ASSESSMENT OF MONITORING ACTIVITES ADOPTED IN VARIOUS FOREST OPERATIONS IN EDO STATE, NIGERIA

BY

ONYEISI ABRAHAM

AGR1500273

DEPARTMENT OF FOREST RESOURCES AND WILDLIFE MANAGEMENT

FACULTY OF AGRICULTURE

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A PROJECT SUBMITTED TO THE DEPARTMENT OF FOREST RESOURCES AND WILDLIFE MANAGEMENT, FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, BENIN CITY, IN FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF FORESTRY AND WILDLIFE

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CERTIFICATION

This is to certify that **ONYEISI ABRAHAM (AGR1500273)** carried out the work reported in this project in the Department of Forest Resources and Wildlife Management, Faculty of Agriculture, University of Benin, Benin City.

_____	_____
Prof. C. P. Kalu	**Prof. (Mrs.) E. G. Oboho**
Project Supervisor	Head of Department
Date: _____	Date: _____

DEDICATION

This work is dedicated first to God Almighty, for His provision, protection and guidance upon my life. I also dedicate this work to my parents, Mr. and Mrs. O. J. Iwebuke, for their moral and financial support and also to my brothers, Godwin, Abiola, Godpower, Favour and Success, and my sister, Faith, for love, support and encouragement throughout the period of carrying out this project.

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LIST OF ABBREVIATIONS

ANOVA – Analysis of Variance

BLC – Benefits to Local Communities

CFRR – Compliance to Forest Rules and Regulations

CIFOR – Center for International Forestry Research

Com. Head – Community Heads

FAO – Food and Agriculture Organization

FC – Forest Conservation

FDF – Federal Department of Forestry

FFA – Forest Offenders Arrest

GRE – Government Revenue Enhancement

LC – Local Communities

LGAs – Local Government Areas

NP – Number of Personnel

SDF – State Department of Forestry

SIR – Sample Intensity of Respondents

SM – Sawmillers

YR – Yield Regulation

ABSTRACT

The monitoring activities adopted in various forest operations in Edo State were investigated in this study. The relevant issues related to the monitoring methods adopted, personnel involved, impacts and challenges of the monitoring methods adopted was studied with the aid of questionnaire. The result showed that there were significant differences among the agents involved in forest monitoring ($P<0.05$) and further analysis with LSD identified State Department of Forest (SDF) as the most dominant. The result revealed that both operational and strategic monitoring method is being adopted (85.5%), and there were significant difference among the adopted methods in operational and strategic method ($P<0.05$), further analysis identified patrol for monitoring log movement, and goal-oriented method as most dominant respectively. The result also revealed that the participatory method in forest monitoring is main professional-based and locally-based, 53.63% and 30.43% respectively. It revealed that there was no significant difference among the participation of local members in participatory forest monitoring ($P<0.05$). It reveal also that there were significant difference among the challenges on proper forest monitoring ($P<0.05$) and further analysis with LSD identified inadequate manpower, underfunding and insecurity as the most dominant. It was observed that there was no significant difference among the impacts of the monitoring methods adopted in the State's forest estate.

CHAPTER ONE

1.0. INTRODUCTION

Forest resources are used to produce goods and services that are vital to socio-economic livelihood of the people. The forest, combined with other factor inputs, help produce consumers' products such as houses, sawnwood, pulp and paper, fuel wood, bush-meat, resin and tennin, outdoor recreation and environmental services (Sackey, 2007).

Forest activities range from planting, weeding, pest control, fire tracing, to logging. All these forest activities require adequate monitoring to ensure sustainability which will guarantee the supply of the resources in perpetuity (Martin Herold, 2009). Adequate monitoring of forest operations has to be adopted to ensure successful implementation of working and proper forest management (FAO, 2015).

Monitoring of forest operations is the sole responsibility of the State Department of Forestry (SDF) in line policy objectives defined by the State's Forest Policy (National Forest Policy, 2006). Professional and technical staff member of the State Department of Forestry (SDF) are responsible for carrying out these activities according to rules and regulations.

The monitoring activities carried out by the State Department of Forestry (SDF) include technical duties surveys (construction of forest roads and structures, growing stock management, and logging operations), demarcation inventories patrols (protecting forest lands perimeters), detection of offences, and prosecution of forest offences in court of law (Ehiagbonare, 2008).

This study focuses on monitoring activities of various forest operations which is centered in effective management of the Edo forest estate.

1.1. STATEMENT OF PROBLEM

There is an urgent need to provide a complete and accurate data estimation for forest resources management, in order to militate against forest losses and assess the extent of execution of various forest operations (Martin Herold, 2009).

The effectiveness of execution of the plan depends on good understanding and acceptance by government officials, forest managers, forest workers, machinery operations, rural communities and others who will be involved in the task of implementation (FAO, 2015).

