

**COURSE
GUIDE**

**AFM 321
FISHERIES MANAGEMENT AND CONSERVATION**

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INTRODUCTION

AFM 321 Fisheries Management and Conservation is a three-credit unit course. The course is made up of three modules divided into 13 study units. Your study time for each unit will vary from one to four weeks. You will find more detailed information about the contents of each unit in the section of this Course Guide entitled "Course Description". Each study unit contains a number of Self-Assessment Exercise which allows you to check your progress as you go through each topic.

WHAT YOU WILL LEARN IN THIS COURSE

You will learn some new terms and expressions in this course. You will also come in contact with new ideas which may change your perception about fisheries management and conservation. You will do well to meditate on these questions. All the questions are discussed in the final unit and tutorials. Some of your recommended textbooks are written by non-Nigerians. You will therefore, judge whether all or some of the materials contained in them apply in the Nigerian environment. Your opinion matters a lot, as there are various answers to these questions.

COURSE AIMS

This course aims to provide you with the basic introduction to Fisheries Management and Conservation. It aims to identify basic concepts of fisheries development and management (unexploited, underexploited, overexploited fisheries resources); basic and practical objectives of fisheries management and conservation in Nigeria; fisheries administration and legislation and the problems of enforcing laws; traditional fisheries enhancement strategies; development and management of lakes, rivers, brackish and marine waters; traditional methods of fisheries management, administration and conservation in Africa such as taboos, superstition, festivals and the roles of traditional heads; government policy in fisheries administration and management; roles and activities of federal, state and local governments in fisheries development and management in Nigeria.

At the end of the course, we shall be able to identify the factors enhancing effective fisheries management and conservation. In this course, national and local aspects are examined and used for illustrations.

COURSE OBJECTIVES

To achieve the above stated aims, some overall objectives must be considered. In addition, each study unit also has specific objectives.

The study unit objectives are always included at the beginning of a study unit; you should read them before you start working through the study unit. You may want to refer to the objectives as you go through each unit to check on your progress. You should always look at the study unit objectives after completing a study unit. In this way, you can be sure that you have done what was required of you by the study unit. Set out below are also the wider objectives of the course as a whole. By meeting these objectives, you should have achieved the aims of the course.

On successful completion of the course, you should be able to:

- define fisheries management and conservation
- explain the roles of national and international legislation in fisheries management and conservation
- identify the methods of assessing resource exploitation
- state the roles of Government policies in fisheries administration and development
- explain the roles and activities of different levels of government in both water and fisheries management in Nigeria.

COURSE DESCRIPTION

One of the most important functions of fisheries management and conservation is to enable the current generation to meet their needs without depriving the future generations of the same privilege. Successful conservation entails adequate knowledge of the system being managed, proper training of resource managers, enactment and enforcement of legislation and adequate support by government and its agencies at all levels. Traditional knowledge is also useful in the management, conservation and enhancement of fisheries resources. The methods employed by government so far had been top-bottom approach which denied end users the opportunities of contributing to the decision making process. The effect of this is the low adoption of such policies and decisions.

COURSE MATERIALS

Major components of the course are:

1. Course Guide
2. Study Units
3. Textbooks
4. Assignment
5. Tutorials

STUDY UNITS

There are three modules in this course divided into 13 study units:

Module 1

Unit 1	Basic Concept of Fisheries Development
Unit 2	Basic Concept of Fisheries Management
Unit 3	Fisheries Exploitation (unexploited, underexploited, overexploited fisheries resources)
Unit 4	Fisheries Enhancement
Unit 5	Basic and Practical Objectives of Fish Management and Conservation in Nigeria

Module 2

Unit 1	Fisheries Administration
Unit 2	Legal Framework for Fisheries Management
Unit 3	Types of Property Rights and Regimes in African Fisheries
Unit 4	Traditional Methods of Fisheries Management, Administration and Conservation in Africa

Module 3

Unit 1	Non-Traditional System of Fisheries Management in Nigeria and Problems of Enforcing Rules
Unit 2	Development and Management of Lakes, Rivers, Brackish and Marine Waters
Unit 3	Government Policy in Fisheries Administration and Management
Unit 4	Roles and Activities of the Federal, State and Local Governments in Fisheries Development and Management in Nigeria

The units in this course build on each other to work from explaining the basic concepts of fisheries management, exploitation, enhancement and conservation to the legal framework and roles of government and its agencies in supporting the work of conservation and management. If you have completed the pre-requisite courses, you will find certain concepts in some familiar units. But if you have not completed the pre-requisite courses, you may need to spend a little extra time familiarising yourself with some of the ideas but this should not create any problems for you.

Each unit directs you to read specific pages from chapters in textbooks or journals. You are expected to study and understand the principles and

concepts involved. Each unit contains self-test question, usually short ones, to test your understanding of a principle you have just read about. By attempting these short questions, you will have instant feedback on your progress. You should attempt to answer all the self-text questions before looking at the answers. This will help you to prepare for your assignments and examination. After each self-test there is a question on your own experience!

At the end of each unit there is one practice exercise, which covers all areas you have studied in that unit. It is important to complete all the practice exercises. This will expose you to the types of questions you will be required to answer in assignments and in your final examination and also introduce you to some problems encountered in real life-situations. The questions reflect the demands of the unit objectives; they are designed to help you understand and apply those principles covered in the unit.

TEXTBOOKS

There are no compulsory textbooks for fisheries management and conservation. *Read as many textbooks, newspaper/journal articles on the subject as possible*

ASSIGNMENT FILE

Assignment questions for this course are contained in the section of the course materials entitled Assignment File. You are required to complete your assignments and mail them together with a tutor-marked assignment (TMA) form to your tutor.

ASSESSMENT

In every unit, there are two set of questions one is the Self-Assessment Exercise and the other is the Tutor-Marked Assignment. The self-assessment exercises are specially designed to enable you ascertain whether you are learning or not. The answers to all self-assessment exercises are contained within the units for you to verify. You are advised to be sincere to yourself since these exercises are not for certification. There is also a final examination at the end of the course.

TUTOR-MARKED ASSIGNMENT

This course has four assignments, which you will find in your Assessment File with detailed instructions on how to complete them. Your tutor will mark and comment on them. Pay attention to the feedback and use it to improve other assignments. You will see from the

course time table the dates to submit in your assignments. The marks for the required TMAs and the best three out of four will be recorded and count towards your final mark for the credit for this course. Presently, the university has adopted electronic e-TMA which comprises eighty multiple or objective questions since 2009/2010 session.

You can write the assignments using the materials from your study units and textbooks. But it is preferable in all degree level education to demonstrate that you have read and researched more widely than the required minimum. Using other references will give you a different viewpoint and a deeper understanding of the subject. *But do remember that copying from any sources without acknowledgement is plagiarism and is not acceptable.* You must make reference when you refer to or quote from others' work. The minimum information needed is: author's name, date of publication, title, edition, publisher and place of publication.

Below are the total marks allocated to the assignments and to your final examination:

Title	Value
TMA	30%
Final Examination	<u>70%</u>
	<u>100%</u>

FINAL EXAMINATION AND GRADING

There will be three hours examination at the end of this course; use the time between the last unit and the examination to review the whole course. Review your practice exercises and assignments and your tutor's comments on them before sitting for the examination. You will be advised of examination arrangements after you send in your examination registration card.

The final examination for AFM 321 Fisheries Management and Conservation covers information from all parts of the course and has the same format as the specimen examination paper, which will be discussed in the half-day school. The examination will not contain "trick" questions or questions that try to confuse you. That is, not consistent with the open approach, the NOUN approach is different. To earn a passing grade for the course you must submit at least three TMAs including the required TMA, and attain a passing grade (i.e. at least score 40) on these **and** on your final examination.

FACILITATORS/TUTORS AND TUTORIALS

Your tutor will mark and comment on your assignments, keep close watch on your progress and on any difficulties you encounter and provide you with assistance. Assignments should be mailed in accordance with the course calendar. They will be marked by your tutor and returned to you as soon as possible. It is a good idea to keep a copy of all the assignments you send to your tutor for marking. The copies will prove useful, should you wish to make reference to them during telephone conversations, or if they are lost in the mail.

Do not hesitate to contact your tutor by telephone if you need help. Here are typical circumstances in which help is necessary.

Contact your tutor if:

- you do not understand any part of the study units or the assigned reading
- you have any difficulty with self-tests or practice exercises
- you have a question or problem with assignments, with your tutor's comments, or grading on an assignment.

Tutors have complete authority on two points. First, they are responsible for the grade you receive on assignments. If you disagree with a mark, discuss it with your tutor. Second, they alone decide if you may or may not rewrite an assignment. To assist you in this course, regular tutorials are organised with your assigned tutor.

Very interesting activities are designed for the tutorials. They also give you an opportunity to sort out any problem. You will be notified of their dates, times, and location, together with the name and phone number of your tutor, as soon as you are allocated a tutorial group. We strongly recommend that you attend these tutorials. They provide considerable assistance in your study and improve your chances of gaining high marks. They also let you meet other learners studying through the NOUN.

SUMMARY

AFM 321 Fisheries Management and Conservation is a subject that should interest anybody who is concerned with fisheries management and conservation which affect the quality of life. The course has been designed to help you understand the most complex problem of the developing nations which is that of modernising the rural areas. It requires both conceptual and analytical skills. You must analyse and apply concepts to understand Fisheries Management and Conservation.

Hopefully, you will find it fun, interesting and useful as an administrator or a policymaker interested in the development of your country. Good luck, and do enjoy the course!

**MAIN
COURSE**

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MODULE 1

Unit 1	Basic Concept of Fisheries Development
Unit 2	Basic Concept of Fisheries Management
Unit 3	Fisheries Exploitation (unexploited, underexploited, overexploited fisheries resources)
Unit 4	Fisheries Enhancement
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UNIT 1 BASIC CONCEPT OF FISHERIES DEVELOPMENT**CONTENTS**

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4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
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1.0 INTRODUCTION

This is the first unit in this course Fisheries Management and Conservation, and it is designed to enable you understand the concept of fisheries development. Fisheries development aims at achieving the full potential of the sector through growth and improvement. It involves the expansion of fishing effort, improvement in post-harvest technology, marketing and transportation of fishery products and the provision of infrastructure and other related facilities.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state the definition of fisheries development and goals of sustainable fisheries development
- identify issues in fisheries development and environmental changes that affect water and fisheries development in Nigeria
- explain the constraints to sustainable fisheries development in Nigeria and methods of achieving sustainable fisheries development.

3.0 MAIN CONTENT

3.1 Definition of Fisheries Development

Fishery development is a process towards achieving the full potential of the sector through growth and improvement. Fishery development is also defined to include the expansion of fishing effort, improvement in post-harvest technology, marketing and transportation of fishery products as well as the provision of infrastructure and other related facilities.

In fisheries, development may be defined as a process of change through which sustainable and equitable improvements are made to the quality of life for most or all members of the society (Bailey and Jentoft, 1990).

A fishery is being developed if:

- i. The biomass is being reduced by fishing, rebuilt after depletion or enhanced to increase its productivity.
- ii. The quality of the catch or its value improves, not necessarily increasing the harvest.
- iii. Under an ecosystem approach to fisheries, development may be achieved through the reduction of the negative environmental impact and/or increasing resilience of the system to unexpected change, meeting broader societal objectives.
- iv. Examples of fisheries development interventions include fish subsidy, fuel subsidy, motorisation, credit, marketing infrastructure, improved post-harvest technology, promotion of cooperatives

3.2 Goals of Sustainable Fisheries Development

The need for sustainability implies that improvements should be achieved without risk to the long term stability of the ecosystem. The

World Commission on Environment and Development, 1987 defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainable development is also defined as the management and conservation of the natural resource base and the orientation of technological and institutional change in a way and manner to ensure the attainment and continued satisfaction of human needs for present and future generations. Such development conserves land, water, plant and genetic resources, is environmentally non-degrading, technologically appropriate, economically viable and socially acceptable (FAO Committee on Fisheries, 1991).

The goals of sustainable fisheries development are:

- i. To improve the welfare of stakeholders directly or indirectly in the fisheries sector as well as the national productive system.
- ii. To establish a more sustainable and optimal use of the available fisheries resources (FAO, 2013).

3.3 Issues in Fisheries Development in Nigeria

Neiland *et al.*, (2002) identified four key issues in the management and sustainability of fisheries in Nigeria’s inland waters.

- a) environmental change
- b) exogenous factors
- c) fisheries management and
- d) fisheries policy and implementation.

3.4 Environmental Changes and Exogenous Factors that Affect Water and Fisheries Development in Nigeria

The environmental changes that have been found to affect both water and fisheries development in Nigeria over the years include:

- a) Droughts (e.g. in Lake Chad 1972/1974, early 80s).
- b) Changes in water quality due to pollution from oil exploration, exploitation and transporting activities, mineral extraction, agricultural and deforestation activities, changing urban and rural land uses.
- c) Dam construction across rivers, e.g. Kainji, Shiroro, Tiga, etc. The construction of dams has many controversial issues surrounding them such as flooding in some areas of a water body and drought or less water supply in others.

- d) Withdrawal of water for irrigation. There are several irrigation projects in Nigeria which have direct and indirect effects on ground and surface waters.

The exogenous factors that affect fisheries include:

1. Human population pressure
2. Deforestation
3. Poverty
4. Demand for food.

3.5 Constraints to Sustainable Fisheries Development in Nigeria

1. There is inadequate knowledge of the fisheries resources and ecosystem based on low and weak scientific data to update laws, other relevant information and policies.
2. There are little or no interactions between the government and stakeholders. This leads to low stakeholder input in policy making and top-bottom approach is often used.
3. Low financial capability to meet specific needs. Minimal resources are invested in both fisheries management and development activities.
4. Low capacity to police coastal zone to enforce existing laws. There is lack of strong political will to enforce existing laws.
5. Many agricultural policies are not specific and may not include programmes or projects for accomplishing set goals.
6. There are often inconsistencies in policies and programmes of governments.
7. Inadequate technical and extension services
8. Lack of monitoring and evaluation of programmes or projects
9. Inadequate supply of inputs to the artisanal fishermen
10. Changing nature of seasonal streams, rivers, pools and poor management of water bodies lead to low productivity.

