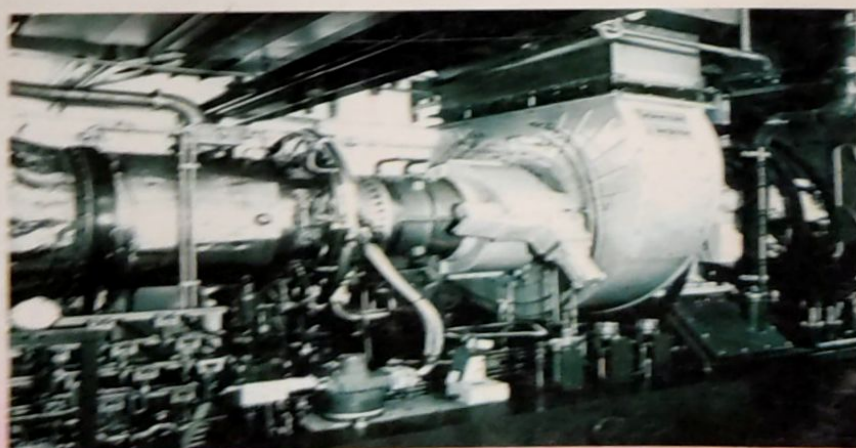
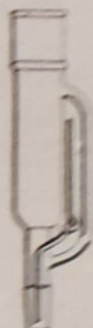




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AN ANALYSIS OF FORESTRY MANAGEMENT PRACTICES IN MAMU FOREST RESERVE, ENUGU STATE NIGERIA

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Abstract

This paper is set out to study the analysis of forest management practice in Nigeria (Mamu Forest Reserve Oji River) and to establish the role of forest managers in effective Forest Resource Management. Various methods such as questionnaires and statistical tools such as tables, percentage, charts etc. were used to arrive at reasonable findings. Such findings led to the recommendation that human resources investment in the reserve should be improved, so that effective management of forestry resources can be achieved through strategic forest management planning. It was also discovered from the finding that since the establishment of Mamu Forest in 1927, it has lost 11.975ha of trees in 75 years which gives an average loss of approximately 0.2 ha per annum. The lost of trees is basically attributed to farming activities and annual bush burning by hunters which is more disastrous in Mamu Forest compare to Akwari Ani Forest. It took cognizance of the management status of the forest estate, agencies involved in forest management, manpower situation, budgetary appropriation and revenue generation. As a result of some problems identified, appropriate recommendations were made in the following directions, provision of detailed Forest Resource plan indicating its economic importance. Administration of Mamu Reserve should be improved and strengthened with professional and forest law to be enacted to deal with offenders as well as revisiting Land Use Act for cultivable land provision to farmers. The reserve should be improved upon and expanded to attract tourist centre. Finally, Enugu State Government should provide adequate funds for the upkeep of the Mamu Forest Reserve (Oji River).

1.0. Introduction

The Society of American Foresters (1958), define forest management as the application of business methods and technical forestry principles to the operation of a forest property. The above definition of forest management shows its different aspects which consist of the acts, skills and knowledge of forestry in its many branches to achieve their full value if only as they are integrated and applied in terms of successfully operated forest business." Every forest offers a real and living individuality. It differs from every other forest by its situation, its aspects, its soil configuration, its component crops (resources) and character. In addition to timber well-defined fields of wildlife, range, recreation and watershed management are recognized. Recently, forest management was concerned only with timber production, which at its best strove to achieve a sustained yield of timber for forests. The current approach to forest management continues to focus on timber production, but it also considers the many other values of the forest and the management required to sustain them. Forest management by governments in Nigeria dates back to the nineteenth century. The colonial masters set 25% of Nigeria's total land area as a forest reservation target for their protection and control as well as removal of forest products.

