



NATIONAL OPEN UNIVERSITY OF NIGERIA

SCHOOL OF AGRICULTURAL SCIENCES

COURSE CODE: AGR 307

COURSE TITLE: ENVIRONMENTAL IMPACT ASSESSMENT

**COURSE
GUIDE**

**AGR 307
ENVIRONMENTAL IMPACT ASSESSMENT**

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INTRODUCTION

AGR 307 is a two (2)-credit unit course on Environmental Impact Assessment (EIA). The course is broken into 17 units in all. These units will teach and explain Environmental Impact Assessment as a tool and systematic process for ensuring that environmental considerations are taken into account in all proposed activities such as projects, plans, programs or legislative actions for achieving sustainable development, which is compatible with the environment today and would continue to be in the future.

This course guide defines what the course is all about as well as the course material that you will need to consult to ensure that the course is simple and within your reach. The course guide suggests some general guidelines for the approximate time you are likely to spend on each unit. The guide contains a separate assignment file for your assessment.

WHAT YOU WILL LEARN IN THIS COURSE

The general aim of AGR 307: Environmental Impact Assessment (EIA) is to teach you the concept, classification, categorization, key elements, guidelines and procedures, and its role and function in ensuring that environmental considerations are included in proposed activities or actions to ensure compatibility of such activities/ actions with the environment to achieve sustainable development. It will also provide you the basic skills to conduct Environmental Impact Assessments.

COURSE AIMS

This course aims at teaching you the basic concept of Environmental Impact Assessment and providing you the basic skills to facilitate Environmental Impact Assessment of proposed activity such as development project, plan, and program action.

COURSE OBJECTIVES

For the aims to be achieved, there are set objectives. Each unit of this course also has its specific objectives that are found at the beginning of each unit. You will need to understand these objectives before you start working on each unit. You are encouraged to refer to them periodically to check on your progress in learning and assimilating the content. On completion of a unit, you may re-examine the objectives to ensure that you fully learn what is required.

You will find below the objectives that are set in order to achieve the aims of this course. On successful completion of this course, you should be able to:

- Define Environmental Impact Assessment
- Discuss the origin of Environmental Impact Assessment
- Describe the institutional arrangement for Environmental Impact Assessment
- Classify and distinguish different types of Environmental Impact Assessment
- State other categorization of Environmental Assessment
- Distinguish the key elements of Environmental Impact Assessment
- Describe the basic guidelines and procedures of EIA, and
- Distinguish the role and function of EIA

WORKING THROUGH THIS COURSE

To successfully complete this course you will be required to read the study units (17 in all), read/consult set books and other materials related to Environmental Impact Assessment. As a two (2) credit load, it is expected that the lecture hours will be eight (8). You will require 3 hours of self-study for every one lecture hour. In addition tutorial classes will be organized for students with the course facilitator to discuss the technical areas of this course.

The breakdown into units will facilitate your reading and your personal study. You should do the self-assessment exercises and questions in order to understand the study.

COURSE MATERIALS

The major components of this course are:

1. Course Guide
2. Study Units/Course Materials
3. Tutor Mark Assessment (TMA)

The material you are reading now is called the course guide which introduced you to this course.

STUDY UNITS

This course has been divided into seventeen (17) units, comprising of five (5) modules. Module 1 has 2 units; module 2 has 2 units; module 3 has 5 units; module 4 has 6 units while module 5 has 2 units. They are:

Module 1 The definition and legal basis of the Environmental Impact Assessment (EIA) Process

- Unit 1 Definition and scope of EIA
- Unit 2 Institutional Arrangement - EIA legislation & Lead Agencies

Module 2 Classification and categorization of Environmental Impact Assessment (EIA)

- Unit 1 Classification of EIA
- Unit 2 Other categorization of EIA

Module 3 Key elements of Environmental Impact Assessment (EIA)

- Unit 1 Scoping
- Unit 2 Screening
- Unit 3 Identifying and evaluating project alternatives
- Unit 4 Mitigating measures
- Unit 5 EIA report and certification

Module 4 Basic guidelines and procedures of Environmental Impact Assessment (EIA)

- Unit 1 Preliminary activities
- Unit 2 Impact identification
- Unit 3 Baseline study
- Unit 4 Impact evaluation
- Unit 5 Mitigation measures
- Unit 6 Documentation, decision making & Post audits

Module 5 Role and function of Environmental Impact Assessment (EIA)

- Unit 1 Role of EIA
- Unit 2 Function of EIA

Every unit contains a list of references and further reading. Try to get the textbooks and materials listed. The textbooks and materials are meant to deepen your knowledge of the course.