In order to achieve management goal, people (labour) are needed to carry out various forest operations, manual or mechanized operations, in accordance to a clearly stated forest plan. Thus, these operations in the forest are guided, in most cases by various forest policies and the most common principle of forest management is the Principle of Sustainable Yield that is geared to manage the forest in such a way as to ensure a sustained yield of timber and other forest products in perpetuity (Adekunle, 2008).

Thus, adequate monitoring activities of various forest operation will minimize or checkmate abandonment of project / neglect of duties, disruption of operations, compromise, illegal logging, agricultural encroachments on forest lands, forest destruction and degradation.

1.2. JUSTIFICATION OF THE STUDY

Edo state is one of the forest-rich states in southern Nigeria. At the moment, the state's forest estate has lost its wholesomeness to other forms of land use (Isikhuemen, 2011). Forest monitoring and reporting are important tools to measure and sisseminate information on status and trends related to Sustainable Forest Management (FAO, 2015). In order to ensure

sustainability of the forest and perpetuity of its products, adequate monitoring of forest operations has to be adopted (Azeke, 2006).

Adequate monitoring of activities ensures effective execution of activities, as neither the planning process, of itself, nor the approval of the plan will lead to the successful implementation of the plan (FAO, 2015).

Adequate assessment of monitoring activities adopted in various forest operations will help estimate the effectiveness of carrying out various forest operations as it affects the growth, sustainability and conservations of the forest and will improve forest based enterprises in Edo State.

Thus, the success in achieving management objectives in a forest estate will relflect the effectiveness of monitoring activities adopted in various forest operations.

1.3. OBJECTIVE OF THE STUDY

The main objective of the study is to assess the monitoring activities adopted in various forest operations in Edo State forest estate.

The specific objectives of the study are to;

1. determine the methods (scientific and traditional methods) adopted in monitoring forest operations;
2. identify the forest personnel involved in various activities;
3. determine problems associated with monitoring activities.

1.4. SCOPE OF THE STUDY

This study entails the assessment of the effectiveness of monitoring activities of forest operation in Edo State, selecting 4 Local Government Areas, Ovia South West, Ovia North East, Orhionmwon and Uhumwonde, and covering the whole of Edo State from the date collected from the Ministry of Environment and Sustainability of the State.

This intends to assess the overall performance of the state's forest estate, given the monitoring efforts adopted in the state forestry management.

1.5. STATISTICAL ANALYSIS

The data collected will be analyzed using descriptive statistics of frequency and percentages, summarized in tables, charts and inferential statistics using analysis of variance, ANOVA, and LSD at 5% level of significance.

`CHAPTER TWO

LITERATURE REVIEW

2.1. FOREST RESOURCES

Forest is an ecological complex, involving an intricate interrelationship of trees, shrubs, vines, other plants, animal life, soils, atmosphere and water. It is the most important resources of nature on earth, after air and water (Santosh, 2010). It is one of earth's greates reservoirs of renewable resources. Properly managed, they can provide essential products indefinitely (Adekunle, 2008). The forest as a valuable economic resources are essential to meeting basic needs for wood, fuel, medicine, fruits and other food.

Forest as valuable economic resources, like other business ventures, has to be conserved to ensure sustainability, proper management and use. Thus, forest operations requires adequate monitoring for proper decision making to determine whether forestry investments can effectively compete with other alternatives as well as whether the estates can satisfy the needs of the resources use (Sackey, 2007).

2.2. FOREST RESOURCES MONITORING

Monitoring is the systematic gathering and analysis of information in order to gauge if something is changing (CIFOR 2007). It is a continuous process of collecting, analyzing, documenting and reporting information on progress to achieve set project objectives. It helps to identify trends and patterns, adapt strategies and influence decisions for project management (Frankel and Gage, 2016).

2.2.1. Impact of Forest Resource Monitoring

There are three general reasons to monitor. First, monitoring can help tropical forest managers and users answer questions or concerns (Cunha dos Santos, 2002) about issues such as sustainable management and livelihoods, biodiversity conservation, human wellbeing, political processes and institutions, and ecosystem services. Establishing clear monitoring questions is the first step in developing a program (Case, 1990).

Second, monitoring not only provides answers to questions about forest management, but also creates a culture of questioning (Guijt, 2007). Recent thinking has concluded that monitoring is more than a way of generating information; it is a catalyst for learning processes at the core of adaptive forest management (Colfer, 2005). Third, monitoring can be a crucial mechanism for enforcing compliance with important forest management rules, such as resource access, use, conservation and benefit distribution (Case, 1990).

Evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision making (UNDP, 2009). Evaluation is used in government to increase transparency, strengthen accountability, and improve performance. Performance management systems establish outcome oriented goals and performance targets, monitor progress, stimulate performance improvements, and communicate results to higher policy levels (Wholey, 2010).