3.6 Methods of Achieving Sustainable Fisheries Development

Sustainable fisheries development can be achieved through responsible fishing. This involves rational fisheries management objectives that address issues like the status of the resource, the health of the environment, post-harvest technology, trade and other economic concerns, social benefits, legal and administrative support. Caddy and Griffiths (1995) proposed the following to achieve responsible fisheries:

- a) Regulation of fishing efforts by avoiding financial incentives that contributes to excess fishing capacity.
- b) Establishment of code of conduct for responsible fishing to guide management plan
- c) Establishment and support of regional/international fishery commissions and organisations to manage shared resources.
- d) Regular consultation among harvesting countries
- e) Set agreed management objectives and related reference points, incorporating a precautionary approach
- f) Develop contingency plans
- g) Develop mechanisms for resolving user conflicts
- h) Protect biodiversity and environment
- i) Promote research
- j) Optimise social and economic stability

4.0 CONCLUSION

Fisheries development is necessary but resources have to be used sustainably and responsibly. Rational fisheries management objectives should address issues like the status of the resource, the health of the environment, post-harvest technology, trade and economic concerns, social benefits, legal and administrative support.

5.0 SUMMARY

In this unit, we defined fisheries development and mentioned the goals of sustainable fisheries development. We also discussed the issues in fisheries development, environmental changes affecting water and fisheries development and methods of achieving sustainable fisheries development in Nigeria

6.0 TUTOR-MARKED ASSIGNMENT

1. Define fisheries development and state the goals of sustainable fisheries development.
2. Explain the issues involved in fisheries development and environmental changes that affect water and fisheries development in Nigeria.
3. Discuss the constraints to sustainable fisheries development in Nigeria and methods of achieving sustainable fisheries development.

7.0 REFERENCES/FURTHER READING

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UNIT 2 BASIC CONCEPT OF FISHERIES MANAGEMENT

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 - 3.2 Approaches to Fisheries Management
 - 3.3 Fisheries Management Plan
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- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Fisheries management is a process which entails information gathering, analysis, planning, consultation, decision-making, allocation of resources, formulation and implementation and enforcement of regulations covering fisheries activities to ensure continued productivity and the accomplish fisheries objectives. In this unit, we consider the concept of fisheries management, and define terms related to fisheries management such as fisheries management plan, fisheries management strategy and fisheries management measures.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state the definition and approaches to fisheries management
- explain the terms fisheries management plan, fisheries management strategy, fisheries management measure and fisheries management systems, fisheries resources, fisheries management unit, fisheries management body and fisheries management tools.

3.0 MAIN CONTENT

3.1 Definition

Fisheries management is “The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources, formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and the accomplishment of other fisheries objectives” (FAO,1995; Cochrane, 2002). It is also the pursuit of certain objectives through direct control such as minimum mesh size to regulate size of fish at capture, increase the productivity of the resource; or a system of licenses to control entry and maximise economic returns from the fishery. Indirect control involves creating an enabling environment by fisheries authorities for fishermen to control the resource, providing opportunities and incentives for communal control of the resource, e.g. community property rights for effective fishing effort or some of its components. The main goal of fisheries management is to achieve long-term sustainable use of the fisheries resources.

Fisheries management entails a set of tasks aimed at ensuring that optimal benefits are obtained for users. Fisheries management draws on fisheries research, analysis and institutional processes of advice. According to FAO (1997), fisheries management can include:

1. Setting policies and objectives for each fishery or stock to be managed; taking into account the biological characteristics of the stock; the nature of existing or potential fisheries and other activities related to or impacting the stock; and the potential economic and social contribution of the fishery to national or local needs.
2. Determining and implementing the actions necessary to allow managers, fishers and other stakeholders to work towards set objectives. The actions required include: developing and implementing management plans for managed stocks; ensuring that stocks and the ecosystem are maintained in a productive state; collecting and analysing biological and fishery data necessary for assessment, monitoring, control and surveillance; adoption and promulgation of laws and regulations needed to achieve set objectives.
3. Consulting and negotiating with resource users and those in related activities or activities that impact fisheries such as groups engaged in riverine, lake, or coastal zone. The interests of fisheries should be considered and catered for in planning and integration of activities.

4. Working with users to regularly review the management objectives and measures to be sure they are still appropriate and effective
5. Reporting to governments, users and the public on the state of resources and management performance.

3.2 Approaches to Fisheries Management

There are several approaches to fisheries management. These include:

- a) Fishing quotas, total allowable catch
- b) Limits on number of fishing days and
- c) Restrictions on number of fishing vessels.

These methods cannot be properly monitored. Other methods used in fisheries management include:

- i. Rights-based management of fisheries. This allows fishermen the right to determine the quantity of fish harvest over a long time by methods such as individual transferable quotas (ITQs) which can be traded.
- ii. Landing fees paid by fishermen to a designated authority based on the amount of fish caught. This removes the incentive for overfishing
- iii. Capping licenses allocated to fishing vessels, limiting engine power or vessel size.
- iv. Limited duration of fishing – Fishermen using available technology can still catch a lot of fish in short periods.
- v. Ban on destructive fishing methods - explosives, poisons, etc.
- vi. Allocation of fishing rights to individuals or groups. Catch and effort are determined by the individual or group reducing the cost of monitoring.
- vii. Protected Areas are demarcated areas of water where all economic activities including fishing are not allowed in order for fish stock to recover.
- viii. Influencing consumers' judgment through the work of agencies like the marine stewardship council and Friends of the Sea which certify products based on some agreed criteria (Schröder, T. World Ocean Review, 2013).

3.3 Fisheries Management Plan

This is a formal or informal arrangement between a fisheries management authority and interested parties or stakeholders. It identifies the partners in the fishery, their roles, agreed objectives for the fishery and specifies the management rules and regulations which apply to it

and gives details about the fishery to the management authority (FAO, 1997).

3.4 Fisheries Management Strategy

Fisheries management strategy refers to the sum of all the management measures selected to achieve the biological, ecological, economic and social objectives of the fishery. Fisheries management requires an investment of time and resources to gather the needed information develop and agree on a management regime, to enforce regulations, and monitor the fishery. An economically sound fishery should make acceptable returns on investments after accounting for the costs of management.

The management of fisheries to achieve specific goals and objectives requires the development and application of set rules to govern the conduct of fishers and the gear they use, those not permitted in the fishery, and those without rights of access to certain parts of the fishery. Fisheries practices should target conflict reduction among fisheries resources users and non-fisheries users of resources.

3.5 Fisheries Management Measure

Fisheries management measure consists of any type of control implemented to contribute to achieving the objectives of the fishery. Management measures are classified as technical measures, input (effort) and output (catch) controls, and any access rights designed around input and output controls.

Technical measures can be sub-divided into regulations on gear-type or gear design, closed areas and closed seasons, minimum legal mesh size, a seasonal closure of the fishery, a total allowable catch (TAC), a limit on the total number of vessels in a fishery, and a licensing scheme to achieve the limit are all examples of management measures.

3.6 Fisheries Management Systems

- a) Traditional management system refers to fisheries being managed by traditional government administration through village heads, district heads or religious leaders.
- b) Modern management system involves administration by governments at local, state and federal levels.
- c) Mixed systems involve both governments and traditional institutions working together either intentionally or inadvertently to manage fisheries. The mixed system is dominant though the

traditional management system is common in Nigeria and is effective in regulating fishing activities.

- d) Fisheries co-management involves institutional arrangements made that facilitate the exchange of information and joint decision-making by state and resource users.

3.7 Fisheries Resources, Fisheries Management Unit, Fisheries Management Body and Fisheries Management Tools

Fisheries management unit refers to the physical areas being managed while the management body refers to the body managing the management unit. Fisheries management tools include all the instruments to regulate the harvest of a fisheries resource. Several management tools can be used in various areas such as taxes, permits, gear restriction, minimum sizes of catches, closed periods.

4.0 CONCLUSION

Fisheries management is important to retain the sustainability of the fisheries resources. Information gathered, analysed and interpreted can be used to make informed decisions about the state of the fisheries and environment. This is used to plan and strategise on management measures to adopt.

5.0 SUMMARY

In this unit, we defined fisheries management, stated the approaches to fisheries management. We also discussed fisheries management plan, fisheries management strategy, fisheries management measure, fisheries management systems, fisheries resources, fisheries management unit, fisheries management body and fisheries management tools.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define and state the approaches to fisheries management.
2. Explain in details the following terms: fisheries management plan, fisheries management strategy, fisheries management measure and fisheries management systems, fisheries resources, fisheries management unit, fisheries management body and fisheries management tools.

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UNIT 3 FISHERIES EXPLOITATION (UNEXPLOITED, UNDEREXPLOITED, OVEREXPLOITED FISHERIES RESOURCES)

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1.0 INTRODUCTION

Several stages occur during fisheries exploitation such as under-exploitation, overexploitation. Several fisheries are overexploited. In this unit, we would define these terms, state the different forms of overfishing, effects of overexploitation, principles of resource exploitation (Sutherland, 2001), measures needed to exploit conservatively and methods for assessing exploitation level.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state definitions of different types of fisheries exploitation
- mention forms of overfishing
- state the effects of overexploitation
- list the principles of resource exploitation (Sutherland, 2001)
- discuss measures needed to exploit conservatively
- explain the methods for assessing exploitation level
- define and explain approaches to fisheries management.

3.0 MAIN CONTENT

3.1 Definitions

Under intense exploitation, most fisheries experience the following sequence: undeveloped, developing, fully exploited, over exploited, collapsed and with appropriate management measures, rebuilding.

Underexploited fisheries refer to underdeveloped or new fisheries. This is believed to have a significant potential for expansion in production. Moderately exploited fisheries are those that are exploited with a low level of fishing. They have some limited potential for expansion in total production.

Fully exploited fisheries: The fishery is operating at or close to an optimal yield level with no expected room for further expansion.

Overexploited fisheries: Fisheries are exploited at or above a sustainable level in the long term with no room for further expansion and at a risk of collapse or stock depletion. Over exploitation or overfishing is the removal of aquatic living resources to levels that cannot sustain viable populations. Overexploitation can lead to resource depletion, threaten or endanger species of fish or wildlife. Over exploitation affects fisheries directly and indirectly. Direct effects are associated with target and by catch species.

3.2 Forms of Overfishing

According to the Community-Based Coastal Resource Management Centre (2003), there are different forms of overfishing which include:

Economic overfishing - Increasing fishing intensity does not translate to more catch or profit. There is a maximum level at which the environment can produce. When the limits of production are reached, the catches begin to reduce. Increasing fishing intensity leads to dwindling catches. If the fishing intensity is increasing, fishing cost such as labour, materials, capital and fuel increases. If the catch is greater than the cost, there is a profit or resource rent (Total catch – Total costs) Recruitment overfishing occurs when fishing is so intense that the parent stock are reduced in numbers and can no longer produce a normal stock in the next year. This is called recruitment overfishing. This can be prevented by the provision of sanctuaries for such fish. This affects the ability of the species to replenish the population. Gears can physically disturb the habitats and sediments, catch both target and non-target species.

Growth overfishing occurs when fish are caught at an uneconomic size; for instance when a lot of small-sized fish are caught in the absence of large fish. This form of overfishing occurs at the species level.

Ecosystem overfishing occurs when several species are overfished. It is difficult to understand when an ecosystem overfishing occurs because when one species is over fished, another one will take over but eventually, the ones that take over may also become consumed. There are three ways an ecosystem can be overfished:

- a. Destruction of the primary producers such as the mangroves, coral reefs, sea grass beds
- b. Decrease in secondary producers
- c. Decrease in primary producers and decrease in biomass of the fisheries

Malthusian overfishing: Limited resources cannot support increasing populations. This implies that fish is being harvested beyond the maximum sustainable yield.

3.3 Effects of Over-Exploitation

Indirect effects of over fishing or over exploitation include ghost fishing where a fishing gear left or lost at sea continues to fish or restrict movement of fish causing starvation, laceration, suffocation and infection. Indirect effects also cause atrophic cascading effects in which top level predators are removed affecting the whole ecosystem.

Overfishing has decreased catches for many fisheries, negatively impacted ecosystem health and the sustainability of stocks. Human food supplies are reduced due to reduction in catches. Overexploited fisheries may be unable to meet the demand for fish oils.

Depleted fisheries have stocks with catches well below historical levels, irrespective of the amount of fishing effort being exerted.

Recovering fisheries are those with increasing catches after being depleted. They are yielding less than their maximum potential owing to excessive fishing pressure in the past. According to FAO (2008), 2%, 52%, 19%, 8% and 1% of the fish stock were underexploited, fully exploited, overexploited, depleted and recovering respectively.

3.4 Principles of Resource Exploitation (Sutherland, 2001)

- i. Population increase can be exploited and population should be exploited at the rate they increase (Caughley & Gunn 1995).