Apart from the print course material, you will equally have the soft copy of the material in NOUN web site – www.nou.edu.ng. When you get to the site, click on course ware and select this course.

ASSESSMENTS

There are three components of assessment for this course:

- Self-Assessment Exercises
- Tutor-Marked Assignment (TMA)
- End of course Examination

SELF-ASSESSMENT EXERCISES

The self-assessment exercises are provided for you to check your progress. Each unit has self-assessment exercises within the texts, and the answers are provided at the end of each unit. You should be sincere when working on the self-assessment exercises. Do not be quick at looking at the answers. Check the answers only when you know you have sincerely completed the questions asked. It is only by this way you will find the questions helping to aid your learning and mastery of the skills. The self-assessment exercises will not be scored.

TUTOR-MARKED ASSIGNMENT

The TMA is the continuous assessment component of this course. It accounts for 30 percent of the total score. You will be given four (4) TMAs to answer. The best three of the TMAs would be chosen which is 30% and will be added to the end of Semester Examinations. The TMAs would be given to you by your facilitator and returned to him or her after you have done the assignment.

FINAL EXAMINATION AND GRADING

There will be final examination for AGR 307. The duration will be three hours. This examination carries a total mark of 70 percent. This final examination will reflect the types of self-assessment/self-testing and Tutor-Marked Assignments. Please make sure you revise all the self-testing questions and the comments of your Tutor before the final examination. The final examination will cover information from all parts of the course.

HOW TO GET THE MOST FROM THIS COURSE

The course material replaces the lecturer that stands before you in a face-to-face classroom situation. Each unit has common format. The first item is an introduction to the subject matter of the unit and how particular unit is integrated into others and the course as a whole. There are also set objectives of the units. These objectives state what you should be able to do on successful completion of each unit. When you have completed each unit, you should go back to the objectives to confirm whether you have achieved them. You are provided exercises to do at appropriate points, just as a lecturer might give you an in-class exercise.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit, and how a particular unit is integrated with the other units and the course as a whole. Next to this is a set of learning objectives. These objectives let you know what you should be able to do at the completion of the unit. The learning objectives are meant to guide your study. When you have completed each unit, you should go back to the objectives to check whether you have achieved the objectives. This will significantly improve your chances of passing the course. The main body of the unit guides you through the required reading from other sources. This will be from your reading sections.

The following is a practical strategy for working through this course: if you run into any difficulty, telephone your facilitator/tutor. The facilitator will help you. When you need his/her assistance, do not hesitate to call and ask your facilitator/tutor to provide it.

In addition, you should do the following:

- Study the course guide thoroughly;
- Turn to the modules and units;
- Study the set modules and units objectives;
- Identify all the resources or materials you would need in all;
- Identify the hours of study allocated to each study unit;
- Plan your hours of study;
- Adhere to your study plan;
- Start your study:
 - a. Read the introduction in Module 1 and Unit 1.
 - b. Study the objective(s) in the unit.
 - c. Note the focus in the unit objective.
 - d. With the focus on the unit objective(s), study the unit.
 - e. Attend to all self-assessment exercises. You could re-read the unit text to answer the simple questions. Note key

- points on the ‘wide space margin in your course material’ when you are studying or answering the self-assessment exercises.
- f. Go through the conclusion and summary and compare with the notes you jotted at the margins of your course material.
 - g. Try to read the references and further readings for wider knowledge.
- Proceed to the next unit following the steps above when you are sure you have mastered the preceding unit.

Note: you will only be facilitated in this course; this means you must study the course material before facilitation. Your facilitator is to guide you and take you through the challenging parts in the course material.

Mode of facilitation

This course will be facilitated through Face-to face and Online. For the face-to-face, go to your study centre. Use the facilitation timetable in your study centre. This is not compulsory.

For the online facilitation, go to NOUN iLearn platform. You will be given your user name and identity number by the school authority once you complete your registration.

Hours of Study and Facilitation

You are required to spend a minimum of 4 hours of self-study per week for each study unit. That will give you a total of 64 hours in this course. You will receive 8 hours of face-to-face facilitation.

Learner Support

You can receive immediate Information, Advice and Guidance (IAG) on deferment of course and examination, course registration, time table etc from your counsellors at the study centres, centre director, facilitator, iLearn through the provided contacts and the directorate of learner support services.

The Facilitator’s Guide

As a facilitator in this course, you have three stages of activities to do as explained below:

Pre-facilitation Activities

Study the course guide and the main text. Note the resources required and how the resources will be applied. Note the number of hours required for facilitation. This course being a two credit course you have only 8 hours for face-to-face facilitation. This is different in the case of online facilitation. For online facilitation you must begin the week with the student, but you need to note the online learning environment – asynchronous or synchronous.