The first forest department was established in 1899 in Southern Nigeria. Hence the northern part of Nigeria had no forest department because of the separate protectorate structure. The first forest ordinance was in 1908. The value of Nigeria's timber resources began to be



widely recognized internationally in the 1930's to 1950's. This, however, resulted in the increase in domestic demand and the export market. The increased awareness of importance of forest products couple with its attendant poor management resulted in the deforestation, loss of investment capital on forest reserve, total extinction of some animals and subsequently overall degradation of the natural environment. Finally, wood exportation was banned in 1976 (Telger and Davies, 1998). Forestry policies came to streamline the system of forest management in Nigeria. Thus, the need for the current study with a view of evolving strategies for a more effective management of forest and its products vis-a-vis the role of Forest Officers and Managers.

Forest resources both natural and plantation forests are quickly shrinking. The remaining forest are being degraded by excessive exploitative pressures (deforestation) and improper management practices such as the use of fire (bush burning) in forest, clearing, intensive collection and destruction harvesting practices, etc. The gap in professional practice has led to the decline in the management of forest. Unless these professionals wake up to the challenge of forest resource management, the problem of deforestation will persist. The implication of this is global warming, ozone layer depletion, climate change among others. All these environmental problems have negative effects on man in particular and the environment in general. In Nigeria, Forest Resources there are limited areas of undisturbed lowland rainforest available to continue to conservation lands. For this reason, it was suggested that proposal be made to protect all undisturbed lowland rain forest. Rainforests are already disappearing, other forests are also disappearing, unless conscious steps are taken in the area of forest conservation and preservation, the little forests left will soon be lost. This problem calls for experts to proffer solutions towards effective forest management practice. The estate surveyor and valuer being an expert is important to the forest managers in striking a balance between the sustainable production of goods and services from forested areas and the conservation of genetic biodiversity within the natural forest resources base which is under societal pressures.

Forest ignorance crises that weave around land ownership in Nigeria are endemic and could be traced to land use decree of 1978. Administration of forest reserve in Nigeria leaves much to be desired especially when one considers government decision and policies on utilization of forest reserves in meeting the needs and aspiration of citizens. The administration of forestry had been monopolized by the state government within the Federal and State structure in Nigeria. The exclusion of the stakeholders such as local country dwellers, hunters, farmers, timber contractor and non timber resources users in the administration of forest directly or indirectly has led to poor forest reserve in Nigeria.

Forest resources are mostly needed because they are beneficial to the entire world for the growth of the economy and other purposes. This study will be a useful reference text to persons engaged in a specific research work. The study will be of immense benefit to investors in small scale industries since they will be able to identify the various forestry resources and where they can be found or located. It is obvious that the demand and the supply for timber will increase. As civilization advanced, people recognized and realized the desire to conserve forest. Individuals and governments depend on the proper conservation and use of natural resources. The conservation of forest guarantee the satisfaction of personal comfort and guarantees the preservation of all organic resources which keep the soil in place and protects it from erosion.

Filibert (1925) defined forest management as Sitting up, putting in order and keep in order of forest business. Order can be maintained only by a well designed and carefully kept set of records, these records mean financial accounting and data of timber volumes and growth. This also includes addition of necessary maps. The purpose of record keeping is to serve as a tool in management for profitable operation and continuous yield of timber. Finally it will help government at various levels in formulating purposeful policies towards the growth of the economy.



2.0. Previous Knowledge

According to FAO (1997), Food and Agricultural Organisation Nigeria's total forest area in 1990 stood at 14,387,000 hectares. But in 1995, it stood at 13,780,000 hectares with a total change, 1990-1995, of 607,000 hectares at an annual change of 121,000 hectares (i.e. -0.9). Adedoyin (1995) describes the current situation as deplorable. After independence, the Nigerian government placed emphasis on the exploitation of forest resources for industrial development and increased foreign exchange earnings. The need to meet with these demands accentuated the unregulated exploitation of forest and forest-reserve resources. In Nigeria, the management of forest reserves is the responsibility of the state governments. How well or how far these state governments (with special focus on Enugu State) ensure the sustainability of these forest reserves, in the light of the threats enunciated above, is not known. Therefore, the sole objective of this study is to assess the level of involvement of estate surveyors and valuers in forest resource management.