- ii. Density dependence is essential. If due to density dependence, reduction in population causes increase in breeding output or survival, then the resulting increase may be exploited. Density dependence is central to sustainable exploitation (Ricker 1954, Schaefer 1954).
- iii. Quantifying density dependence is difficult to measure because of sampling errors (Shenk *et al*, 1998).
- iv. Sustainable exploitation involves reducing population size and depends on a growing population which can be achieved by reducing populations to take advantage of the density dependent increase in survival or breeding output. Exploited populations must be lower, even when exploited sustainably.
- v. Sustainability has many conflicting definitions depending on the objectives.
- vi. It is better to monitor the population than the harvest: It is easier to measure changes in numbers of individuals exploited but determining changes in population sizes is better for adjusting the exploitation level (Lande *et al*, 1997). It is the population size that really matters.
- vii. Quotas are unstable. Populations fluctuate, estimates of a sustainable quota maybe faulty or the quota exceeded. When the population declines, the quota becomes an increasing proportion of those remaining which can drive the population further downward. Monitoring can prevent overexploitation. There is a natural variation in the population size. It is difficult to reduce agreed quotas.
- viii. Increasing effort is simple, reducing it is painful. Over exploitation of populations continues even when reducing effort should produce greater long-term yield (Ludwig *et al*, 1993).

3.5 Measures Needed to Exploit Conservatively

- i. It is better to restrict effort rather than quotas.
- ii. Only exploit populations when they exceed a threshold size (Lande *et al*, 1997).
- iii. Adopt rotational management in which areas are exploited for a period and then left (Myers *et al*, 2000).
- iv. Exclusion zones in which fishing is not allowed (McCullough, 1996).
- v. Protection of gravid and juvenile individuals.
- vi. Protection of water from pollution
- vii. Inclusion of fisheries impact assessments in environmental impact assessment for activities which impact fishery or other aquatic resources.

3.6 Methods for Assessing Exploitation Level

a) Surplus production method

This method determines how catch varies with effort. Data required are numbers or biomass exploited per year and effort. This method has been used mainly for fisheries.

b) Yield per recruit method

This method considers recruitment in determining long term sustainable strategy. It is used mainly for fisheries and forestry.

c) Robinson and Bedford model

This method entails calculation of maximum growth and yield if population is 0.6 of expected population size. The data required average at first reproduction, annual birth rate, age at last reproduction. This method is used when nothing is known about a species. It has been used mainly for Tropical forest mammals and birds.

d) Linking yield to recruitment and mortality

Data required for this method are recruitment and mortality rates. No data are needed for trends or effort. It does not apply to populations in equilibrium only to populations at sustainable population sizes. The method is used occasionally for mammals

e) Adjusting to population changes

This method loosens and tightens regulations to adjust to population changes. It demands very little data on population. It emphasises population sizes but may be difficult to respond to environmental changes.

f) Comparing demography across sites

This method relates exploitation intensity to density or population change. The data required are exploitation level and population density (or population change at a range of sites). The method focuses on populations and can be carried out in the short term without detailed ecological studies. It is necessary to know whether results are affected by other interactions, e.g. environmental factors

g) **Reducing to a fixed fraction of exploited population size**

This method maintains population at a proportion of (e.g. 60%) of unexploited population. Data required are likely unexploited population size, current population size and the method can be used with very little data. This method is useful for data-deficient populations. However, the method requires estimates of unexploited population and is difficult to use for variable populations.

h) **Full population model**

Creates full model of major components of the population and examines consequences of different harvest levels. It requires full data on strength of all density-dependent processes. It is about the best method and can be used to examine the consequences of other changes.

i) **Adaptive Management**

This method uses models to determine where doubts occur and the consequences of these doubts. Experiments are undertaken to reduce uncertainty. It involves continually improving knowledge and management. Data from experiments are used. The main strength is that it continually improves knowledge.

4.0 SUMMARY

In this unit, we looked at definitions, forms of overfishing, effects of overexploitation, principles of resource exploitation, measures needed to exploit resources conservatively and methods for assessing exploitation level.

5.0 CONCLUSION

Most fisheries all over the world are fully exploited or depleted. Overfishing has many effects therefore measures are required to assess exploitation levels and use resources conservatively.

6.0 TUTOR-MARKED ASSIGNMENT

1. Give the definitions of different types of fisheries exploitation.
2. Mention forms of overfishing.
3. Explain effects of overexploitation.
4. State principles of resource exploitation (Sutherland, 2001).
5. Explain measures needed to exploit conservatively.
6. Explain the methods for assessing exploitation level.

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UNIT 4 FISHERIES ENHANCEMENT

CONTENTS

- 1.0 Introduction
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1.0 INTRODUCTION

Fisheries enhancement involves activities targeting the supplementation or sustaining the recruitment of one or more aquatic organisms and raising the total production of selected elements of a fishery beyond a level which is sustainable by natural processes. We mentioned five forms of fisheries enhancement in this unit. Traditional fisheries enhancement involves two main systems mainly habitat modification and retention systems. There are constraints which sometimes lead to failures of fisheries enhancement schemes

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- discuss fisheries enhancement
- list forms of fisheries enhancement
- explain the constraints of traditional fisheries enhancement
- state reasons for the failure of fisheries enhancement schemes in Africa.

3.0 MAIN CONTENT

3.1 Definition of Fisheries Enhancement

Fisheries enhancement refers to production systems beyond extractive, unmanaged open access and/or managed capture fisheries. The Food and Agriculture Organisation of the United Nations defines 'enhanced

fisheries’ as “activities aimed at supplementing or sustaining the recruitment of one or more aquatic organisms and raising the total production or the production of selected elements of a fishery beyond a level which is sustainable by natural processes”.

3.2 Forms of Fisheries Enhancement

Forms of fisheries enhancement include (Welcomme and Bartley, 1998):

- i. Introduction of new species to exploit underutilised parts of the food chain or habitat.
- ii. Stocking of water bodies to improve recruitment.
- iii. Fertilisation of the water to increase productivity.
- iv. Engineering the environment to improve fish reproduction, migration, provide shelter and food resources.
- v. Elimination of predators and other unwanted species.

3.3 Traditional Fisheries Enhancement

Traditional fisheries enhancement systems or measures have the following characteristics in common:

1. A degree of management and intervention beyond traditional capture fisheries
2. Property rights which are defined more narrowly than in capture fisheries.

Areas of intervention in traditional fisheries enhancement include movement of fish stocks, extent of water retention, water quality (fertility) and/or availability of fish feed. Enhancement techniques may be associated with and/or combined with methods like the attraction or confinement of fish. Fisheries enhancement systems depend on the same resources as capture fisheries. They involve smaller water bodies which can be guarded and harvested more easily than larger rivers and lakes. Unlike in capture fisheries, exclusive use rights over the enhanced fisheries resources and enhancement facilities are usually necessary.

Fisheries enhancement systems or measures are usually in competition with other forms of resource use such as capture fisheries. Traditional fisheries enhancement systems are based on local knowledge and subject to traditional rules and regulations applicable to resource utilisation.

The traditional fisheries enhancement systems may be based on:

1. Habitat modification or fish shelter systems

By introducing structures which attract fish e.g. fish aggregating devices (FADs) in capture fisheries; provide periodic shelter which improves stock recruitment, survival rates of juvenile fish and/or natural food supply. These systems are referred to as shelter fisheries systems. Many fish species associate themselves with floating or drifting objects which provide shelter and protection against predators. Fish aggregating systems exploit this behaviour to attract fish and increase catches. These systems also improve fish habitats or provide additional feed thereby enhancing the resource. An example of this system is the brush park.

Brush parks are submerged structures made up of wooden materials - brushes and branches which are usually fixed to the bottom of a shallow water body. Brush parks are located in brackish water lagoons, but are also found in freshwater lakes and rivers. They cover water areas ranging from few square metres to several hectares. They are labour-intensive to construct and operate. They:

- i. Offer some fish species a protected environment for breeding, spawning and feeding
- ii. Provide additional fish food in form of aquatic organisms attached to underwater substrates and associated fauna which colonise the structures
- iii. Attract fish.

2. Retention systems

The fish retention system is the traditional enhancement technique closest to aquaculture. They involve the retention of water by physical structures such as weirs, flood depressions and ponds; water management and some control over fish stocks. Fish can either be stocked or naturally present in the retained water and their production is aided by feeding and/or fertilisation.

- i. Permanent or semi-permanent barriers

Barriers and dams are made of reeds, grass, mud or more solid materials across mall channels or used to raise natural embankments to control the inflow and outflow of water and retain fish. Traps, baskets or nets are used for fishing while the water is still in place, or by breaching the dam and releasing the water through nets or traps and collecting the remaining fish when the bottom becomes dry.

ii. Fences and traps

A combination of fences and traps built from bamboo or palm fronds can be used to exploit fish migration patterns. Fences and traps are closer to fish-catching devices than to enhancement systems, when they do not involve additional management measures.

iii. Drain-in ponds

In floodplains and other seasonally inundated areas, naturally occurring depressions are deepened or ponds are dug to prolong the retention of water and lengthen the fish-harvesting season. These structures are known as drain-in ponds or fish holes. Fish enter these ponds during the floods and are trapped as the waters recede. Drain-in ponds exploit the annual cycle of flooding and drying. During the wet season, the rivers overflow their banks and flood waters extend across the plains acquiring nutrients from terrestrial sources. Fish are able to move freely in flooded areas taking advantage of increase in primary productivity and a seasonal increase in fish biomass. Drain-in ponds become congested with vegetation during the dry season and may become anoxic during high water temperatures. Management includes feeding of retained fish mainly with agricultural wastes and by-products or fertilising the pond water. Retention ponds can also be stocked with juvenile fish sourced from open waters.

3.4 Constraints of Traditional Fisheries Enhancements

Constraints on fish sheltering and retention systems include:

- i. High financial and labour investments for the construction and maintenance of large fish sheltering systems such as brush parks.
- ii. Market constraints arising from the harvesting of larger sheltering systems which leads to bulk supplies resulting in low market prices and low returns on investment.
- iii. Environmental problems from large-scale construction and deforestation may require wood purchase from long distances which may cause conflicts with local communities.
- iv. Resource use conflicts as fish retention systems require established user rights over a long period. Conflicts occur where suitable sites for water retention are limited and other users are excluded from the benefits of fish retention and resource use.
- v. The productivity of traditional retention systems suffers due to poor water management. Fish production in confined water bodies is reduced by low levels of oxygen, high concentrations of wastes and low water exchange.

3.5 Reasons for Failures of Fisheries Enhancement Projects in Africa

- a. Low returns on investment leads to loss of interest in fish farming and enhancement schemes.
- b. Fish farming is labour-intensive and may divert attention from other farming activities. Many aquaculture projects are not planned in collaboration with target groups and experts.
- c. Production inputs such as agricultural land and water always have opportunity costs. The availability and regular supply of fingerlings is also a constraint to long-term sustainability of fish farming. Feed and fertilisers for fish farming also have other uses.
- d. The specific skills and knowledge required for aquaculture are not part of traditional African knowledge systems.
- e. Comprehensive interventions in the rearing process of aquatic organisms and their environment have no tradition in Africa.
- f. African traditional institutions do not provide a context conducive to modern fisheries enhancement and aquaculture because:
 - i. Modern fisheries enhancement and aquaculture require large investments and are viable only if the benefits can be realised by those bearing the costs.
 - ii. Traditional land and water use rights are not always secure enough to justify investments in facilities.
 - iii. Modern fisheries enhancement as culture-based fisheries in open waters is feasible only if exclusive use rights are granted to investors which often contravene the traditional use and access rights.

4.0 CONCLUSION

Traditional fisheries enhancements explore methods of increasing fish yield. These include systems such as the brush parks and retention systems in which fish may be fed or the water fertilised. However, large investments may be required which may not produce adequate returns as the system may continue to allow open access.

5.0 SUMMARY

In this unit, we defined fisheries enhancement and discussed different forms of fisheries enhancement, constraints and reasons for the failure of traditional fisheries enhancement schemes.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define fisheries enhancement.
2. Mention forms of fisheries enhancement.
3. Explain the constraints of traditional fisheries enhancement.
4. Give the reasons for the failure of fisheries enhancement schemes in Africa.

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UNIT 5 BASIC AND PRACTICAL OBJECTIVES OF FISH MANAGEMENT AND CONSERVATION IN NIGERIA

CONTENTS

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1.0 INTRODUCTION

Several authors and groups have defined the term conservation in different ways. Three of such definitions are given in this unit. We also discussed various issues related to conservation such as conservation legislation and the constraints of implementing Agenda 21 in Nigeria.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- list the principles and objectives of conservation
- state the causes of declining fish stocks and conservation methods for fisheries
- discuss the biodiversity most affected by human impacts and conservation legislation
- describe the Government's effort to conserve biodiversity and the regulatory mechanisms to promote sustainable consumption of resources including fisheries

- explain the constraints to implementing Agenda 21 in Nigeria and major issues in conservation of fisheries.

3.0 MAIN CONTENT

3.1 Definitions of Conservation

There are many definitions of conservation given over the years by individuals or groups (Olver, *et al.* 1995). A few of them are given here:

“The use of the natural resources for the greatest good of the greatest number of people for the longest time” (Pincot, 1947).

“Management of human use of the biosphere so that it may yield sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of the future generations” (International Union for the Conservation of Nature and Natural Resources, 1980).

“Management of human use of organisms or ecosystems to ensure such use is sustainable. Besides sustainable use, conservation includes protection, maintenance, rehabilitation, restoration and enhancement of populations and ecosystems” (World Conservation Union, United Nations Environmental programme and Worldwide Fund for Nature, 1991).

3.2 Principles of Conservation

The primary goal of fisheries management is to ensure the perpetuation of self-sustaining stocks of indigenous aquatic species and where possible to allow their sustainable use. Aquatic ecosystems should be managed to ensure long term sustainability of native fish stocks. The key to conservation is sustainability of naturally producing wild stocks of native fish. Stocks are the repository of genetic diversity within each species and are the building blocks of on which fisheries management is based. The sustainability of fish stocks requires maintenance of its supporting native community. The sustainability of a fish stock requires the protection of the specific physical and chemical habitats utilised by the individual members of the stock population (Olver, 1995).

