372867438m² as against Oyo state that recorded the highest coverage in 1985. Next to this is Osun state with 775126135.6m² while the least is Ekiti state with 96776707.69m². The data revealed that the reduction in the sizes of the forest is general to all the states under investigation, though in varied degree depending on the cosmopolitan nature as well as the rate of urbanization going on in the states. It also revealed that majority of the degradation and monumental logging take place on reserves closer to cities than the remote ones because of transport and logistics required for their movement to sawmills and markets. Also, the economic growth and development as well as socio-cultural and political development going on across the south western states coupled with high level of urbanization accounted for the spatial depletion of the forest resources experienced.

Conclusion

As a follow up to the above data and the discussion that follows, it is evident that there are significant changes in the biodiversity status of forest in terms of area coverage and forest types across the south western part of the country. Also, there is significant relationship between the changing spatial pattern and the livelihood activities of the inhabitants of the forest environment since their sources of livelihood are directly attached to non timber forest products which are being degraded. As a result of this, income as well as their standard of living becomes eroded, and this makes them vulnerable to a lot of economic, social, cultural, political and ecological vices which are detrimental to their wellbeing.

Recommendations

It is recommended that government; donor agencies and other forest stakeholders should come to rescue these vulnerable groups whose lives depend on the resources from starving to death. Also, various government and international organizations in charge of policy formulation for forest use and management should jettisoned the current centralized management policies which give all power to the central government and their agencies at the expense of the rural dwellers who live and rely on this resources for their daily livelihood. A new policy strategy of political decentralization of forest use and management, which depict the bottom-top approach where all forest stakeholders who live and depend on forest resources are democratically elected to take charge of the administration and management of forest resources within their geographical enclave, should be adopted. It is when this is done, that we can be sure of abating the current rate of deforestation which has led to pauperization of the rural inhabitants as well as blighted on the national economy in general. The strategy will also bring about the desired sustainable forest management which is the goal of all government and non government forest bodies all over the world.

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