Forest conservation can have far-reaching environmental, economic and social effects. Environmental consequences can include the disruption of natural hydrological processes, soil erosion and degradation, nutrient depletion, loss of biological diversity, increased susceptibility to fires, and changes in local distribution and amount of rainfall (Ehrlich and Wilson, 1991; Wilson, 1988). The social consequences of unsustainable conversion practices may include the decline of indigenous cultural groups and the loss of knowledge of local resources and resource management practices; dislocation of small communities of farmers or forest dwellers as forest lands are appropriated for more profitable land uses; continued poverty and rural migration as farmers abandon lands degraded through soil-depletion agricultural practices (Lynch, 1990; Sanchez, 1991; Lugo, 1991). The economic consequences include the loss of production potential as soil is degraded; the loss of biological resources such as food or pharmaceuticals from primary forests; the destabilization of watersheds with the attendant downstream effects of flooding and siltation; and at the global level, the long-term impacts of deforestation on global climate change (Nórsgaard, 1989; Randall, 1988; Repetto and Gillis, 1988).

Forest management offers a promising alternative to depletion of forest resources within primary and secondary tropical moist forests. It involves controlled and regulated harvesting, combined with silvicultural and protective measures, to sustain or increase the commercial value of subsequent stands; and it relies on natural regeneration of native species (NRC, 1993). Criteria and indicators for sustainable forest management can be applied in different ways at different places for different purposes (Funston, 1994). C & I can refer to the design of forestry operations on a site or assessing the cumulative outcomes or impacts of forestry operations regionally or nationally. Land, basic source of forest resources, is required to be planned and managed for by experts. The basic capital of any timber production enterprise is the land and the timber standing upon it. Forest resources study (1998) observed that forest land use planning will require planning exercises that are carried out at variety of scales in order to capture and assess all the information necessary for sustainable development. There is need to plan and use forest resources by integrated scale such as treating urban and rural problems of forest together, not in isolation. The levels involved in the planning and use are Urban Level (Economy), Rural Level (Regional Economy) and National Level. At all levels, there is need for the integration of knowledge in various segments of the economy and by so doing deal with under seen circumstances to avoid getting negative effects (Ochuba, 1996).

According to the Federal Ministry of Agriculture (1988), it is important that State land use designation must also consider the international and national recommended areas to be retained under forest cover in Nigeria. The Agricultural Policy outline is the forestry and wildlife sub-sector implantation guidelines that 25% of the total land area in Nigeria should be forested. However, the Forest Resources Study failed to recognize how important it is to involve some key stakeholders in land use planning in order to effect sustainable forest resources management. The key stakeholders could be enumerated as follows:



1. The Land Use and Allocation Committee, and
2. The Land Allocation Advisory Committee.

Table 1: List of Enugu State forest plantations which cover a total of eight thousand four hundred and twenty-eight (8,428 ha) hectares but Mamu forest reserve covers 361.8ha.

S/N	Name of Reserve	Size of Reserve (ha)	Size of Plantation (Ha)	Species Composition
1	Iva-Valley	500	190	Gmelina Teak
2	Miliken Hill	94	90	Gmelina
3	Akpakume/Nze II	911.4	911.4	Pinus Eucalyptus
4	Akpakume/Nze II	21,000	870	Gmelina
5	Aguobu Owa	800	552	Pinus Gmelina Eucalyptus
6	Oji-River (Mamu)	361.8	300	Gmelina
7	Ugwuoba Forestry Reserve, Nkwere Forestry Reserve, Akpugoeze forestry Reserve	4,618	1,110	Gmelina Teak
8	Anambra	850	650	Gmelina Teak
9	Ifite Amoli	50	40	Gmelina
10	Akwari Ani	220	50	Gmelina
11	Awlaw Isikwe Achi	415	25	Gmelina
12	Affa	150	70	Gmelina
13	Umuabi	1,166	20	Gmelina
14	Umabor 1&2	330	50	Gmelina
15	Akpugo	768	40	Gmelina
16	Agbogazi	848	20	Gmelina
	Total	8428.4		

Source: Enugu State Ministry of Environment, (2007).