3.3 Objectives of Conservation

Several reasons have been given for the conservation of wild species of plants and animals. Conservation is important for economic, medical, scientific, ecological, aesthetic and recreational values of species.

- a) Economic and medical importance of wild species - food crops and animals are sourced from the wild. Existing wild stocks are needed for producing improved strains. Medicines from plant and animal sources, e.g. plant extracts derived for drugs e.g. antibiotics from microorganisms such as penicillin and tetracycline.
- b) Wild species provide ecological services and are key factors in sustaining the earth's biodiversity and ecological integrity. They supply food, recycle nutrients, generate and maintain soils, produce oxygen and other gases, absorb pollutants, moderate the earth's climate, regulate local climates and water supplies, reduce erosion and flooding, store solar energy, detoxify poisonous substances, breakdown organic wastes, control potential pests and disease carriers, make up the gene pool for future generations.
- c) Aesthetic and recreational importance - They serve as sources of beauty and recreation.
- d) Ethical importance - Species have rights to exist and each species has its intrinsic value unrelated to its usefulness to man.

3.4 Causes of Declining Fish Stocks

- i. Overfishing/overharvesting - The rate of fishing is greater than the ability of the stock to replenish or replace itself.
- ii. Habitat loss/destruction e.g. deforestation, sand filling of wetlands - swamps, mangrove forests for construction purposes and destruction of coral reefs by dynamite fishing.
- iii. Habitat fragmentation is a form of habitat destruction involving the removal or modification of the original habitat leaving only patches. It causes degeneration of biodiversity, disruption of life cycles, and isolation of some animals in islands of habitats.
- iv. Introduction of species create major problems such as predation; uncontrolled breeding because of lack of natural checks and balances, disruption of food chains, competition for space, nutrition, mineral resources and changes in ecosystems.
- v. Pollution (oil, industrial, etc.) of coastal areas and wetlands lowers habitat quality. Excessive release of chemicals over extended periods will poison habitats and spread out into food chains; cause loss of the aesthetic values of beaches due to unsightly oil slicks; damage to marine life, ecosystem changes due to species mortality and changes in food chains; decrease in fishery resources.
- vi. Trawling for fish disturbs the benthos.
- vii. Human population pressure.
- viii. Poor agricultural practices, e.g. destruction of watersheds, clearing of river banks and other critical areas cause silting of

river beds and loss of water courses; excessive use of agro-chemicals cause problems of chemical persistence in the soil.

3.5 Biodiversity most Affected by Human Impacts

Human impacts on the environment such as habitat loss and pollution do not threaten all groups of biodiversity equally. The most affected groups are the species with small population sizes, species with slow rates of population growth. Groups most susceptible to extinctions include:

- i. Species at higher trophic levels such as large, rare animals with slow rates of population growth. They are very susceptible to over exploitation and habitat loss.
- ii. Local endemics which are species with restricted ranges and often threatened by habitat loss. Water development, pollution or habitat alteration can easily drive these species to extinction.
- iii. Species with small populations, e.g. many species at higher trophic levels have low populations. Habitat restrictions or fragmentation may reduce their populations to very low levels. Populations of species at very low trophic levels may also be very low in a habitat or region.
- iv. Large species have high metabolic demands, require large habitats and occur in low densities. The largest species within a group or of species sharing similar food sources (a guild) tend to be at high risk of extinction.
- v. Species with poor dispersal and colonisation abilities: Groups with narrow habitat requirements and species that cannot disperse easily to new habitats are at high risk of extinction.
- vi. Species with colonial nesting habitats are very susceptible to over exploitation or loss of breeding habitat.
- vii. Migratory species depend on suitable habitat along the migratory routes and in different seasons. Adverse habitat effects on migrant populations are very high and species with specialised feeding habits will fluctuate greatly.
- viii. Species with little evolutionary experience of human disturbance are more affected by human-induced perturbations

3.6 Conservation Methods for Fisheries

- i. Cultural practices: These include societal beliefs, norms, values, and ethics. These provide checks and balances, e.g. attachment of some water bodies and their aquatic resources to certain deities and other superstitious beliefs, taboos and fines to offenders both in cash and kind
- ii. Legislation: Some legislation, e.g. Sea Fisheries Decrees (1971, 1972, 1992), Inland Fisheries Act (Decree 108, 1992) ban the use

- of poisons, pesticides, explosives, some types of nets and fishing gear such as fish fences.
- iii. Conservation and consumer education using face-to-face interactions, radio/television messages and advertisements. These create awareness on the needs to conserve fisheries. Consumers should be educated to reject the consumption of fry, fingerling and juveniles
 - iv. Monitoring, control and surveillance: It is difficult to enforce laws, inland waters are not as well policed as coastal areas.
 - v. Stock assessment: For proper conservation measures to be carried out there is a need for stock assessment to know the available fish stocks.
 - vi. Aquaculture could be encouraged to reduce the pressure on wild stock or capture fisheries.
 - vii. Restocking operations (and other enhancement methods) can be explored to revive overfished stocks. Provision of correct fishing inputs to discourage the use of faulty fishing gear (Adeleye, 1993).

3.7 Conservation Legislation

International conventions on conservation with agreements ratified by Nigeria:

- a) The United Nation Convention on the Law of the Sea (ratified in 1986).
- b) African Convention on the Conservation of Nature and Natural Resources, (Algiers), 1968.
- c) International Convention for the Prevention of Pollution of the Sea by Oil, 1954-62.
- d) Convention on Fishing and Conservation of the Living Resources of the High Seas, 1985.
- e) Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matters, 1972.
- f) United Nations Convention on the Law of the Sea, 1982.
- g) The RAMSAR Convention on the Conservation of Wetlands of International Importance, especially as Waterfowl Habitat, 1971.
- h) The Convention Concerning the Protection of the World Culture and Natural Heritage, 1972.
- i) Convention on International Trade in Endangered Species of Fauna and Flora, (CITES) 1973.
- j) Convention on the Conservation of Migratory Species of Wild Animals, 1973.
- k) Framework Convention on Climate Change, 1992.

3.8 Government's Effort to Conserve Biodiversity

Efforts to conserve and sustainably use Nigeria's coastal water and adjacent land include:

- i. Government's Action Plan on water pollution control and biological diversity conservation in the Niger Delta area.
- ii. Collaborative efforts in West African sub-region under the Gulf of Guinea Large Marine Ecosystem (GOGLME) Project for monitoring coastal water for pollution and biological diversity conservation. The activities carried out in this effort include:
- iii. Reconnaissance survey of coastal areas in Lagos and Port Harcourt.
- iv. Workshops and seminars to train officers of participating agencies.
- v. Creating awareness among communities and non-governmental organisations through environmental enlightenment campaigns.
- vi. Studies on pollution and natural resources conservation by universities in the country in plankton survey, mangrove study, coastal pollution, industrial pollution.
- vii. Standards and legislation.
- viii. Measurements of meteorological parameters over the Atlantic Ocean bordering the country by relevant agencies.
- ix. National Water Resources Master Plan (1995-2020) was designed to take care of water resources assessment, promulgation of enabling decree, rehabilitation of dams and soil erosion sites, establishment of water quality laboratories, development of a national water supply policy, Production of the national rural water supply, Sanitation Sector Strategy and Action Plan, and strengthening of national water quality monitoring networks. (First Biodiversity Report of Nigeria, 2001).

3.9 The Regulatory Mechanisms to Promote Sustainable Consumption of Resources (including Fisheries) in Nigeria

Several regulatory mechanisms are available in Nigeria aimed at promoting the sustainable use of available resources which include fisheries. These are:

- i. The Nigerian Constitution, 1999
- ii. Sea Fisheries Decree 1971, as amended in 1992
- iii. River Basin Development Authority Act, Cap 396 LFN 1990
- iv. Lake Chad Basin Development Authority Act 1985 and 1987
- v. Land Use Act Cap 202 LFN 1990
- vi. Exclusive Economic Zone Act, Cap 166 LFN 1990

- vii. Environmental Impact Assessment (EIA) Decree 86,1992
- viii. Federal Environmental Protection Agency Decree No58 of 1988 as amended by Decree 59 of 1992
- ix. Harmful Wastes (Special Criminal Provisions) Act Cap 165 LFN 1990
- x. Inland Fisheries Decree No 108 of 1992
- xi. The National Agricultural Research Project (NARP)
- xii. Nigerian Biodiversity Strategy and Action Plan (NBSAP) (Policy and Legal Advocacy Centre, 2012).

3.10 Agenda 21 and Constraints to its Implementation in Nigeria

Agenda 21 was established by the United Nations from the Earth's summit (UNCED) in Rio de Janeiro, 1992 as a non-binding voluntarily implemented action plan with regard to sustainable development. It is an action agenda for the United Nations, other multilateral organisations and governments around the world that can be executed at local, national and global levels. The constraints to its implementation in Nigeria include:

- i. Resistance to change, e.g. consumption patterns and values.
- ii. Lack of involvement of the public in environment related issues and development, e.g. in project design and implementation.
- iii. Frequent changes in government, government policies, programmes; duplication of roles, policies and laws.
- iv. Weak database, e.g. inadequate data for policy formulation and poor inventory of natural resources.
- v. Lack of institutional capacity, inadequate co-ordination and communication among agencies of Government working on similar projects or programmes.
- vi. Poor enforcement of laws, standards and regulations because of inadequate policing, overlap of functions of agencies, poor monitoring and enforcement mechanisms. Very low fines for offenders.
- vii. High cost of funding Agenda 21 which will require assistance from international agencies.
- viii. Inadequate trained manpower, awareness of environmental and natural resources concerns and management.
- ix. Inadequate technology (Federal Government of Nigeria, 1997, 1999; UNCSD, 1997).

3.11 Major Issues in Conservation of Fisheries

According to Shepherd (1993), there are several key issues in the conservation of fisheries such as:

- i. Management and conservation of fish stocks are necessary because economic forces do not usually lead to satisfactorily stable stocks. Fishing increases death rate of fish, reduces the size of stock and lowers the catch per unit effort and the profitability. An unregulated fishery will give poor profitability and stocks fall below the maximum sustainable yield. There is also the risk of poor recruitment due to the small number of spawning stock.
- ii. Conservation measures are needed permanently not only while the stocks are in poor shape. Conservation measures are designed to reduce the death of fish due to fishing. If discontinued when the fishery recovers, fishing would increase again depressing the population again.
- iii. Technical conservation measures, e.g. mesh size regulation are not usually enough but should be used with direct conservation measures e.g. limits on catches and or fishing effort.
- iv. Closure of fisheries during spawning is not very effective as a conservation measure. To be effective, it is necessary to ensure that catches in the rest of the year in the other areas do not increase to make up for the loss of catches in the closed areas. The total allowable catches and national quotas should be reduced. Harvesting juvenile fish is more damaging than spawning fish as more fish would be required to make up for the weight of catch.
- v. Properly calculated total allowable catches (TACs) and quotas do not necessarily allow the fishing all year, restrictions on the fishery do not mean that the scientific assessment must be wrong.
- vi. TACs and quotas are an indirect method for controlling fishing effort: direct limitation is another way of achieving the same objective.

4.0 CONCLUSION

Conservation entails the wise use of resources to make them available not only for now but also for future generations. Several measures, national and international regulations are available which may enable the effective work of conservation.

5.0 SUMMARY

In this unit, we looked at three definitions of conservation out of several. We also discussed the principles, reasons or objectives of conservation, causes of declining fish stocks, biodiversity most affected by human impacts, conservation methods for fisheries, conservation legislation, Government's effort to conserve biodiversity, the regulatory mechanisms to promote sustainable consumption of resources including

fisheries , constraints to implementing Agenda 21 in Nigeria and major issues in conservation of fisheries.

6.0 TUTOR-MARKED ASSIGNMENT

1. Mention the principles and objectives of conservation,
2. Mention the causes of declining fish stocks and conservation methods for fisheries,
3. Explain the biodiversity most affected by human impacts and conservation legislation,
4. Highlight Government's effort to conserve biodiversity and the regulatory mechanisms to promote sustainable consumption of resources including fisheries,
5. List the constraints to implementing Agenda 21 in Nigeria and major issues in conservation of fisheries.

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MODULE 2

- Unit 1 Fisheries Administration
- Unit 2 Legal Framework for Fisheries Management
- Unit 3 Types of Property Rights and Regimes in African Fisheries
- Unit 4 Traditional Methods of Fisheries Management, Administration and Conservation in Africa

UNIT 1 FISHERIES ADMINISTRATION

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- 1.0 Introduction
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 - 3.1 Fisheries Resource Base of Nigeria
 - 3.2 Fisheries Administration in Nigeria
 - 3.3 Fisheries Management Institutions in Nigeria
 - 3.3.1 The Federal Department of Fisheries (FDF)
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 - 3.3.3 The National Food and Drugs Administration and Control (NAFDAC)
 - 3.3.4 The Nigerian Ports Authority
 - 3.3.5 The Federal Ministry of Transport
 - 3.3.6 The Inland Water Ways Department
 - 3.3.7 Departments of Fisheries at State Level
 - 3.4 Research and Fisheries Training Institutions in Nigeria
 - 3.4.1 Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos
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 - 3.4.5 Some Nigerian Universities and Colleges Involved in Training in Fisheries and Aquaculture
 - 3.5 Professional Fisheries Organisations in Nigeria
- 4.0 Conclusion
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- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Nigeria is a country with a large fisheries resource base consisting of inland and marine fisheries. Many institutions at the federal, state, local and non-governmental organisations are involved in fisheries

management in Nigeria each with its specific function such as the Federal Department of Fisheries, The Nigerian Navy and several others.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- discuss the fisheries resource base and fisheries administration in Nigeria
- state the fisheries management institutions, research and fisheries training institutions and professional fisheries organisations in Nigeria.