2.2.2. Monitoring Methods

Operational and strategic monitoring methods are being adopted in forest management. Operational monitoring is done to ensure that present prescriptions and guidelines are being followed. It is also a basis for improving present practices and identifying areas where corrective or remedial action is required (Frankel and Gage, 2016). Strategic monitoring is

more about long-term observations and measurements of the environmental and social effects of forest management, which are used to guide and adapt management strategies. Key areas for strategic monitoring include management regimes, growth and yield, and environmental and social impacts (Frode and Masara, 2007).

Typically operational monitoring include operations such as, harvesting, timber production, road construction, occupational safety and health observation of protected zones, conservation programmes and measures, regeneration, thinning and other silvicultural treatments, and contractor performance (Pokorny, 2004). In operational forest monitoring, operators are responsible for monitoring their own operations to ensure that standards are observed (UNDP, 2009), operators undertake statistically sound sampling of specified operational aspects with the monitoring method.

The strategic monitoring of management regimes normally involves periodic inventories of forest condition. Many ongoing inventory programmes are aim to assess the entire forest estate under management in a ten-year cycle. Among other things, the results of such inventory programmes provide data for estimating the sustainable annual harvest. Monitoring should also aim to assess the effectiveness of silvicultural treatments such as forest regeneration methods, and thinning regimes (WWF Malaysia, 2007).

Strategic monitoring also involves monitoring the extent and impacts environmental changes such as impacts of erosion, changes in site productivity, the impact of forest activities on water quality and quantity, the impact of forest activities on wildlife populations, including species on the IUCN Red List of Threatened Species, and the presence and impacts of exotic species (WWF Malaysia, 2007).

2.2.3. Participatory Forest Monitoring

Participatory monitoring shifts the emphasis away from externally defined and driven programs and stresses the importance of a locally relevant process for gathering, analyzing, and using the information. It means involving (groups of) people in aspects of monitoring in which they have not previously been involved and creating conditions so that they can dictate the focus, means and rhythm of the learning process (Guijt, 2007).

Participatory monitoring refers to forest monitoring performed directly by forest stakeholders. It has the advantages of obtaining information on stakeholder perceptions of the impacts of forest activities. Participatory approaches to monitoring can be employed in monitoring economic, social and environmental aspect of forest management (FAO, 1990).

People based forest management system is responsive to various forest stakeholders needs, allows people (the stakeholders) to take responsibilities and share meaningfully in the benefits accruing from sustainable forest management (Higman, 2000).

Participatory forest management system integrates the socio-economic and cultural needs of the people with resource conservation. It is becoming increasingly clear that government alone cannot manage forest resources sustainably in view of its inability to provide the necessary financial resources, personnel and other facilities to ensure appropriate resources management (Jimoh, 2002).

Monitoring for rule enforcement is a necessary condition of sustainable forest management as it a critical component of any natural resource management system (Ostrom, 1990). Rule enforcement in natural resource management and participatory monitoring is an effective and non-confrontational approach to ensuring local compliance (Gibson et al., 2004).

Participatory monitoring can take many forms. This includes;

Professional-based monitoring – Is the monitoring method carried basically by formally trained experts, usually by the foresters and government personnel (Danielsen et al., 2005).

Locally-based monitoring – is the participatory monitoring where local people, including communities and/or local government staff, collect and analyze data ranging from self-monitoring of harvests to censuses, and inventories (Danielsen et al., 2005).

Collaborative monitoring – Is a process of conscious information seeking followed by shared critical analysis to inform collective decisions that affect resource management (Guijt, 2007). It stresses the importance of developing a locally relevant process for gathering, analyzing and using information for natural resource management and emphasis is being shifted away from external institutions or professional project managers to focus on the most important issues to local people (Guijt, 2007).

Community-based ecosystem monitoring (CBEM) – This is a term for monitoring programs in developed countries that involve local, non-professional volunteers in environmental or natural resource monitoring, organized by government entities or conservation organizations to improve information collection and community input (Whitelaw et al. 2003).

Joint monitoring - This is also known as multi-party monitoring were local people and local authorities engage in monitoring for enforcement (Andrianadrasana et al. 2005), and is a way of sharing responsibilities between local people and local authorities in forest management (Steinmetz et al. 2006).

2.2.4. Challenges in Forest Monitoring

Sustainable forest management encompasses forest law enforcement and governance, involving tackling illegal forest activities, strengthening and reforming forest management institutions, updating and reviewing policy, building legal and institutional frameworks, and increasing capacity to enforce existing laws and policies (Ewane *et al.*, 2015).

Forest policy and administrative machinery focused on government as the major stakeholder. This policy framework and its implementation does not encourage people's participation in forest management, even though it states the need for the private sector participation as part of the strategies to achieve the objective of government policy on forest product. For example, the compulsion of individuals, groups, organizations and communities to obtain permission from government forestry offices before harvesting any tree, including those raised by them on their own land, suggests that all forest resources belong to government alone. This policy could deter to investors, hence, must be carefully reviewed to evolve a strategy that strikes a balance between sustainable management goals and proprietary rights (Akande, 2003).