The aim of this work is to analyze the forestry management in Mamu Forest Reserve in Enugu State, Nigeria. The objectives of this study include to:

1. characterize the management system of the forest reserve,
2. access the capacity of the management in terms of human resources,
3. determine the major management problems of the reserve,
4. identify and assess the forest resource management policies and its implementation,
5. Proffer solutions to forest resource management problem.

3.0. Methodology

3.1. The Study Area

The focus is on Mamu in Oji-River Local Government Area in Enugu State which covers about 361.8 hectares. Enugu, which is captioned "Coal City" is well known as a civil service city. Their natural vegetation is moist woodland savanna. Natural soil is Ferralitic red-yellow soil of humid tropical area. The derived savanna ecological zone of Enugu is found in a densely populated east-west trending band between the guinea savanna and the lowland rain forest ecological zones. During the dry season, there is always a deterioration of forest vegetation in the forest reserves.

Enugu State is one of the states in the eastern part of Nigeria. The state shares borders with Abia and Imo states to the south, Ebonyi state to the east, Benue state to the northeast, Kogi state to the northwest and Anambra state to the west. Though land-locked, Enugu is approximately 150 driving minutes away from Port Harcourt, Calabar and Warri, all coastal cities with major shipping ports. Enugu is also located within an hour's drive from Onitsha and 2 hours' drive from Aba, both of which are trading centers in Nigeria. The city is also located within 5 driving hours from Abuja and seven driving hours from Lagos, the administrative and commercial headquarters of Nigeria respectively. Lying partly within the semi-tropical rain forest belt of the south, the state spreads towards the north through a land area of approximately 8,727.1 square kilometres (3,369.6sq mi). Its physical features change gradually from tropical rain forest to open wood-land and then to savannah. Apart from a chain of low hills, running through Abakaliki, Ebonyi state in the east to Nsukka in the north-west, and southwards through Enugu and Agwu, the rest of the state is made up of low land separated by numerous streams and rivulets, the major ones of which are the Adada River and the Oji River.

Enugu has good soil and climate, sitting at about 223 meters (730 ft) above sea level, and the soil is well drained. The mean temperature in Enugu state in the hottest month of February is about 97.16°F (36.20°C), while the lowest temperatures occur in the month of November, reaching 68.54°F (20.30°C).



The lowest rainfall of about 0.16 cubic centimetres (0.0098 cu in) is normal in February, while the highest is about 35.7 cubic centimetres (2.18 cu in) in July.

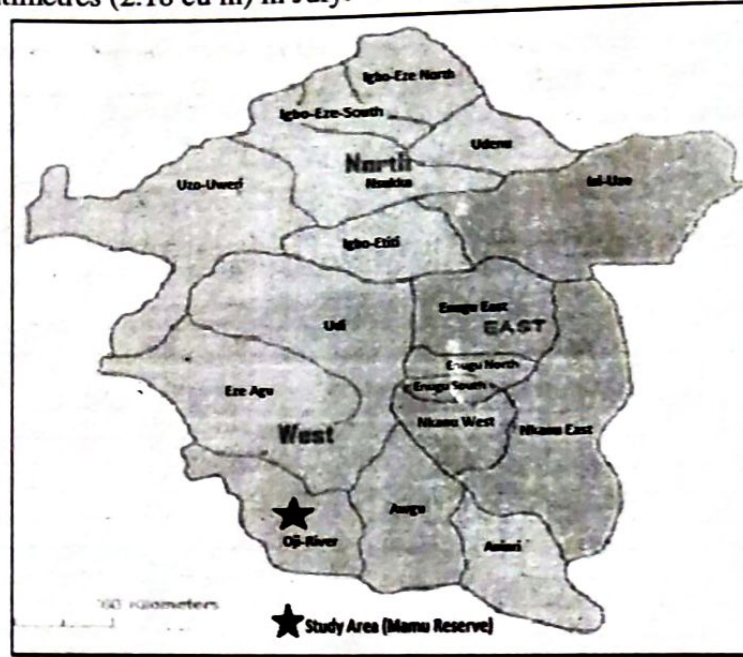


Fig. 1: Map of Enugu State including Study Area
 Source: Encarta Encyclopaedia, 2009

The sample plan for the study comprises mainly a number of trips to the sample units for the study for the purposes of contacting the members of the sample units. Two sources of data were collected primary and secondary data using well structured questionnaire and interpersonal interview. The primary data were collected from forestry officers at the ministry of agriculture and natural resources Enugu, community people, displaced farmers primary data collected include number of forest reserve and their status, land area, manpower position, status of artificial plantation development, budgetary allocation, revenue generation and various agencies involved in forest management in Enugu. While secondary data was on major use of the forest reserve.