3.0 MAIN CONTENT

3.1 Fisheries Resource Base of Nigeria

Nigeria has a rich fishery resource base made up of:

- a) Offshore waters (between 30 miles territorial limits and 200miles Exclusive Economic Zone (EEZ));
- b) Coastal waters adjacent to the country's 853km coastline;
- c) Continental shelf varying in width between 2-12 miles off the coast from west to east;
- d) River Niger Delta;
- e) Inland water associated with rivers Niger, Benue, etc., their tributaries and floodplains;
- f) Natural lakes and reservoirs; impoundments for irrigation water supply, hydroelectricity.

Fisheries in Nigeria are divided into:

- a. Marine capture (industrial and artisanal) comprising of offshore, inshore industrial (targets resources 5nautical miles off the coast to the edge of the continental shelf and coastal and brackish water artisanal fisheries
- b. Inland capture (mainly artisanal) fisheries
- c. Aquaculture (commercial and subsistence)

3.2 Fisheries Administration in Nigeria

The federal government is responsible for managing marine resources but shares responsibility with States for inland water resources. Ministries (including agriculture) at the federal level are controlled by Ministers and Ministers of State. The executive structure is similar at the state level with Commissioners at the head. "Fisheries" is a Department

in the Federal Ministry of Agriculture and Rural Development under the control of the Director of Fisheries. State Directors of Fisheries also head similar Departments in their respective Ministries of Agriculture.

3.3 Fisheries Management Institutions in Nigeria

3.3.1 The Federal Department of Fisheries (FDF)

The functions of the Federal Department of Fisheries include policy formulation, programme development, regulations and quality control. FDF is structured into divisions namely:

- i) Fisheries Resources Monitoring, Control and Surveillance (MCS) Unit
- ii) Fish Quality Control and Assurance Service
- iii) Fish Quarantine Service
- iv) Lake and Lagoon Fisheries Management Unit.

3.3.2 The Nigerian Navy

The Nigerian Navy plays several roles among which are:

- a. Military roles: This involves both projection of force and balance of power functions
- b. Policing role:
 - i. The Navy's policing role are concerned with the nation's territorial waters and the maintenance of law and order within this area.
 - ii. Coastguard duties
 - iii. Nation Building functions.
- c. Diplomatic roles: Management of foreign policy - negotiations, manipulations and prestige.

Parliamentary Act No. 21 of 1964 legally established the Nigerian Navy and charged it with the following functions:

- a. The naval defence of Nigeria
- b. Assisting in the enforcement of custom laws e.g. against illegal bunkering, fishery and immigration laws of Nigeria at sea.
 - i. Training in Naval duties.
 - ii. Undertaking hydro graphic surveys: making of charts and coordination of all national hydro graphic surveys; promoting, coordinating and enforcing safety regulations in the territorial waters and EEZ.
 - iii. Any other duty as the President, with the advice of the National Assembly may from time to time or such other

duties as the Council of Ministers may from time to time direct.

3.3.3 The National Food and Drugs Administration and Control (NAFDAC)

The NAFDAC Act was established by Decree 51 of 1993 as amended by Decree 19 of 1999 and now the National Agency for Food and Drug Administration and Control Act Cap N1 Laws of the Federation of Nigeria, 2004. The Act mandates NAFDAC to regulate and control the manufacture, importation, exportation, distribution, advertisement, sale and use of foods, drugs, cosmetics, chemicals, detergents, medical devices, and packaged water.

3.3.4 The Nigerian Ports Authority

The statutory duties of the Nigerian Ports Authority before the privatisation programme of the Federal Government of Nigeria were to:

- i. Develop, own and operate ports and harbours
- ii. Provide safe and navigable channels
- iii. Offer cargo handling and storage services
- iv. Ensure safety and security
- v. Develop and own property.

Some of the functions ceded by the NPA under the current privatised state are:

- i. Ownership and administration of land and water limits within ports
- ii. Planning and development of port operational infrastructure
- iii. Leasing and concession of port infrastructure and setting benchmark for tariff structure
- iv. Responsible for nautical harbour operations and hydrographic survey
- v. Marine incidents and pollution
- vi. Maintenance of safety and security at the common user areas
- vii. Enacting port regulations and by-laws as well as monitor and enforce them
- viii. Day to day monitoring of operations and enforcement of relevant sections of respective agreements.

The private sector now takes care of:

- i. Cargo handling, stevedoring, warehousing and delivery
- ii. Acquisition of cargo handling and operations of related equipment
- iii. Development and maintenance of port's superstructure
- iv. Maintenance of safety and security within the terminals
- v. Towage, mooring, bunkering, ship chandelling and repairs.

3.3.5 The Federal Ministry of Transport

- a) Policy formulation and planning at national level of basic marine infrastructure
- b) Legislation
- c) International relations.

3.3.6 The Inland Water Ways Department

The Inland Waterways Department of Nigeria was established by Decree No. 13 of 1997 with the mandate to manage Nigeria's vast inland waterway resources. The inland waterways of Nigeria comprise the main river systems - Rivers Niger and Benue with the confluence at Lokoja, creeks, lagoons, lakes, and intra-coastal waters.

The Department provides regulatory, economical and operational leadership in the nation's inland waterways system and develops infrastructural facilities for efficient inter-modal transport in line with global best practices that is safe, seamless and affordable.

3.3.7 Departments of Fisheries at State Level

In Nigeria, the management of inland waters is regarded as the responsibility of the states to which such water bodies belong. There are no uniform laws for inland water fisheries.

3.4 Research and Fisheries Training Institutions in Nigeria

3.4.1 Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos

NIOMR has the responsibilities to conduct research into the resources and physical characteristics of Nigerian territorial waters and the high seas beyond. The Specific mandates of NIOMR are:

- i. Abundance, distribution, biological and other characteristics of species of fish and other marine forms of life and management measures for their rational exploitation and conservation.
- ii. Improvement of brackish/marine waters aquaculture.
- iii. Genetic characterisation of marine and brackish water colourable fish species including the development of improved strains of fish species culture.
- iv. Effective and sustainable management of fisheries resources through improved post-harvest preservation, utilisation and storage using profitable technological processes.
- v. Physical characteristics of the Nigeria's territorial waters, the high seas beyond, topography of the sea beds and deposits on/or under the sea beds.
- vi. Effect of pollution on the health of Nigerian coastal waters and its prevention.
- vii. The socio-economic challenges of exploitation of the resources of the sea and brackish water.
- viii. Global climate change and sea level rise.
- ix. The improvement of coastal and brackish water fishing and fish culture through the design and fabrication of ecosystem friendly fishing gear types and fisheries implements
- x. The nature of the coastal and marine environment including coastal erosion, monitoring marine hazards, forecasting/prediction and the topography of the sea beds and deposits on or under it.
- xi. Extension research and liaison services.
- xii. Provision of technical training in areas of mandate.

3.4.2 National Freshwater Fisheries Research Institute (NIFFR), New Bussa

The mandates of the National Freshwater Fisheries Research Institute, New Bussa are:

- i. Genetic improvement of freshwater fishes and other aquatic resources in rivers and lakes (natural and man-made).
- ii. The abundance and distribution of freshwater fishes and other aquatic resources.
- iii. Hydrological behaviour of natural and man-made lakes.
- iv. Limnology of surface and groundwater around natural and man-made lakes.
- v. Rational exploitation and utilisation of freshwater aquatic resources.
- vi. Ecological and socioeconomic effects of the development of man-made lakes.
- vii. Aquaculture.

- viii. Improvement in aquaculture activities among fishing communities and fish farmers
- ix. Any other matter related to the above.

Additional functions of NIFFRI include:

- i. Extension research services, liaison services with the federal as well as state ministries, primary producers, industries and other users of research results on matters of freshwater fisheries and other aquatic resources in collaboration with NAERLS of Ahmadu Bello University, Zaria.
- ii. Provision of technical and vocational training in freshwater fisheries and related fields leading to the award of National Diploma Certificate.
- iii. Provision of laboratory and other technical services to fish farmers, industries and others concerned with fresh water fisheries problems.
- iv. Collaboration with all relevant research institutes, universities and other organisations including agencies in both public and private sectors.

3.4.5 Some Nigerian Universities and Colleges Involved in Training in Fisheries and Aquaculture

Some Nigerian Universities with full-fledged Departments of Fisheries and Aquaculture include Universities of Ibadan, Lagos, Calabar, Abeokuta, Makurdi, Umudike, Akure, Minna and Yola. Others are Ebonyi State University, Enugu State University, Federal University of Technology Owerri, and Cross River State University of Technology. The Federal Colleges of Fisheries at Lagos, New Bussa and Baga, Maiduguri and Federal College of Agriculture, Ishiagu.

3.5 Professional Fisheries Organisations in Nigeria

Fisheries Society of Nigeria (FISON)

Fisheries Society of Nigeria is a non-Governmental organisation for the fisheries sub sector which is committed to promoting the contribution of fisheries to the Nigerian economy, ensuring food security through sustainable investments and livelihood; and improving fisheries Planning, Research and Development through advocacy and optimal utilisation of the wealth and experience of her professional members. The objectives of the FISON include:

- i. To promote the professional development of individual and corporate members involved in aquaculture and Fisheries Research and Development in Nigeria.
- ii. To foster the interests in aquaculture and fisheries programmes at all levels of governance.
- iii. To provide the necessary form/fora for the exchange of ideas and interaction of individuals and corporate organisations involved in aquaculture and fisheries activities in Nigeria.
- iv. To collaborate with organisations/societies having related interests both in Nigeria and other parts of the world.
- v. To support the training and teaching in aquaculture and fisheries in Nigeria and elsewhere for national benefits.
- vi. To promote research into the development of the fisheries resources and potentials in Nigeria.
- vii. To disseminate fisheries knowledge through the organised activities such as conferences, public lectures, seminars, symposia, films, exhibitions, workshops, etc. for national benefits.
- viii. To consult with different tiers of governance - traditional, local, state and federal for the progressive development of fisheries and aquaculture potentials in Nigeria (Fish Network, 2012).

Other professional organisations relating to fisheries in Nigeria include: Nigerian Trawler Owners Association (NITOA), Catfish Farmers Association of Nigeria (CAFAN), Tilapia Aquaculture Developers Association of Nigeria (TADAN), Nigerian Union of Fishermen and Seafood Dealers (NUFAS), Association of Fish Importers of Nigeria (AFIN), Association of Ornamental Fish Exporters of Nigeria (AOFEN), National Fisheries Development Committee (NFDC).

4.0 CONCLUSION

Fisheries administration in Nigeria involves government at different levels and many non-governmental groups. There is a need to streamline and ensure no duplication of efforts.

5.0 SUMMARY

In this unit, we discussed the fisheries resource base of Nigeria, fisheries administration in Nigeria, fisheries management institutions in Nigeria, research and fisheries training institutions in Nigeria and professional fisheries organisations.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the fisheries resource base and fisheries administration in Nigeria.
2. Explain the Fisheries Management Institutions, research and fisheries training institutions in Nigeria. Explain the professional fisheries organisations in Nigeria.
3. Define the roles of five governmental bodies involved in fisheries management in Nigeria.

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UNIT 2 LEGAL FRAMEWORK FOR FISHERIES MANAGEMENT

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 National Fisheries Decrees and Regulations
 - 3.2 International Laws and Legislation on Fisheries
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

The Laws that relate to natural resources in Nigeria include the Exclusive Economic Zone Decree of 1978, Sea Fisheries Decree and several others regulate these resources in Nigeria. There is a need to enforce these laws to allow proper functioning of the sector.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state the national fisheries decrees and regulations
- discuss international laws and legislation on fisheries.

3.0 MAIN CONTENT

Several decrees and laws (national and international) have been enacted in response to the need to properly manage fisheries in Nigeria. These include:

3.1 National Fisheries Decrees and Regulations

1. Exclusive Economic Zone Decree No. 28 of 1978

This decree defines the exclusive economic zone of Nigeria as an area extending from the external limits of the territorial waters of Nigeria up to 200 nautical miles seawards from the baseline, according to the provisions of the UN Convention on the Law of the Sea. Within this zone, Nigeria exercises sovereign rights in areas of policing, exploration, conservation and exploitation of the natural resources - minerals, plants, animals including fish and shell fish.

2. Sea Fisheries Decrees 1971 and 1972

The Sea Fisheries Decree of 1971 and 1972 were stipulated for:

1. The registration and licensing of fishing trawlers operating in the coastal waters of Nigeria.
2. The 1971 decree prohibited the use of explosives and poisons in catching fish.

According to the 1972 Sea Fisheries Decree:

- a) Trawlers were not allowed in the first two nautical miles of the continental shelf to prevent competition with small-scale artisanal fisheries.
- b) The minimum cod end mesh size of trawl nets was put at 3.5 inches (or 76mm) for finfish and 1.75 inches (or 44mm) for shrimps.
- c) Shrimp trawlers were prevented from operating within the inshore waters of the Lagos-West fishing grounds to protect the juvenile croakers that were common in the area.

3. Sea Fisheries Decree No. 71 of 1992

The Sea Fisheries Licensing Regulation of 1992 stipulated the conditions for granting fishing license for shrimp harvests and fishing. This required application for pre-purchase assurance and submission of feasibility studies. It provided that no person should operate or navigate any unregistered and unlicensed motorised fishing boat for the purpose of fishing or a reefer vessel for the purpose of discharging frozen fish within the territorial waters of Nigeria or its exclusive economic zone (EEZ). It recognised the Minister responsible for fisheries as the licensing officer and ensured that the operation of the motorised fishing boats in the territorial waters of Nigeria or its EEZ would not negatively affect the interest of the sea fishing industry in Nigeria.