Forest crime, including illicit activities such as illegal logging, illegal occupation of forest land, woodlands arson, wildlife poaching, encroachment on both public and private forests, and corruption is rampant throughout the world, particularly in developing countries of Africa, Latin America and Asia (World Bank, 2006). The prevalence of forest crime has been on the increase as a result of poor governance, corruption and illegality in the forest sector particularly in sub Saharan countries of Africa. This has put at risk forest-dependent populations who rely on timber and non-timber forest products for their livelihoods and survival, and undermine responsible forest enterprises by distorting timber markets (World Bank, 2006). Forest offences contribute to forest degradation and destruction, as well as revenue losses by government (Ajayi, 1991; Udo, 1997).

Forest crimes can be poverty driven or associated with commercial exploitation of timber. The causes of illegal logging and other forest crimes are complex, and often lie outside the forestry sector (Udo, 1997).

Problems such as lack of political will on the part of Government, underfunding, lack of or dilapidated office/accommodation, inadequate manpower, lack of equipment and lack of

capacity buildings, government preference and emphasis on revenue generation as against biodiversity conservation, compromise of forestry officers, village heads and chiefs with merchant timber loggers, lack of effective supervision, coordination and enforcement of forest legislations has led to increase forest crimes, forest degradation and deforestation (Ahmed, 2017). These weaknesses are difficult to address politically, since well-connected interest groups tend to benefit from the status quo and resist change (Colchester, 2006.)

There is no database on forest reserves and their associated resources in the state. This makes it difficult to ascertain the areal extent of forest reserves and extent of encroachment by both the farmers and cattle grazers (FAO, 2015).

CHAPTER THREE

METHODOLOGY

3.1. Study Area

This study was conducted in Edo State. The State has a total land area of about 17,802km^2 and a population of 3,233,366 (Federal Republic of Nigeria Official Gazette, 2009). The State is situated between latitude $5^0$45$^{'}$ and $7^0$8$^{'}$ north and longitude $5^0$4$^{'}$ and $6^0$52$^{'}$ east. The rainfall pattern is bimodal and varies from about 2000mm annually in the southern part to about 1150mm annually in the northern parts. The mean monthly temperature is about 27^0C with a range of 22-35^0C, and relative humidity ranges from 75-90% (Formecu, 1999).

Edo State forest estate covered about 572,373ha at the inception of forest reservation. This acreage has declined to 133,234ha in 2006 (Azeke, 2006). The state agroecological zones is divided into a moist rainforest in the south, dry rainforest in the centre, and in the northern part of the state is derived savannah and southern guinea savannah. At the present, the state's forest estate has lost its wholesomeness to other forms of land use (Isikhuemen, 2011).

3.2. Sampling Method

A reconnaissance visit was carried out to the Departments of Forest Management and Utilization, and Conservation and Regeneration, Edo State Ministry of Environment and Sustainability. This is to obtain information on the number and distribution of forestry workers across the state, methods adopted in monitoring forest operations, personnel involved, frequency of monitoring, and set-backs associating to the monitoring activities.

A 20% sampling intensity of the eighteen (18) LGAs in the State was taken to select four (4) LGAs to be sampled. These comprises of; Ovia South West, Ovia North East, Orhionmwon and Uhumwonde LGAs (Table 1).

The respondents consist of professionals, technical, and uniform personnel of Departments of Forest Management and Utilization, and Conservation and Regeneration, Edo State Ministry of Environment and Sustainability in the selected LGAs. A 100% sampling intensity was applied on the personnel in the sampled LGAs (Table 1). A total of 69 questionnaires were administered.

Table 1: **Sampled Population of Respondents**

Sampled LGA (20%)	NP	SIR(100%)
Ovia South West	15	15
Ovia North East	28	28
Orhionmwon	5	5
Uhumwonde	12	12
Headquarters	9	9
Total	69	69

Key:
NP – Number of Personnel
SIR – Sample Intensity of Respondents
Source: Ministry of Environment and Sustainability, Edo State.

3.3. Data Collection

Data will be collected from structured and semi structured questionnaires and interview schedules with respondents. Secondary data was used by extracted information from records, reports, documents and relevant materials from the Ministry, Journals, and internets.

3.4. Data Analysis

The data collected was subjected to simple statistical analysis such as mean, frequency, percentages, and correlation statistics with the use of t-test and ANOVA at 5% level of significance.

CHAPTER FOUR

RESULTS AND DISCUSSION

The results showed that there were significant difference among ($P<0.05$) various agents involved in monitoring of forest activities in the study area. Further analysis revealed that the State Department of Forestry dominated all the agents considered in the foregoing analysis.