The research design used in this study is survey and field research. It has been used to assess the level of involvement of forest officers, community people hunters, farmers and other government supervising agency in forest resource management, and an attempt is made to evolve the various parts forest officers and community people can play towards more effective forest management. A total of 200 questionnaires were administered to both Mamu and Akwari Ani forest areas each receiving 100 questionnaires respectively with simple randomly selected respondents. Simple statistical tools such as tables and percentage were used for data presentations and discussions.

4.0. Results and Discussion

The extent of forest and its deforested area over a period of time in Mamu Forest Reserve.

Table 2: Proportion of Forest Reserve Currently Covered by Trees in Mamu

Total land area in 1927 (ha)	47.90
Total area covered with trees (ha)	35.925
Total area deforested (ha)	11.975
Average loss per annum (ha)	0.2 per annum

Source: Enugu State Ministry of Environment (2007)



From the above table 2, it is cleared that out of total land area (49.90 ha) of Mamu – River forest reserve, 75.00% (35.925ha) is presently covered by trees. This means that since its establishment in 1927, it has lost 11.975ha of trees in 75 years. This gives an average loss of approximately 0.2 ha per annum. If this situation continues unchecked, Mamu-River forest reserve will last for only the next 180 years approximately. The situation is worse in Akwari – Ani forest reserve where only 25% out of the initial 134.30ha, are currently covered by trees. This means that as of today, only 33.575ha of the initial forest reserve area are covered by trees. In other words, it has lost 100.725 ha of trees since its creation in 1974, with an average loss of 3.597 ha (approximately 4ha) per annum. If this situation continues, the implication is that in the next 11-12 years, all the trees in Akwari – Ani forest reserve would be lost, if no reforestation takes place.

Table 3: The Rate and Nature of Deforestation in Mamu Area Enugu State

S/N	Name of Reserve	Size of Reserve in 19	Size of Plantation Defores	Land use
		(ha)	Area	
1	Iva-valley	500	190	Agriculture
2	Miliken Hill	94	90	Farming
3	Akpakume/Nze I	911.4	0	Forestry
4	Akpakume/Nze II	21,000	870	Construction
5	Aguobu Owa	800	552	Agriculture
6*	Oji-River (Mamu)	361.8	300	Farming
7	Ugwuoba forestry Reserve, Nkwere Forestry Reserve, Akpagoze fore reserve	4,618	1,110	Farming
8		850	650	Construction
9	Anambra	50	40	Construction
10	Ifite Amoli	220	50	Construction
11	Akwari Ani	415	25	Construction
12	Awlaw Isikwe Achi	150	70	Construction
13	Affa	1,166	20	Farming
14	Umuabi	330	50	Farming
15	Umabor 1&2	768	40	Farming
16	Akpago Agbogazi	848	20	Farming
	Total	8428.4		

Source: Enugu State Ministry of Environment, (2007)

Table 3 shows that farming and construction activities are the predominant cause of deforestation in the study area. Only Akpakume/Nze I is free from deforestation.

Table 4: Tree species that have gone extinct

Mamu River	None
Akwari Ani	None

Source: Questionnaire Survey, 2010.

The forest reserve managements of both Mamu-River and Akwari-Ani confirmed that none of the original tree species in these reserves is extinct. The prime tree species in Mamu-River forest reserve are *Gmelina spp*, *Tectona spp* and *Chlorophora excelsa*, while in Akwari-Ani they are *Gmelina spp* and *Eucalyptus spp*. The minor tree species in Akwari-Ani is *Anacradium occidentale*, while in Mamu-River they are *Khaya spp* and *Eucalyptus spp*. In Mamu-River forest reserve, the proportion of prime tree species remaining is estimated to be 50.00% of the original population, while that of Akwari-Ani is estimated to be 75.00% of the original population. Also, the proportion of minor tree species remaining in Mamu-River forest reserve is put at 50.00% of the original population, while the zonal forestry officer for Akwari-Ani could not estimate the current population of the minor tree species in this forest reserve.