The knowledge of the content, learning environment and what is required in this course will help you plan your facilitation effectively. Do not start facilitating this course based on assumption. Plan your time table.

Activities during Facilitation

For face-to-face facilitation, plan the course material into 8 facilitation hours. You are not to lecture but to guide the students. Find out what the students have known and understood in the course materials with special attention to the unit objectives. Identify their area of difficulty and take them through it. Answer their questions. Guide them on how to achieve the most using the unit objectives and the resource materials indicated in the material.

For online facilitation, identify the learning environment on your planning. Note the activities to be carried out in the asynchronous and those to be done in synchronous environment. Begin by introducing yourself to the students and create environment for them to introduce themselves and upload their pictures. Also ensure that your picture is uploaded. This will make you to know yourselves even when you are not seeing each other physically. By this way the students will be aroused and ready to learn.

At the beginning of each week, introduce the students to the topic(s) of discussion in the week. Where there is a preceding week, summarize the previous week's lesson and introduce the new lesson. Where you need to meet with the students synchronously, give them date and time and ensure compliance.

In NOUN iLearn Platform, you have the chat and discussion sections. Make sure that these sections are well utilized to achieve the set objectives. Ask questions that will lead students to attend to all the self-assessment exercises. Ask questions on the videos to find out if they actually understood the knowledge that is transferred.

You must give feedback to students in their assessments. Apart from the scores, let a student know what he/she did right and those that were not right. In addition, let the student know why his/her response was wrong. Feedbacks help students to learn.

Post Facilitation Activities

At the end of facilitation you have to mark the final examination scripts and give feedback to the students. Note that it is not just enough for a student to pass rather the idea is to train the students to master the skills. So they need every explanation that would make them have the mastery when giving feedback.

Assess the course material and give over-all feedback through the questionnaire provided for you to assess the material.

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MODULE 1 THE DEFINITION AND LEGAL BASIS OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

Unit 1	Definition and scope of EIA
Unit 2	Institutional Arrangement - EIA legislation & Lead Agencies

UNIT 1 DEFINITION AND SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT

CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Definition of EIA
3.2	Scope of EIA
4.0	Conclusion
5.0	Summary
6.0	References/Further Reading

1.0 INTRODUCTION

This unit will define Environmental Impact Assessment (EIA). You will be acquainted with the definition and scope of the EIA and familiarized with the main purpose of a good EIA.

2.0 OBJECTIVES

On successful completion of this unit, you should be able to:

- define Environmental Impact Assessment
- explain the scope of a good EIA process
- identify the main purpose of EIA

3.0 MAIN CONTENT

Please read this simple text and pay attention to the simple explanation given after:

3.1 Definition of Environmental Impact Assessment (EIA)

EIA is recognized as a planning tool used to predict the likely environmental impacts of a proposed activity such as a project, plan, program or legislative action so that they can be addressed at an appropriate stage in the design or formulation before further decisions are taken on the activity or action. The EIA involves a systematic process for identifying, predicting and evaluating potential effects or impacts associated with a new development project, plan, program or legislative action. The EIA process is the various stages a proposed activity undergoes from proposal to approval for implementation.

The process compares alternatives by which a desired objective may be achieved and seeks to identify the one which represents the best combination of environmental and economic costs and benefits. It must also provide solutions called mitigation measures to avoid, reduce or minimise the negative effects or impacts that would arise from a proposed activity on the environment and public health.

Increasingly, EIA must cover socio-economic, cultural and physical impacts. It must also take into account the interaction between various impacts and their results. Local knowledge of socio-economic and cultural values is important and must be addressed as much as possible to ensure acceptance by the public. The EIA study thus involves a team of experts and specialists in the various disciplines to cover all the areas of information to be collected, collated, analysed and interpreted in the proposed environment.

3.2 Scope of Environmental Impact Assessment (EIA)

EIA is a management tool. It provides information upon which decisions may be taken. It must involve the participation of various groups or stakeholders, such as project proponent or developer, investor, regulators, planners, local communities, non-governmental organisations, and politicians who will make decisions about a proposed major activity.

It is increasingly a requirement for international assistance for grants and loans from some major donors, investors and various financial and development organisations such as the World Bank, European Union, and African Development Bank among several others. The potential scope of a comprehensive EIA process is considerable and could include the appraisal of policies, plans, programmes and specific development projects. The primary purpose is to encourage the consideration of environmental issues in the planning and decision-making in order to ensure that the action is compatible with the environment.