Table 2: **Agents / Personnel involved in Forest Monitoring in Edo State forest estate**

LGAs	SDF	LC	SM
Ovia South West	15	3	-
Ovia North East	28	7	2
Orhionmwon	5	1	-
Uhumwonde	12	2	1
Headquarter	9	4	-
Total	69	17	3
Mean	13.8^{a}	3.4^{b}	0.6^{b}

Key:

- LGAs – Local Government Areas
- SDF – State Department of Forestry
- LC – Local Communities
- SM – Sawmillers

This findings agree with the report of Martin Herold (2009) that Federal Department of Forestry (FDF) together with the State Department of Forestry (SDF) is responsible for planning, management and monitoring the forestry sector. This is because the State Forestry

Department (SFD) is in charge provision and collection of information about the forestry sub-sector.

Table 3 shows that 85.5% of the respondents affirmed that both Operational and Strategic monitoring method was adopted by Edo State Government in managing the state's forest estate, while 10.1 and 4.3% of the respondents agreed that only strategic monitoring method and Operational Monitoring method were adopted respectively.

Table 3: **Monitoring Method Adopted in Edo State forest estate**

Monitoring Methods	*Frequency*	*%*
Operational monitoring	3	4.3
Strategic monitoring	7	10.1
Both Operational and Strategic monitoring	59	85.5
Total	69	100.0

These finding agree with the view expressed by Ehiagbonare (2008) that monitoring activities like technical duties such as surveys (construction of forest roads, structures, growing stock management, and logging operations), demarcation, inventories patrols (protecting forest lands perimeters, detection of offences and prosecution of forest offences take place in Edo State.

Table 4 shows that there were significant difference ($P<0.05$) among the adopted operational monitoring methods adopted in the foregoing analysis. Further analysis revealed that patrol for monitoring log movement dominated the aspects of operational monitoring under consideration.

Table 4: **Adopted Operational Monitoring in Edo State**

LGAs	Harvesting	Hauling	Planting	Thinning	Weeding	Fire Tracing	Road Cons.	Patrols
Ovia South West	2	1	14	4	2	10	11	15
Ovia North East	5	1	25	12	5	26	24	28
Orhionmwon	-	-	3	1	-	3	3	5
Uhunmwonde	1	-	7	3	1	11	10	12
Headquarter	2	1	9	3	2	8	5	9
Total	10	3	58	23	10	58	53	69
Mean	2^{d}	0.6^{d}	11.6^{ab}	4.6^{bcd}	2^{d}	11.6^{ab}	10.6^{abc}	13.8^{a}

Key:
LGAs – Local Government Areas

This finding somewhat agrees Fröde and Masara (2007) that harvesting/logging, planting, patrol and construction of forest structures are the major forest activities monitored in the forest.

Table 5 shows that there was significant difference (P<0.05) among the strategic monitoring adopted in the foregoing analysis. The results further revealed that goal oriented strategic monitoring method dominated the strategic monitoring methods under consideration.

Table 5: **Adopted Strategic Monitoring Method in Edo State**

LGAs	Time Oriented	Goal Oriented	People Oriented	Government Oriented
Ovia South West	7	12	6	5
Ovia North East	6	22	16	7
Orhionmwon	1	3	3	2
Uhunmwonde	2	11	7	3
Headquarter	4	7	3	6
Total	20	55	35	23
Mean	4^{b}	11^{a}	7^{ab}	4.6^{b}

Key:
LGAs – Local Government Areas

The findings agree with the report of Samuel Iwah (2013) that people-orientated strategies facilitates and fosters participatory sustainable forest management and militate against the consequences of the monopolistic forest management such as widespread illegal and destructive lumbering, degradation, deforestation and varying ecological disasters.

Table 6 shows that there was no significant difference (P<0.05) among local members involved in participatory monitoring in the foregoing analysis.

Table 6: **Local members involved in participatory monitoring of the state's forest estate**.

LGAs	Com. Head	Youths	Vigilante
Ovia South East	8	15	7
Ovia North East	16	28	13
Orhionmwon	2	5	2
Uhumwonde	6	12	7
Headquarter	7	9	2
Total	39	69	31
Mean	13[a]	13.8[a]	10.3[a]

Key

- LGAs – Local Government Areas
- Com. Head – Community Heads

The findings somewhat agree with the views of FAO (2001) that the level of involvement of communities members in forest management varies among communities and level of resources available and also in agreement with view expressed by Wagonhurst (2002) that human resource plays a key role in project monitoring and management.

Table 7 shows that 53.62% of the respondents affirmed that professional-based participatory monitoring method was adopted by Edo State Government in managing the state's forest estate, while 30.43 and 15.94% of the respondents affirmed that locally-based and joint participatory monitoring method were adopted respectively.

Table 7: **Type of Participatory Monitoring Method adopted in Edo State**

Participatory Type	Frequency	%
Professional-based	37	53.62
Locally-based	21	30.43
Joint	11	15.94
Total	69	100

These findings agree with the view of FAO (1990) that for participatory forest monitoring programs to be sustainable, they must be locally relevant, simple to conduct and inexpensive. And disagree with the view of Danielsen (2005) that local people, including communities and/or local government staff collect and analyse data by local resource users themselves.