Out of the 35.925 ha currently covered by trees in Mamu-River forest reserve, 50.00% (17.96 ha) are occupied by prime tree species. In Akwari-Ani also, 50.00% (16.79 ha) are



occupied by prime trees species. Furthermore, the remaining 50.00% (17.96 ha) is occupied by minor tree species in Mamu-River forest reserve, while 25.00% (8.39 ha) is occupied by minor tree species in Akwari-Ani forest reserve.

Table 5: Incidence of insect attacks

Mamu River	Nil
Akwari Ani	Nil

Source: Questionnaire Survey, 2010.

In both Mamu-River and Akwari-Ani forest reserves, there has never been any experience of insect on tree species. However, in Akwari-Ani 25.00% of *Gmelina* spp were lost due to the incidence of root knot, but in Mamu-River forest reserve there has not been any recorded case or experience of disease infestation.

Table 6: Incidence of wild fire

Mamu River	Annually
Akwari Ani	Annually

Source: Questionnaire Survey, 2010.

On the other hand, wildfire is a major problem in both forest reserves. Even the forest guards/rangers assess the incidence of wildfire to be high. The source of this wildfire is usually illegal hunters. This problem is often experienced on yearly basis. In fact, 75.00% and 25.00% of tree species have been lost in Mamu-River and Akwari-Ani forest reserves respectively. See table 7 below.

Table 7: Percentage Trees Lost to Wildfire

Mamu River	75%
Akwari Ani	25%

Source: Questionnaire Survey, 2010

Majority (75.00%) of forest guards/rangers agree that the incidence of access to farmland within these forest reserves is high, while the remaining 25.00% say it is low. About 25.00% (11.975 ha) of the total forest reserve area has been converted to farmland in Mamu-River forest reserve, while the proportion could not be estimated in Akwari-Ani forest reserve. But, the officers of both forest reserves confirmed that conservations could be up to 25.00% on annual basis for Mamu-River and minimal for Akwari-Ani. Equally, about 25.00% of total forest reserve area has been lost to infrastructure development (in terms of access roads) in Mamu-River forest reserve.

Besides, both zonal officers confirmed that the legal annual proportion of removal required for sustainability is 25.00%. But, in Mamu-River, the proportion harvested presently is 50.00% and 25.00% for Akwari-Ani. At this rate, the sustainability of Mamu-River forest reserve is in doubt. Then, if about 75.00% of forest cover has been annual removal may not be sustainable. Forest guards/rangers are of the view that adherence to sustained yield principle is low.

Table 8: Law enforcement and regulations

	Adequate %	Inadequate %
Mamu River	15	85
Akwari - Ani	20	80

Source: Questionnaire Survey, 2010

The managements of both forest reserves were found to be unable to enforce properly the laws/rules/regulations guiding the utilization of forest reserve resources. The obstacles militating against



the enforcement of rules/laws include lack of enough manpower, inadequate funding and inadequate logistics.

Table 9: Village and community participation

	Involved %	Not involved %
Village	0	100
Community	0	100

Source: Questionnaire Survey, 2010.

Just as confirmed by the households, the zonal forestry officers of both forest reserves say that villages/communities are not involved in the management and decision-making concerning the forest reserves. Also, all the forest guards/rangers interviewed confirmed this fact. Actually, they insinuate that this may be one of the underlining factors that breed conflicts once in a while. Table 10 above also confirmed that. The forestry zonal offices of both forest reserves confirmed that these reserves have experienced the incidence of conflict(s) sometime in the past. They attributed this conflict(s) to the opposition of the local village/community to forest reserve laws/regulations and, most of the time, the inability of the government to pay royalties to these villages/communities. This situation is not favourable at all for sustainability of these forest reserves.