Sea Fisheries (Licensing) Regulations of 1992 provided conditions for licensing, types of motor fishing boats approved for use in Nigeria's territorial waters; and the validity of a license. The Sea Fisheries (Fishing) Regulations of 1992 had the following functions:

- i. Provided guidelines on where not to trawl or navigate.
- ii. Specification of trawl nets and fishing vessels.
- iii. Landing of catch and size that could be displayed for sale.
- iv. Powers of adjudication.

- v. The decree made provision for the Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos, to publish the minimum total length of different species.

4. Sea Fisheries (Fish Inspection and Quality Assurance) Regulations of 1995

This regulation was mainly to institutionalise fish inspection and quality assurance in Nigeria. The emphasis was on the mode of transportation, handling, storage and sale of fish imported into or exported from Nigeria.

5. Inland Fisheries Decree No. 108 of 1992

The inland fisheries decree was promulgated to harmonise the administration, management, protection and improvement of inland water fisheries. The roles of the decree included:

- i. Provision for licensing and identification of fishing craft.
- ii. Restriction on the use of certain fishing gear.
- iii. Prohibition of obnoxious fishing methods.
- iv. Prohibition of unauthorised export or import of live fish.
- v. Protection of fish products from contamination and infection.

Commissioners of Agriculture in the States were to regulate the activities of the fisheries sector in the inland waters under this Act.

1. Inland Fisheries (Fish Quality Assurance) Regulations of 1995

This regulation provided for the manner of transportation, handling, preservation and marketing of fish caught from the inland waters of Nigeria.

2. Turtle Excluder Device Regulations of 1996

This decree provided conditions for the enforcement of application of by-catch reduction devices to industrial fisheries.

3. Land Use Act (1978)

State Governors were empowered to grant statutory rights of occupancy to persons or organisations for the use of land. The licensing system concerns the diversion, storage and use of water on commercial basis for the construction, maintenance, operation, repair of hydraulic works. No reference was made to aquaculture.

4. Interim Guidelines and Standards for Environmental Pollution Control in Nigeria (1991)

The guidelines and standards set by the Federal Environmental Protection Agency of Nigeria were related to six areas of environmental pollution control namely:

- a) Effluents' limitation,
- b) Water quality for industrial uses at point of intake,
- c) Industrial emission limitations,
- d) Noise exposure limitations,
- e) Management of solid and hazardous wastes,
- f) Pollution abatement in industries (LEX-FAO, 2014).

5. Water Resources Decree, 1993

The Federal Ministry of Water Resources prepared the Water Resources Decree 101 of 1993 to give the legal framework for the development of the water resources of Nigeria. The Decree placed the development of the nation's water resources on the Ministry of Water Resources and Rural Development. Nigeria's Water Resources Master Plan for the 1995-2020 periods was completed with the technical assistance of the Japanese International Cooperation Agency (JICA) between 1992 and 1995.

The National Water Supply Policy completed and approved in 1995 provided the guidelines for water supply development up to the year 2015 (UN Agenda 21,1997).

6. Aquaculture Legislation

According to FAO (2013), Nigeria has no legislation regarding aquaculture at national level. It is not directly mentioned in the Sea Fisheries Decree (1971, 1992) but the Minister of Fisheries is to determine whether the setting up of enclosures, pens, cages, should be subjected to license fees.

3.2 International Laws and Legislation on Fisheries

1. United Nations Convention on the Law of the Sea of 10 December 1982 which entered into force in 1984 governs marine environment and their resources.
2. Convention on Biodiversity is a binding agreement and countries that are parties to the Convention are obliged to implement its provisions which are:

- a. Conservation of biodiversity;
- b. Sustainable use of the components of biodiversity;
- c. Sharing the benefits arising from utilisation of genetic resources in a fair and equitable way.

3. FAO Code of Conduct for Responsible Fisheries

- i. This is a voluntary agreement pertaining to fisheries adopted in 1995 by the Food and Agriculture Organisation of the United Nations.
- ii. It stipulates the principles and standards of responsible practices to ensure effective conservation, management and development of aquatic resources, with adequate respect for the ecosystem and biodiversity.

Nigeria also belongs to some international groups namely:

- i. World Trade Organisation (WTO)
- ii. The Bio safety Protocol
- iii. Convention on International trade in endangered species, wild flora and fauna.
- iv. Revised Convention for the Establishment of Niger Basin Authority (Ndamena, 1987) which replaced the Niger River Commission and the Convention and Statutes concerning the development of the Chad Basin Commission.

4.0 CONCLUSION

The national and international laws on fisheries are meant to keep the fisheries sector functioning optimally. These laws need to be enforced.

5.0 SUMMARY

In this unit, we studied the national fisheries decrees, regulations and international laws and legislation on fisheries.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the national fisheries decrees and regulations.
2. Explain the international laws and legislation on fisheries.

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UNIT 3 TYPES OF PROPERTY RIGHTS AND REGIMES IN AFRICAN FISHERIES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Private Property
 - 3.2 Common Property
 - 3.3 State Property
 - 3.4 System with no Defined Property Rights (open access)
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

There are different types of property ownership in Africa such as private, common, state and open access. Each has its unique characteristics, advantages and disadvantages.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- discuss private property ownership
- state the common property ownership type
- describe the state property ownership type and system with no defined property rights.

3.0 MAIN CONTENT

3.1 Private Property

Individuals, families or legal entities have the right to use and manage resources to the exclusion of others. Private property of inland fisheries resources is uncommon in African traditional rural societies. Water bodies and aquatic resources are regarded as the property of the community or higher beings, but can in some cases be allocated to a person or family for exclusive use.

3.2 Common Property

The most commonly found regime in African inland fisheries is based on common property, where the right to use a delimited resource is vested with a delimited social entity. The resource belongs to a group, which jointly uses it to the exclusion of non-members. The property is managed by all members or their representatives. This system is useful for the management of water bodies with defined boundaries. The property is regarded as part of the resource base of a village, clan or similar entity or ethnic group with similar beliefs, norms, language, etc. Control rights are exercised by the local traditional authorities, who act as trustees for the 'true owners'. Every member of the group has access to the resource either directly or through representative group members. Non-members may be allowed after payment of fees or other agreed terms.

Use rights are granted to all members of the group which owns the resource, or to sub-groups such as males or part or full-time fishers. Members share resource use rights and related duties equally. Common property regimes provide a framework for the joint use of resources. They prevent unauthorised access by outsiders and 'free riding' by group members. Where no property rights have been established or where a property regime has become inefficient or has collapsed altogether, an open access situation exists.

3.3 State Property

Property over which the state exercises management rights and defines access rules. State property is in most cases used by the citizens, within the given legal framework. Most African countries claim ownership of fisheries resources. State properties are often superimposed on common property. There is often ineffective management of state-owned property.

3.4 System with no Defined Property Rights (open access)

Everybody has a right to access a resource and withdraw from the resource ('open-access'), nobody has a right to exclude others from using it. Inefficient or no property rights exist. Fish stocks are regarded as abundant and harvests are not enough to warrant management efforts. Open-access allows excess effort, overfishing and dissipation of economic surplus that a fishery can generate. Examples of areas under open access are large lakes, rivers, floodplains during the rainy season (Williams, 1998).

4.0 CONCLUSION

The property rights that exist in Africa vary depending on traditions and customs. The most common type is the common property regime where the resource belongs to all members of a community or group.

5.0 SUMMARY

In this unit, we mentioned the different property regimes that operate in African fisheries such as the private property, common property, state property and those with open access without any defined rights.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the private property ownership type in African Fisheries.
2. Explain the common property ownership type in African Fisheries.
3. Explain the state property ownership type and system with no defined property rights.

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UNIT 4 TRADITIONAL METHODS OF FISHERIES MANAGEMENT, ADMINISTRATION AND CONSERVATION IN AFRICA

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Traditional Fisheries Management System
 - 3.2 Features and Objectives of Traditional (or Community-Based) Fisheries Management Systems
 - 3.3 Management Measures Used in Traditional Fisheries Management
 - 3.4 Factors Affecting the Acceptance of Traditional Methods of Fisheries Management
 - 3.5 Limitations of Traditional Authority
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Fisheries management systems in Nigeria involve both formal (government) and informal (traditional) institutions. Traditional management systems entail the regulation of fisheries activities and resources by traditional authorities or communities. These groups are united by common beliefs or norms, languages and interests. In traditional management systems, an individual has no exclusive right to the resource and cannot dispose or sell part or whole of the system or resource being managed.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- list the characteristic features and objectives of traditional (or community-based) fisheries management systems
- discuss the management measures used in traditional fisheries management
- explain the factors affecting the acceptance of traditional methods of fisheries management
- state the limitations of traditional authority.

3.0 MAIN CONTENT

3.1 Traditional Fisheries Management System

Traditional fisheries management methods describe the self-regulation by communities based on traditional practices with the aim of controlling fishery exploitation. Traditional fisheries management systems are management systems operated by the traditional authorities such as the Bulamas, Sarkin Ruwasor the village heads. This is effective at the community level. Ita (1993) described two types of fisheries management systems as:

1. Inadvertent (unintentional), e.g. water tenure, ritual prohibitions, taboos and magic.
2. Intentional strategies, e.g. gear restrictions, closed seasons and floodplain intensification.

Traditional methods of managing fisheries are based on social agreements where individuals, groups or communities have rights to resources. Property regimes determine the rights, responsibilities of stakeholders and provide incentives to preserve or invest into the resource. Property regimes, other prevailing norms and values, provide the framework for management of the resource.

In the traditional system, the fisheries are classified as common property resources in that use-rights for the resource are controlled by an identifiable group (e.g. local community who may exclude others) and are not managed by government or the state. The objectives of the traditional systems in Nigeria (Neiland *et al.*, 1997) include:

- i. The control of fishing rights and reduction of conflict.
- ii. Generation of food and income for the community.
- iii. Conservation of fish stocks.

The main method of management is the control of access. Local leaders or traditional authorities or the community makes the rules although all users can have inputs into the process (“bottom-up” approach), under some circumstances.

3.2 Features and Objectives of Traditional (or Community-Based) Fisheries Management Systems

Fisheries activities are regulated by traditional rules, beliefs, customs and authorities based on indigenous knowledge. This is easy where water has defined boundaries - lakes, floodplains, lagoons and reservoirs. Those responsible for fisheries management are traditional

rulers, religious leaders, shore masters, fish watchers or chief fishermen. The whole community observes and enforces compliance to set rules which are effective because of the acceptability and legitimacy of local authorities (Olomola, 1993). The main objective of fisheries management in the traditional system is to protect the interest of the community. In the traditional system:

- i. Individuals within the community have access to the resource but cannot sell or dispose of part or whole of the fishing ground temporarily or permanently.
- ii. The village head and council of elders make decisions on behalf of the group and such decisions are communicated to the people.
- iii. This system is effective where population density is low and there is little internal and external pressure on the resource.
- iv. Access to resources, harvesting and consumption of fish are subject to socially determined regulations and form part of resource management and allocation.
- v. Traditional authorities control entrance into the fishing grounds, e.g. during fishing festivals. Seasonal closures, acceptable gear and other regulations are set by traditional authority based on experience.
- vi. Traditional authorities have no licensing systems but fisheries management regulations are rooted in the social concept of resource-sharing, allowing every member to benefit from available resources.
- vii. Sanctions include fines, seizure of gear and social sanctions.
- viii. Supernatural' beings are often believed to set rules for resource utilisation and enforce rules.

3.3 Management Measures Used in Traditional Fisheries Management

Traditional fisheries systems exploit several management measures such as:

- i. Access control-The most common traditional fisheries management measure is to restrict the right of withdrawal in order to quantitatively limit fishing pressure. Access may also be granted as a territorial use right.
- ii. Ban on capture of immature fish.
- iii. Restriction or ban of some fishing gears permanently or temporarily such as cast nets, pole and lines.
- iv. Prohibition of fishing in some water bodies regarded as sacred grounds (closed areas) and on some festive days which inadvertently protects such fish stocks.
- v. Prohibition of fishing with chemicals owing to health concerns.

- vi. Prohibition of magical power in fish harvesting.
- vii. Emphasis on rituals for replenishing fish stock. Sacrifices are offered for release of rain, receding of floods and for permission to fish.
- viii. Some fish species are not eaten and are taboos to some consumers and fishermen. Such fish are not caught.
- ix. Use of closed seasons allowing only short periods for fishing during fishing festivals.
- x. Closure of sensitive areas during breeding seasons, e.g. mangrove swamps or other nursery areas (Ita, 1993; Olomola, 1993; Neiland, *et al*, 1994).

3.4 Factors Affecting the Acceptance of Traditional Methods of Fisheries Management

- i. Traditional knowledge is accepted in traditional fisheries management for example allowing fingerlings to grow before harvest.
- ii. The rules agree with traditional beliefs and customs or well established social systems like kinship, language, etc.
- iii. Easy detection and prompt sanctions for offenders.
- iv. Policing of communal territorial waters.

3.5 Limitations of Traditional Authority

The dependence of traditional management on traditional authority has the following limitations.

- i. The declining authority of traditional institutions due to changes to modern societies with lower adherence to traditional rules, urbanisation and migration.
- ii. Traditional authority over resources is limited to a defined territory. Where fishing grounds fall into more than one traditional territory, proper management requires co-ordination between the different authorities which often leads to conflict.
- iii. The overlapping and conflicting roles of traditional and modern institutions undermine the functioning of the traditional system.
- iv. The taxation of fisheries by local or state governments could reduce offerings and weaken traditional authorities

4.0 CONCLUSION

Traditional fisheries management system is an informal one in which the management of water and its fisheries are completely controlled by traditional authorities or religious bodies. Members of such communities have similarities in language, religious or traditional belief system, or

common interests. They are able to abide by the rules and regulation of such fisheries because of their respect for such authority. These systems are however being challenged by changes in modern societies and challenges of modern societies.