Table 8 reveals that there was no significant difference (P<0.05) among the various impacts of monitoring methods adopted in the study under review. The results also indicated forest offenders arrest, forest conservation, government revenue enhancement and yield regulation dominated compliance to forest rules and regulations, and benefits to local communities.

Table 8: **Impact of the Monitoring method adopted on forest management**

LGAs	FFA	CFRR	FC	YR	BLC	GRE
Ovia South West	14	5	11	7	3	12
Ovia North East	27	8	21	13	7	23
Orhionmwon	4	1	3	2	-	3
Uhunmwonde	11	3	7	7	2	10
Headquarter	9	3	5	4	4	5
Total	65	20	47	33	16	53
Mean	13^{a}	4^{b}	9.4^{ab}	6.6^{ab}	3.2^{b}	10.6^{ab}

Key:
LGAs – Local Government Areas
FFA – Forest Offenders Arrest
CFRR – Compliance to Forest Rules and Regulations
FC – Forest Conservation
YR – Yield Regulation
BLC – Benefits to Local Communities
GRE – Government Revenue Enhancement

These findings agree with the view of Ehiagbonare (2008) that forest crimes such as illegal logging, illegal procurement of non-forest timber produce have being reverse by the government by making professionals to head various forestry sector, and hence, forest conservation, effective monitoring, forest regeneration, environmental conservation can be appreciably handled.

Table 9 shows that five major challenges were identified to militate against proper forest monitoring methods in the foregoing study. The results revealed that there was significant difference ($P<0.05$) among the identified challenges under consideration. Further analysis indicated that dealt of manpower, funding and security dominated other challenges under consideration.

Table 9: **Challenges on proper forest monitoring methods in Edo State**

LGAs	Manpower	Funding	Security	Communal Crisis	Compromise
Ovia South East	15	11	13	5	-
Ovia North East	27	27	24	13	2
Orhionmwon	5	3	2	2	-
Uhumwonde	11	11	10	5	1
Headquarter	9	7	9	3	2
Total	67	59	58	28	5
Mean	13.4^{a}	11.8^{ab}	11.6^{ab}	5.6^{abc}	1.0^{c}

Key
LGAs – Local Government Areas

The findings strongly agreed with the view of Ahmed (2017) that the State Department of Forestry has continued to grapple with problems such as lack of political will on the part of government, underfunding, lack of or dilapidated office/accommodation, inadequate manpower, lack of equipment and lack of capacity building, Government preference and emphasis on revenue generation as against biodiversity conservation, Sedition of forestry officers, village heads and chiefs with merchant timber loggers, lack of effective supervision, coordination and enforcement of forest legislations are implicated.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

Based on this study, it can be concluded that the State Government is fully responsible for the monitoring of the state's forest estate through the State Department of Forestry. Operational and strategic monitoring are carried out in the state, patrol for monitoring log movement and goal oriented strategy are the most dominant respectively. Youths, local heads and vigilante are in similar involvement with the state government in monitoring the forest.

Inadequate manpower, underfunding, poor security, communal crisis, and compromise by forestry staff pose major challenges to effective forest monitoring and management in the state. The findings showed that there have being improvement achieved in forest patrol, arresting and compoundment of forest offenders and, somewhat help in conservation of the state forest and increased government revenue.

RECOMMENDATIONS

- Government should employ more professional, technical, uniform and non-uniform forestry workers.
- Government should allocate more funds to the State Department Forestry (SDF) for effective patrol and monitoring of activities.
- Government should provide adequate security for forest officers/workers in patrol and help fight against insurgence in the State's forest estate.
- Government should encourage more local involvement in forest monitoring.
- Punishment of forest offenders should be more severe to deter forest crimes.

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APPENDIX 1

WORKINGS

Table 2: **Agents / Personnel involved in forest monitoring in Edo State forest estate**

Cf = 528.0667

SStotal = 1343 – 528.0667 = 814.9333333

SStrt = 5059 – 528.0667 = 4530.933333

SSerror = SStotal – SStrt = 814.9333333 - 4530.933333 = 331.2

ANOVA

SV	*SS*	*Df*	*MS*	*F*	*F crit*
TRT	483.7333	2	241.8667	8.763285	3.885294
Error	331.2	12	27.6		
Total	814.9333	14			

Mean Separation using LSDα0.05

$LSD = t_{\alpha 0.05} df_{error} \times \sqrt{\frac{2 * MSerror}{r}}$

$= t_{\alpha 0.05} 12 \times \sqrt{\frac{2 * 27.6}{5}} = 2.179 \times \sqrt{\frac{55.2}{5}}$

$= 2.179 \times 3.32265 = 7.24$

Means

SDF	Local Com.	Sawmillers
Ť1	Ť2	Ť3
13.8	3.4	0.6

a b

/T1 vs T2/ = /13.8 – 3.4/ = /10.4/ > 7.24* sig.