Table 10: Reforestation and Regeneration Programme

Mamu River	Natural Regeneration
Akwari Ani	Natural Regeneration

Source: Questionnaire Survey, 2010.

Apart from natural regeneration of trees and deployment of forest reserve ranger, no other practical action has been taken by the government over the years to ensure genetic conservation of commercial or endangered trees species. In fact, researchers that may aim at developing, for instance, trees species that can take little or less time to mature and can give yield of higher quality is not in the know. On the other hand, the forestry zonal officers claimed that they have successfully regenerated naturally and artificially some portions of the forest reserves. 25.00% and another 25.00% have been naturally and artificially regenerated respectively in Mamu-River forest reserve. In Akwari-Ani forest reserve, the zonal forestry officer could not estimate proportions naturally regenerated. However, he claims they have successfully artificially regenerated 25.00% of the forest reserve. About 75.00% of the forest guards/rangers can confirm the forest reserve. About 75.00% of the forest guards/rangers can confirm awareness of a reforestation programme in these forest reserves.

Although 50.00% of forest guards/rangers say they are aware and have been involved in reforestation programmes in these forest reserves, another 50.00% of them claim the opposition view. This situation may raise doubts about the so-called reforestation programmes that have been embarked upon in these forest reserves. In fact, the impact of such reforestation programme in terms of execution and success may be questionable.

Annual Forest Reserve Budget

The state zonal forestry officers rated the average annual forest sector share of the state's total annual budget as insufficiently insignificant. This problem was confirmed as the most single factor responsible for most of the challenges facing forest reserves.

5.0. Conclusions

Having analyzed the data sourced through the distribution of questionnaire, the results show that the forest managers as experts in land resources development and management had in the past been neglected in playing some roles toward effective management of forest resources in Enugu State in particular and



Nigeria in general. Also, the unavailability of fund to carryout actions/plans on sustainable forest management has been a cog in the wheel of smooth administration of the forest. The study observed that almost all the forest reserves in Enugu state are in state of neglect and poorly maintained. From the analysis carried out, it was observed that strategic forest management planning is veritable tool for achieving effective management of forest resources which Forest Managers must be key-stakeholders.

It is a common knowledge in Enugu and Nigeria that the forest resource base in the country is quickly shrinking and the remaining forests are being degraded by excessive exploitative pressures and improper management practices. It attests to the fact that the demand for timber resources is greater than the supply. Forest management demands consideration of both financial and non-financial factor. A non-financial factor which involves the stake-holders such as forest managers etc is the experts that will implement all those plans in action to attain sustainable development. Although forest practice is concentrated on the growing of trees and management of forests for production of timber and poles, the situation has now changed. It is realised that forests can be of much more use than its direct products. Management of forests this time around makes provision for the utilization of forests to achieve such objectives as stabilization of climate, water and cleaning, flood and erosion control.

Subsequently, with the recent trend of industrialization in the country coupled with the fast diminishing mineral oil and other resources on which the nation depends, the need has therefore arisen for an effective management of the forest resources in Enugu and to start exploitation of other areas through which industrial proposals could be met.

Finally, unless measures are taken immediately to counteract the current trends in Enugu and Nigeria as a whole, we will continue to experience a decline in the forest resource base and can expect to experience critical resources (timber in particular) shortages in the future. On the basis of the findings, it is recommended that:

- A detailed survey of Nigeria forests is necessary to find out the extent of other resources of economic importance apart from timber. This should be carried out jointly by Federal and State forestry department.
- The administration of the forestry department should be strengthened and more professionally trained staff should be recruited.
- The adoption of community management approach for effective forest governance.
- Revisiting of Land Use act, it is imperative to design alternative means of acquiring land by the government without necessarily eroding the traditional ownership in land.
- Recommends community management approach which pressurises the symbiotic relationship between government and the community people within a defined institutions and technical frame work.
- The technical environment should provide the tools and knowledge which define how forest resources would be used as factor of production. The institutional environment should define who constitute the resources and how the technique would be applied.
- Enforcement of severe Forest Laws to check deforesters.

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