5.0 SUMMARY

In this unit, we defined traditional fisheries management system and explained the features and objectives of the system. The management measures used in traditional fisheries management, factors affecting the acceptance of traditional methods of fisheries management and limitations of traditional authority were discussed.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the characteristic features and objectives of traditional (or community-based) fisheries management systems.
2. Explain the management measures used in traditional fisheries management.
3. Explain the factors affecting the acceptance of traditional methods of fisheries management.
4. Explain the limitations of traditional authority.

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MODULE 3

- Unit 1 Non-Traditional System of Fisheries Management in Nigeria and Problems of Enforcing Rules
- Unit 2 Development and Management of Lakes, Rivers, Brackish and Marine Waters
- Unit 3 Government Policy in Fisheries Administration and Management
- Unit 4 Roles and Activities of the Federal, State and Local Governments in Fisheries Development and Management in Nigeria

UNIT 1 NON-TRADITIONAL SYSTEM OF FISHERIES MANAGEMENT IN NIGERIA AND PROBLEMS OF ENFORCING RULES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Modern System of Fisheries Management
 - 3.2 Similarities between Traditional and Modern Methods of Fisheries Management
 - 3.3 Mixed System of Fisheries Management
 - 3.4 Problem of Laws Enforcement
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Non-traditional system involves management of fisheries by the state or its agents as opposed to the management by traditional authorities. We shall be discussing issues such as the modern systems of fisheries management, similarities between traditional and modern methods of fisheries management, mixed system of fisheries management and the problem of enforcing laws. Many objectives of the traditional and modern government-managed systems have similar objectives.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- discuss the modern systems of fisheries management
- identify the similarities between traditional and modern methods of fisheries management
- explain the mixed system of fisheries management
- state the problem of laws enforcement.

3.0 MAIN CONTENT

3.1 Modern System of Fisheries Management

Modern system of fisheries management includes those operated by the agents of the federal government where fisheries regulations are enforced by officers of the Fisheries Departments (Neiland *et al.* 1994a; Ovie & Raji, 2006). States' control of fisheries exist alongside common property and traditional management systems. Authority and control of fisheries resources lie with state, local and federal governments. The objective of fisheries management is sustainable exploitation or revenue generation.

The federal government controls the natural resources in Nigeria including fisheries with state and local governments having mandates to enforce licensing, catch and gear regulations, designation of fish sanctuaries, closed seasons and other management measures. Traditional jurisdiction over fisheries resources retain some power within this framework

3.2 Similarities between Traditional and Modern Methods of Fisheries Management

Most traditional fisheries management systems contain objectives similar to those found in modern fisheries management. The objective of sustainable resource use and resource conservation is a feature common to both traditional and modern fisheries management systems. Equally common are objectives which reflect economic and social postulates: while aiming at optimising resource utilisation, they still contain elements of resource sharing.

3.3 Mixed System of Fisheries Management

The leaders of traditional government (village and district heads) and the local government co-operate in the control and licensing of fishing

areas. The mixed system ensures that fishing sites are allocated without serious conflicts and that revenue is collected and passed to the leaders of both the traditional and local governments. This arrangement of the “mixed system” is a good example of how local-level fishery management arrangements can be adapted to accommodate a new fishing system through the co-operation of both traditional and modern governments.

3.4 Problem of Laws Enforcement

- i. Governments lack the logistics such as personnel, funds, field vehicles to enforce fisheries laws and regulations.
- ii. Lack of strong political commitment by government. There is need for co-ordination of activities of organisations involved in fisheries management, e.g. between the licensing authority of The Federal Department of Fisheries and the Nigerian Institute for Oceanography and Marine Research (NIOMR) in aspects of enforcement of number of boats to be registered (Amiengheme, 1993).
- iii. The problem of low licensing fees. The primary objective of licensing vessels has been to generate revenue while the control of effort was secondary and ineffective (Tobor, 1991).
- iv. Wrong interpretation of decrees and other regulations by stakeholders.
- v. Weak scientific data gives incomplete information and knowledge thereby producing wrong policies.
- vi. Absence of stakeholders’ input in policy formulation process. Most decisions are usually derived using top-bottom approach (Neiland *et al.*, 2002, Nwosu *et al.*, 2011).

Fisheries co-management was introduced on Kainji Lake through technical assistance to the Government of Nigeria (1993-2001) from German Ministry of Economic Co-operation and Development (GTZ) has not become widely practiced.

4.0 CONCLUSION

The non-traditional systems of fisheries management involve management of the resources by the government and its agencies at all levels. This often involves a top-bottom approach with the stakeholders playing minimal roles in management and decision making. However, both traditional and non-traditional fisheries management systems have similar objectives though different approaches may be employed.

5.0 SUMMARY

In this unit, we discussed the non-traditional system of fisheries management and compared it with the traditional system. We also talked about the problems associated with the enforcement of laws. Fisheries co-management which was introduced into the country is not widely practiced though it has several advantages.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the modern systems of fisheries management.
2. Explain the similarities between traditional and modern methods of fisheries management.
3. Explain the mixed system of fisheries management and the problem of enforcing laws.

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UNIT 2 DEVELOPMENT AND MANAGEMENT OF LAKES, RIVERS, BRACKISH AND MARINE WATERS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Hydrology and Inland Water Resources of Nigeria
 - 3.2 Important Drainage Systems in Nigeria
 - 3.3 Management of Water Resources in Nigeria
 - 3.4 Administrative Responsibility for Managing Water in Nigeria
 - 3.4.1 Federal Government
 - 3.4.2 State Governments
 - 3.4.3 Local Governments
 - 3.4.4 Foreign Partners and Non-governmental Organisations Involved in Water and Sanitation Management in Nigeria
 - 3.5 Lake Chad Management
 - 3.6 Integrated River Basin Management
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Nigeria is dominated by two main river systems namely the Niger-Benue and Chad system. These two systems have several tributaries and support several activities including agriculture and fishing. Water in Nigeria is managed concurrently by the Federal, State and local governments. While the federal government manages marine fisheries, the state governments manage the rivers that fall within their jurisdiction. Local governments supply water to their communities by sinking boreholes and wells. Lake Chad is a shared lake with Nigeria having 25% and is managed by a committee set up by the four owner countries - Nigeria, Cameroon, Niger and Chad. We shall also discuss the integrated river basin management programme and the key principles involved.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- explain the hydrology and inland water resources of Nigeria
- state the important drainage systems in Nigeria
- discuss the management of water resources in Nigeria
- discuss the administrative responsibility for managing water in Nigeria.

3.0 MAIN CONTENT

3.1 Hydrology and Inland Water Resources of Nigeria

Nigeria is dominated by two main river systems - the Niger-Benue and Chad systems. The climate of Nigeria is tropical with high temperatures and humidity. There are marked wet and dry seasons. The rainfall reduces from the south to the north. There is a large expanse of mangrove ecosystem with the largest area found in the Niger Delta Area, Ondo and Lagos states. The total surface area of water bodies in Nigeria excluding deltas, estuaries and wetlands is estimated at 14,991,900ha (about 15 % of total area).

The major rivers in Nigeria are Niger, Benue, Anambra, Cross River, Imo, Qua Iboe, Ogun and Osun. The main natural lake is Lake Chad. Others lakes and reservoirs are man-made, e.g. Kainji, Jebba, Kiri, Bakalori, Lower Anambra, Zobe, Oyan, Shiroro, Goronyo, Tiga, Chalawa Gorge, DadinKowa and Kiri. Other fresh water bodies in Nigeria are Niger Delta fresh water, Niger/Sokoto basin, Niger/Kaduna basin, Benue River flood plain, Hadejia-Komadugu –Yobe, Ogun/Osun flood plains, Imo River flood plains, Qua Iboe, reservoirs and fish ponds.

Brackish waters include Shiroro, Goronyo, Tiga, Chalawa Gorge, DadinKowa, the Niger Delta, Cross River Estuary, Imo and Qua Iboe estuaries (Ita, 1993).

Deltas and estuaries include the Niger Delta, Cross River Estuary, Imo and Qua Iboe Estuaries. These have brackish water wetlands. Freshwater wetlands include Niger Delta freshwater, apex of Niger Delta to Lokoja, Niger/Sokoto basin, Niger-Kaduna basin, Benue River floodplain, Hadejia–Komadugu-Yobe, Ogun-Oshun flood plains, Cross River flood plains, Qua Iboe floodplains

3.2 Important Drainage Systems in Nigeria

Nigeria has four major drainage basin areas (Federal Ministry of Water Resources, 2003 a, b): the lower Niger, the Chad basin, the river basin of Cross River, Imo and the south western drainage basin.

- i. The Niger River Basin drainage system has major tributaries which include Benue, Sokoto-Rima, Kaduna, Gongola, Katsina-Ala, Dongo, Taraba, Hawal and Anambra Rivers.
- ii. The Lake Chad inland drainage system comprising Kano, Hadejia, Jama'are, Misau, Komadongou-Yobe, Yedseram and Ebeji Rivers.
- iii. The Atlantic drainage system to the east of the Niger made up of the Cross, Imo, Qua Iboe and Kwa Rivers.
- iv. The Atlantic drainage system to the west of the Niger consisting of the Ogun, Osun, Owena and Benin Rivers.

Nigeria has surface and groundwater resources estimated at over $250 \times 10^9 \text{m}^3$ (Federal Republic of Nigeria, 2001).

3.3 Management of Water Resources in Nigeria

The variable regimes of the rivers make it necessary to store water for various uses. A total of about 142 dams (60 large dams with height above 15 m) and 82 small and medium dams have been constructed or are under construction. The large dams are mostly found (85%) in the northern and central states for perennial storage of wet season runoff for use in the dry season for irrigation.

The goals of water resource management in Nigeria are:

- i. Provision of urban water supply
- ii. Generation of hydropower
- iii. Development of large-scale surface irrigation
- iv. Navigation

3.4 Administrative Responsibility for Managing Water in Nigeria

In Nigeria, water is managed concurrently. This means that water is managed by the Federal, States and Local Governments. The federal government is in charge of water resources management and policy making while the States take care of urban water management and the local governments are responsible for rural water supply though the capacity of local governments to plan and carry out this activity is low. The Federal Ministry of Water Resources was established in 1976 but

later merged with Agriculture to form the Federal Ministry of Agriculture.

3.4.1 Federal Government

The Federal Ministry of Water Resources (a part of the Ministry of Agriculture until 2010), is responsible for large water resources development projects, irrigation work, collection of hydrological, hydro-geological data and provision of water in bulk to states and cities from dams. The River Basin Development Authorities under the Ministry include Sokoto-Rima Basin, Sokoto; Hadejia-Jama'are Basin, Kano; Lake Chad Basin, Maiduguri; Upper Benue Basin, Yola; Lower Benue Basin, Makurdi; Cross River Basin, Calabar; Anambra-Imo Basin, Owerri; Niger Basin, Ilorin, Niger Delta Basin, Port Harcourt; Benin-Owena Basin, Benin City; Ogun-Osun Basin, Abeokuta.

The Federal Government of Nigeria through the river basin development authorities control and maintain the water reservoirs and the sale of water for various uses. The presence of river basins is less felt where there are no large dams.

The River Basin Development Authorities were set up by the Federal Government in 1976 to harness Nigeria's water resources. Their major functions were to

- a) Undertake comprehensive development of both surface and underground water resources for multi-purpose use with particular emphasis on the provision of irrigation infrastructure and the control of floods and erosion and for water shed management
- b) To construct, operate and maintain dams, dykes, polders, wells, boreholes, irrigation, drainage systems, navigation, hydroelectric power generation, recreation facilities, fisheries projects and other works necessary for the achievement of the authority's functions and hand over all lands to be cultivated to the farmers.
- c) To supply water from the Authority's completed storage schemes to all users for a fee to be determined by the authority concerned, with the approval of the minister.

3.4.2 State Governments

State Water Agencies (SWAs) or State Water Departments are responsible for urban potable water supply in the 36 states. The SWAs are responsible to their state governments, through a State Ministry of Water Resources for urban water supply, and in some states also for rural water supply. The need for the promulgation and enforcement of

inland fisheries laws and regulations by state and federal government has been highlighted as the first step towards effective management of inland water fisheries in Nigeria (Ita *et al.* 1985).

The state governments are involved in the management of water through the water corporations or boards who procure raw water from the river basins and make it available for use. Some water corporations also have their own water reservoirs, e.g. Benin-Owena River Basin.

3.4.3 Local Governments

The Local Government Authorities (LGAs) are responsible for the provision of rural water supplies and sanitation facilities in their areas but only a few have the resources to meet this need. Only few LGAs have rural water supply divisions.

3.4.4 Foreign Partners and Non-governmental Organisations Involved in Water and Sanitation Management in Nigeria

Some important external partners in the Nigerian water supply and sanitation sector are African Development Bank, the European Union, Japanese International Cooperation Agency (JICA), United Nation's Children Emergency Fund (UNICEF), United States Agency for International Development (USAID), the Non-governmental Organisation Water Aid and the World Bank. Nigerian NGOs involved in water and sanitation programmes in Nigeria include the Benue NGO Network (BENGONET), Society for Water and Sanitation in Nigeria (NEWSAN), Justice Development and Peace Initiative (JDPI), Community Based Development - NGO (CBD-NGO), Women Empowerment in Nigeria (WEIN) and the Bol Development Association (BOLDA).

3.5 Lake Chad Management

Lake Chad is the largest lake in West Africa, with Nigeria controlling 25% of the lake. The rest is shared by Cameroun, Niger and Chad. The lake is overseen by a Lake Chad Basin Commission, formed by these countries, which Nigeria joined in 1962. The affluent of Lake Chad within Nigeria consists of the Komadugu Yobe and the Ngadda and Yedseram systems.