/T2 vs T3/ = /3.4 – 0.6/ = /2.8/ < 7.24 not. sig.

Mean 13.8^{a} 3.4^{b} 0.6^{b}

Table 4: **Adopted operational monitoring in Edo State**

Cf = 2016.4

SStotal = 4270 – 2016.4 = 2253.6

SStrt = 3007.2 – 2016.4 = 990.8

SSerror = SStotal – SStrt = 2253.6 - 990.8= 2253.6

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Trt	990.8	7	141.5428571	3.586768632	2.312741
Error	1262.8	32	39.4625		
Total	2253.6	39			

Mean Separation using LSDα0.05

$LSD = t_{\alpha 0.05} df_{error} \times \sqrt{\frac{2 * MSerror}{r}}$

$= t_{\alpha 0.05} 32 \times \sqrt{\frac{2 * 39.4625}{5}} = \quad 2.037 \times \sqrt{\frac{78.925}{5}}$

= 2.037 x 3.973 = 8.093

Means

T1	T2,T3	T4	T5	T6,T7	T8
13.8	11.6	10.6	4.6	2	0.6

a

b

c

d

/T1 vs T5/ = /13.8 – 4.6/ = /9.2/ > 8.093** Very sig.

/T2 vs T6/ = /11.6 – 2/ = /9.6/ > 8.093* sig.

/T4 vs T6/ = /10.6 - 2/ = /8.6/ > 8.093 * sig.

/T5 vs T8/ = /4.6 – 0.6/ =/4/ < 8.093 not sig.

Mean - 13.8^{a} 11.6^{ab} 10.6^{abc} 4.6^{bcd} 2^{d} 0.6^{d}

Table 5: **Adopted Strategic Monitoring method in Edo State**

Cf = 884.45

SStotal = 1395 – 884.45 = 510.55

SStrt = 1035.8 – 884.45 = 151.35

SSerror = SStotal – SStrt = 510.55 - 151.35 = 359.2

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Trt	151.35	3	50.45	2.247216036	3.23887
Error	359.2	16	22.45		
Total	510.55	19			

Mean Separation using LSDα0.05

$LSD = t_{\alpha 0.05} df_{error} \times \sqrt{\frac{2 * MSerror}{r}}$

$= t_{\alpha 0.05} 16 \times \sqrt{\frac{2 * 22.46}{5}} = 2.120 \times \sqrt{\frac{44.92}{5}}$

$= 2.120 \times 2.997 = 6.35$

Means

T1	T2	T3	T4
11	7	4.6	4

a

b

/T1 vs T3/ = /11 – 4.6/ = /6.4/ > 6.35 sig.

/T2 vs T4/ = /7 – 4/ = /3/ < 6.35 not sig

Mean - 11^{a} 7^{ab} 4.6^{b} 4^{b}

Table 6: **Local Members involved in participatory monitoring in Edo State**

Cf = 1288.066667
SStotal = 1942.999967 – 1288.066667 = 654.9333

SStrt = 1448.599967 – 1288.066667 = 160.5333

SSerror = SStotal – SStrt = 654.9333 - 160.5333= 494.4

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Trt	160.5333	2	80.26667	1.94822	3.885294
Error	494.4	12	41.2		
Total	654.9333	14			

Mean Separation using LSDα0.05

$LSD = t_{\alpha 0.05} df_{error} \times \sqrt{\frac{2 * MSerror}{r}}$

$= t_{\alpha 0.05} 12 \times \sqrt{\frac{2 * 41.2}{5}} = 2.179 \times \sqrt{\frac{82.4}{5}}$

= 2.179 x 4.06 = 8.845

Means

T1	T2	T3
13.8	13	10.3

a

/T1 vs T3/ = /13.8 – 10.3/ = /3.5/ < 8.845 not sig.

Table 8: **Impact of the Monitoring method adopted on forest management**

Cf = 1564.46
SStotal = 2807.26 – 1564.46 = 1242.8
SStrt = 1936.86 – 1564.46 = 372.4
SSerror = SStotal – SStrt = 1242.8 - 372.4 = 870.4

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Trt	372.4	5	74.48	2.053676	2.620654
Error	870.4	24	36.26667		
Total	1242.8	29			

Mean Separation using LSDα0.05

$LSD = t_{\alpha 0.05} df_{error} \times \sqrt{\frac{2*MSerror}{r}}$

$= t_{\alpha 0.05} 24 \times \sqrt{\frac{2*36.267}{5}} = 2.064 \times \sqrt{\frac{72.534}{5}}$

= 2.064 x 3.809 = 7.862

Means

T1	T2	T3	T4	T5	T6
13	10.6	9.4	6.6	4	3.2

a b

/T1 vs T5/ = /13 – 4/ = /9/ > 7.862 sig.

/T2 vs T6/ = /10.6 -3.2/ = /7.4/ < 7.862 not sig.