Lake Chad provides natural storage of water and supports one of the main irrigation projects – the South Chad irrigation project. It is a shallow lake with 1.5-5m depth. Almost 90% of the inflow is contributed by the Chari-Logone river system outside Nigeria from the

Central African Republic and Adamawa highlands to the south. The lake fluctuates considerably in size depending on rainfall. The lake is an important wetland situated in the semi-arid Sahel corridor.

Other than the agencies involved in the joint commission managing the affairs of the lake, the only Federal Government presence in the lakeshore region is the Chad Basin Rural Development Authority (CBRDA) which has made huge investments in the irrigation of the lakeshore (Krings and Sarch, 2002).

3.6 Integrated River Basin Management

Integrated river basin management entails dealing with water in a more integrated way by moving away from the sector by sector approach; looking for sustainable use of water, satisfying the needs of both man and the environment and moving progressively away from centralised management models in order to adopt increased stakeholder participation (Burton, 2003; Jaspers, 2003). In its bid to address the poor drinking water services and sanitation problems, and meet its water-related millennium development goals (MDGs), Nigeria is undergoing a broad process of reform of its integrated water resources management at basin level (Federal Government of Nigeria, 2003).

“Integrated River basin management is the process of coordinating conservation, management and development of water, land and related resources across sectors within a given river basin, in order to maximise the economic and social benefits derived from water resources in an equitable manner while preserving and where necessary, restoring freshwater ecosystems.”

Integrated River Basin Management rests on the principle that the functioning of the river basin ecosystem, including accompanying wetland and groundwater systems are the sources of freshwater. The Management of river basins include maintaining ecosystem functioning through the use of ecosystem approach.

The seven key elements of IRBM are:

- i. Long-term vision for the river basin agreed to by all the major stakeholders.
- ii. Integration of policies, decisions and costs across sectoral interests such as industry, agriculture, urban development, navigation, fisheries management and conservation, including through poverty reduction strategies.
- iii. Strategic decision-making at the river basin scale, which guides actions at sub-basin or local levels.

- iv. Effective timing, taking advantage of opportunities as they arise while working with strategic framework.
- v. Active participation by all relevant stakeholders in well-informed and transparent planning and decision making.
- vi. Adequate investment by governments, the private sector and the civil society organisations in capacity building for river basin planning and participation processes.
- vii. A solid foundation of knowledge of the river basin and the natural and socio economic forces that influence it.

4.0 CONCLUSION

Development and management of water resources are important to meet domestic and industrial needs. In Nigeria, the Federal government through the River Basin Authorities is involved in the construction of dams and other major water or water-related projects and supplies water to the states. The local governments also construct wells and boreholes within their areas of jurisdiction.

5.0 SUMMARY

In this unit we discussed the development and management of lakes, rivers, brackish and marine waters. The hydrology and inland water resources of Nigeria; important drainage systems in Nigeria; management of water resources in Nigeria; administrative responsibility for managing water in Nigeria; Lake Chad management and integrated river basin management with its seven key principles highlighted. We also discussed the roles of the federal, state and local governments through agencies like the River Basin Development Authorities.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the hydrology and inland water resources of Nigeria.
2. Explain the important drainage systems in Nigeria.
3. Explain the management of water resources in Nigeria.
4. Explain the administrative responsibility for managing water in Nigeria.

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UNIT 3 GOVERNMENT POLICY IN FISHERIES ADMINISTRATION AND MANAGEMENT

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of Policy
 - 3.2 Nigeria's Fisheries Policy
 - 3.3 Strategies Adopted for the Achievement of the Fisheries Policies
 - 3.4 Problems of Fisheries Policy in Nigeria
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

In this unit we shall discuss government policy in fisheries administration as it relates to Nigeria. The government policy defines the course of action necessary to steer the affairs of government in a particular sector of the economy. We shall define policy, discuss Nigeria's fisheries policy and the objectives it aims to achieve, strategies adopted for the achievement of the fisheries policies and the problems of fisheries policy in Nigeria.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- state the definition of policy
- discuss the Nigeria's fisheries policy
- list the strategies adopted for the achievement of the fisheries policies
- identify the problems of fisheries policy in Nigeria

3.0 MAIN CONTENT

3.1 Definition of Policy

Policy is defined as a course of action, proposed or adopted by those with responsibility for a given area (in government) and expressed as formal statements or positions (e.g. the 1992 Nigeria Fisheries Decree,

Sutton, 1999). Policy is also described as a principle or rule to guide decisions and achieve rational outcomes. It may also be the process of making important organisational decisions including identification of alternatives such as programmes or priorities and choosing on the basis of impacts they have.

3.2 Nigeria's Fisheries Policy

The major policy goal of the federal government is to ensure sustainable development of Nigerian fisheries for national food security, self-sufficiency in fish production, optimum resource utilisation and conservation; employment generation, wealth creation, poverty alleviation and reduction in rural-urban migration in line with the National Economic and Empowerment Development Strategy (NEEDS) and the New Partnership for Africa's Development (NEPAD) Initiatives (Federal Department of Fisheries, 2005; Federal Government of Nigeria/Agenda 21).

Specific Objectives of Nigeria's Fisheries Policy

- i. Achievement of self-sufficiency in fish production and utilisation;
- ii. Development and modernisation of means of production, processing, storage, marketing and resources conservation;
- iii. Promotion of export of shrimps and fish products as a means of earning foreign exchange from non-oil sector;
- iv. Improvement on the quality of life in fishing villages;
- v. Provision and improvement of employment opportunities in the rural fishing communities thereby reducing rural-urban drift, crime and criminalities;
- vi. Acceleration of Research and Technology dissemination and adoption in all aspects of fisheries;
- vii. Ensuring rational exploitation of the nation's marine fisheries resources;
- viii. Human capacity development through improvement and development of training Institutions and facilities;
- ix. Promotion of fisheries curricula in the institutions of higher learning;
- x. Encouragement of private entrepreneurship in all aspects of fisheries;
- xi. Ensuring total compliance with the FAO's Code of Conduct for Responsible Fisheries.
- xii. Conservation of fisheries resources for sustainable exploitation;
- xiii. Improving technology application in artisanal and industrial fisheries as a means of promoting growth of the sub sector;
- xiv. Promotion of aquaculture.

3.3 Strategies Adopted for the Achievement of the Fisheries Policies

The strategies adopted to achieve the policy objectives of the Federal Government of Nigeria include:

- i. The provision and maintenance of infrastructure such as jetties and fishing terminals for fish landing, storage and processing.
- ii. Provision of extension services to farmers.
- iii. Monitoring and surveillance of the nation's water bodies, fishing terminals and other landing sites.
- iv. Manpower development to manage the subsector.
- v. Restocking of bodies of water with fast-growing fish species.
- vi. Involvement of stake holders in decision-making process, creation of environmental awareness through public enlightenment and education.
- vii. Promotion of information exchange among stakeholders.
- viii. Instituting participatory procedures that allow all stakeholders to partake in decision-making on the location, processes and products of projects (Federal Government of Nigeria, 1997).

3.4 Problems of Fisheries Policy in Nigeria

- i. A top-bottom approach monopolised by government agencies and institutions rather than the bottom-up approach where the end users of decisions should participate in decision making;
- ii. Poor and weak government's economic, political and institutional capacities make the execution and monitoring of implementation of decisions difficult;
- iii. Lack of adequate or relevant data, the policy process depends on a narrow information base or inadequate knowledge;
- iv. Lack of adequate logistical support such as funding, to involve more stakeholders in the policy-making process;
- v. Incomplete development narratives and strategies; narrow or ill-defined policy narrative;
- vi. Under-valued fisheries;
- vii. Lack of stakeholder recognition and utilisation of non-formal institutions;
- viii. Limitation of national policy-making and implementation processes;
- ix. Lack of relevant data;
- x. Low level of participation by available spectrum of stakeholders in policy and decision making;
- xi. Absence or weakness of the interconnections between local and national levels of authority (Neiland *et al*, 2002; Ovie & Raji, 2006).

4.0 CONCLUSION

The government's policy provides the direction for action in the fisheries sub sector of agriculture. In this unit, we discussed that the major policy goal of the federal government is to ensure sustainable development of Nigerian fisheries for national food security, self-sufficiency in fish production, optimum resource utilisation and conservation; employment generation, wealth creation and poverty alleviation.

5.0 SUMMARY

In this unit, we discussed the government policy in fisheries administration and management with reference to Nigeria. We defined policy and highlighted the key areas of Nigeria's fisheries policy. We also discussed the strategies adopted for the achievement of the fisheries policies and the problems associated with fisheries policy in Nigeria.

6.0 TUTOR-MARKED ASSIGNMENT

1. Give the definition of policy.
2. Explain the Nigeria's fisheries policy.
3. Explain the strategies adopted for the achievement of the fisheries policies.
4. Explain the problems of fisheries policy in Nigeria.

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UNIT 4 ROLES AND ACTIVITIES OF FEDERAL, STATE AND LOCAL GOVERNMENTS IN FISHERIES DEVELOPMENT AND MANAGEMENT IN NIGERIA

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 The Roles of the Federal Government
 - 3.2 Role of States and Local Governments
 - 3.3 Promulgation and Enforcement of Fisheries Edicts in the States
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

The management of water and fisheries resources in Nigeria is undertaken by all levels of government - federal, state and local governments. The federal government is involved in fisheries management through the activities of the Federal Department of Fisheries. The states have edicts promulgated to regulate activities in the fisheries sector under their jurisdiction.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- identify the roles of the federal government in the management of fisheries
- state the roles of states and local governments in the management of fisheries
- discuss the promulgation and enforcement of fisheries edicts in the states.

3.0 MAIN CONTENT

All levels of government in Nigeria are involved in the regulation of fisheries operations in Nigeria.

3.1 The Roles of the Federal Government

The federal government plays its role in fisheries mainly through the Federal Department of Fisheries. These roles include:

- i. The supply of inputs to fishers and provision of fisheries extension services
- ii. Enactment of laws, policies and guidelines
- iii. Promulgation of decrees, e.g. the inland fisheries decree for inland fisheries, Sea Fisheries Decree of 1971 and 1992 for coastal marine areas.
- iv. Registration and licensing of fishermen
- v. Mesh size regulation: Large mesh size excludes fry, fingerlings and juveniles from capture. A mesh size of 7.5 was recommended for all inland water bodies in Nigeria (Ita, 1985).
- vi. Gear size regulation: The objective in regulation of fishing gear is to control fishing effort. Catch quota can also be introduced for the same reason.
- vii. Prohibition of the use of poison and explosives which kill all aquatic organisms within their reach without discrimination.
- viii. Fishing with electricity: This prohibition may not be applicable in Nigeria where such technology may not be available to the local fishers.
- ix. Closed season and area: Areas to be closed should be important to such fisheries such as spawning grounds - wetlands including mangrove forests, shallow floodplain areas of lakes, reservoirs and rivers. These areas usually contain enough nutrients for growing fish. The water body should be closely monitored before choosing areas to close.
- x. The responsibility for updating the national fisheries statistics, resource monitoring, control and surveillance rests with the Federal Department of Fisheries (FDF).

3.2 Role of States and Local Governments

Some States Fisheries Departments have enumerators in Local Government areas who should undertake accurate statistical collection. Each state is expected to set up a surveillance unit to enforce different aspects of the fisheries edicts such as licensing, mesh and gear size regulations.

Each state is supposed to have an Inspectorate Unit of Fishery Guards for the enforcement of the edict through a Resource Monitoring, Control and Surveillance System. Inspectorate Zones are to control an Area Fisheries Guard and an Assistant Guard per unit number of fishermen in each zone or Local Government Area. These are to be supervised by

Area/Block Fisheries Supervisors who would report offences directly to the Zonal Fisheries Officers. In states that have promulgated their Fisheries Edicts, field extension staff is used to enforce them, collect licensing fees as well as fisheries statistics records. Extension duties are often concerned with fishery development efforts by way of demonstration and training of fishermen.

3.3 Promulgation and Enforcement of Fisheries Edicts in the States

Some states such as Sokoto, Niger, Kwara, Benue, Plateau, Lagos, Delta/Edo, Ondo and Oyo States have had Fisheries Edicts (Ita, 1985). A typical State Fisheries Edict in Nigeria reads:

- i. No fisherman shall:
 - a. Catch any of the freshwater fish species below the size specified in Schedule I of this Edict.
 - b. Fix stationary fishing structures across the river for the purpose of cultivating, culturing or propagating fish.
- ii. No person shall take from or destroy any fish within the water bodies by any of the following methods:
 - a. The use of any explosive substance or electricity
 - b. The use of any poisonous or noxious matter
 - c. The use of gillnet or draw net of less than 3 inches or 7.62 cm mesh size
 - d. The use of clap net, cast net or any webbing traps of less than 2 inches or 5.1 cm mesh size
 - e. Lift net of not less than 1.5 inches or 3.8 cm mesh size.
- iii. No person shall:
 - a. Preserve fish by use of insecticide or other toxic chemical
 - b. Transport, display or sell fish under unhygienic conditions.
- iv. No person shall fish within the territorial waters of the State unless he obtains a licence so to do.

The edict elaborates on the licensing procedures and fees, penalties for committing any offence stipulated.

4.0 CONCLUSION

Three levels of government in Nigeria are involved in the management of fisheries in Nigeria. While the federal government provides regulatory activities, inputs, etc. through the Federal Department of Fisheries, the edicts produced by some states governments are meant to guide operators in the areas under their jurisdiction.

5.0 SUMMARY

In this unit, we discussed the roles of the federal, state and local governments in the management of fisheries. We also presented a sample of the typical state's fisheries edict.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the roles of the federal government in the management of fisheries in Nigeria.
2. Explain the role of states and local governments in the management of fisheries in Nigeria.
3. Explain the promulgation and enforcement of fisheries edicts in the states.

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