Mean -	13^{a}	10.6^{ab}	9.4^{ab}	6.6^{ab}	4^{b}	3.2^{b}

Table 9: **Challenges on proper forest monitoring methods in Edo State**

Cf = 1883.56
SStotal = 3381 – 1883.56 = 1497.44
SStrt = 2428.6 – 1883.56 = 545.04
SSerror = SStotal – SStrt = 1497.44 - 545.04 = 952.4

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Trt	545.04	4	136.26	2.86	2.86
Error	952.4	20	47.62		
Total	1497.44	24			

Mean Separation using LSDα0.05

LSD = $t_{\alpha 0.05} df_{error}$ x $\sqrt{\frac{2*MSerror}{r}}$

= $t_{\alpha 0.05} 20$ x $\sqrt{\frac{2*47.62}{5}}$ = 2.086 x $\sqrt{\frac{95.2}{5}}$

= 2.086 x 4.363 = 9.10

Means

T1	T2	T3	T4	T5
13.4	11.8	11.6	5.6	1.0

a

b

c

/T1 vs T4/ = /13.4 – 5.6/ = /7.8/ < 9.10 not sig.

/T1 vs T5/ = /13.4 – 1.0/ = /12.4/ > 9.10 sig.

/T2 vs T4/ = /11.8 – 5.6/ = /6.2/ < 9.10 not sig.

/T3 vs T4/ = /11.6 – 5.6/ = /6/ < 9.10 not sig.

/T4 vs T5/ = /5.6 – 1.0/ = /4.6/ < 9.10 not sig,

Mean - 13.4^{a} 11.8^{ab} 11.6^{ab} 5.6^{abc} 1.0^{c}

APPENDIX 2

Questionnaire

Dear Sir/Madam

Monitoring of forest activities helps provide a complete and accurate data estimation in order to militate against forest losses and assess the extent of executing forest operations, identify trends and patterns, adapt strategies and influence decisions for proper forest management.

1. Do you know that the forest is being monitoring? Yes ☐ No ☐

2. Do you agree that monitoring of forest activities will help in proper management of the State's forest estate?
   Yes ☐ No ☐

3. Do you agree that Monitoring of forest activities should be done continuously in order to provide a comprehensive data on the forest status of the state? Yes ☐ No ☐

4. Who are those involved in monitoring the forest?
   The State Government ☐, The Community Head ☐ The Saw millers ☐

5. What monitoring method is being adopted by the State in overseeing its forest?
   a. Operational Monitoring Method Yes ☐ No ☐
   b. Strategic Monitoring Method Yes ☐ No ☐

6. How is the Operational Monitoring Method carried out?
   a. Harvesting [ ]
   b. Hauling [ ]
   c. Planting [ ]
   d. Thinning/pruning [ ]
   e. Weeding [ ]
   f. Fire tracing [ ]
   g. Construction of forest roads and bridges [ ]
   h. Patrols [ ]

7. How is the Strategic Monitoring Method carried out?
   a. Time Oriented [ ]
   b. Goal oriented [ ]
   c. People oriented [ ]
   d. Government oriented [ ]

8. Are the local communities involved in the monitoring of the state forest reserves?
   Yes ☐ No ☐

9. If yes, who are the members of the local communities involved?
   i. Youths [ ]
   ii. Community heads/leaders [ ]
   iii. Police and other local security staff [ ]
   iv. Development levy collectors [ ]
   v. Revenue collectors [ ]

10. Is the monitoring method adopted participatory? Yes ☐ No ☐

11. What type of following participatory monitoring method is being carried out in the forest reserve in your area?
    a. Professional Monitoring (trained staff only) [ ]
    b. Locally-based monitoring (Local people only) [ ]
    c. Collaborative monitoring [ ]
    d. Community-based system monitoring [ ]
    e. Joint Monitoring [ ]

12. Will the monitoring method adopted properly account for the following?
    a. Environmental aspect Yes ☐ No ☐
    b. Growth and Yield Yes ☐ No ☐
    ☐ ☐

c. Conservation of forest resources Yes No

d. Social aspect Yes ☐ No ☐

e. Economic aspect Yes ☐ No ☐

13. Does the Monitoring method adopted ensure proper management of the forest resources?

Yes ☐ No ☐

14. If yes, is there improvement in the following?

a. Arrest of forest offenders Yes [ ] No [ ]

b. Compliance to forest rules and regulations Yes [ ] No [ ]

c. Increment in forest resources Yes [ ] No [ ]

d. Conservation of the forest resources Yes [ ] No [ ]

e. Benefiting the local communities Yes [ ] No [ ]

f. Government revenue Yes [ ] No [ ]

15. Has there being any significant improvement on the forest status of the State due to the monitoring method adopted? Yes ☐ No ☐

16. What are the challenges to proper forest monitoring?

a. Manpower [ ]

b. Funding [ ]

c. Security [ ]

d. Compromise [ ]

e. Communal crisis [ ]