SELF-ASSESSMENT EXERCISE

Respond by True or False?

- i. Environmental Impact Assessment (EIA) is a tool for predicting environmental consequences of a proposed project, plan or programme.
- ii. EIA allows environmental effects (impacts) to be foreseen at an early stage in the design or formulation of a proposed activity or action.
- iii. EIA aids decision-making.
- iv. It does not protect the environment.
- v. Public participation is necessary in the EIA process.

4.0 CONCLUSION

In this unit, you have learned what is meant by EIA. You should now be able to define and explain the concept and its nature in simple words. You have also appreciated the purpose of EIA with respect to compatibility of project, plan or programme with the receiving environment.

5.0 SUMMARY

This unit has explained the need for consideration for the environment in development projects, plans, and programmes. You have learnt the basic definition and purpose of EIA. You can now discuss and mention some features of an EIA. You can now also state the primary purpose of an EIA.

6.0 REFERENCES/FURTHER READING

Ahmad, Y. J. and Sammy, G. K. (1985). Guidelines to EIA in Developing countries. Hodder and Stoughton Ltd, London, Britain.

Fouracre, P. (ed.) (2001). Environmental Impact Assessment and Management.

Rural Transport Knowledge Base. Rural Travel and Transport Program.

Puja Mondal (2015). Assessment: Definition, Roles and Classification. <http://yourarticlelibrary.com/tag/articles-on-eia> accessed on 03 August 2015.

UNIT 2 INSTITUTIONAL ARRANGEMENT - ENVIRONMENTAL IMPACT ASSESSMENT (EIA) LEGISLATION & LEAD AGENCIES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Legal and regulatory framework for EIA
 - 3.2 Lead Agencies for EIA
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

Institutional arrangements involve the establishment and empowerment of a designated authority to require EIAs and administer the process in any country. Generally, the institutional arrangements are very similar in various countries but with peculiarities depending on the country and the stage of their EIA requirement and development. This unit will familiarize you with the institutional arrangements and the regulatory framework for EIA in Nigeria.

2.0 OBJECTIVES

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

- Explain the origin and legal framework for EIA
- Distinguish the lead agencies for EIA process in Nigeria

3.0 MAIN CONTENT

3.1 Legal and regulatory framework for Environmental Impact Assessment (EIA)

The EIA was formally introduced to project management with the passage of the United States National Environmental Protection Agency (USNEPA) Act of 1970. It is regarded as the precursor of other EIA legislations that led to the formal introduction of EIA. It was the first legislation for EIA, requiring analysis of the environmental impacts of major federal actions significantly affecting the receiving environment. Other countries have had to tailor their legal, institutional and

procedural context to suit their own peculiar situations. The United States approach is quite elaborated and detailed especially when compared to those of Malaysia, South Korea and Brazil. Currently, EIA is practised in over 100 countries in the world.

EIA is proclaimed in Principle 17 of “Agenda 21” of the United Nations Conference on Environment and Development (UNCED) held in Brazil in June 1992. It states that “Environmental Impact Assessment as a national instrument shall be undertaken for proposed activities that are likely to have significant adverse impact on the environment and subject to a decision of a competent authority”.

In Nigeria, the regulatory framework for EIA is the EIA Act No. 86 of 1992 (formerly EIA Decree 86 (1992)). It is the law that governs EIA practice in Nigeria as adopted in 1992. It is the main legal document explaining the system and principles of EIA in Nigeria. It can be found at the Federal Ministry of Environment website [http://www.nigeria-law.org/Environmental Impact Assessment Decree No. 86 1992.htm](http://www.nigeria-law.org/Environmental_Impact_Assessment_Decree_No._86_1992.htm).

In the evolution of the EIA systems in Nigeria there are three independent types in operation. These are the EIA Act 86 of 1992, the Town and Country Planning Decree 88 (1992) and the Petroleum Act (1969). The EIA schemes (the Town and Country Planning Decree) has not evolved satisfactorily but the other two Acts have produced legislations and robust guidelines. The Petroleum Act of 1969 was the first comprehensive legislation introduced in Nigeria applicable to petroleum operation.

3.2 Lead Agencies

The lead agencies for the EIA process in Nigeria are the Federal Ministry of Environment (FMEnv), the competent authority, through its Environmental Assessment Department for EIA and the Department of Petroleum Resources (DPR), an arm of the Ministry of Petroleum Resources, which also has a mandate for the regulatory framework for all activities in the Oil and Gas sectors of the economy. DPR does this through the Petroleum Act of 1969 and the updated Environmental Guidelines and Standards (EGAS formerly EGASPIN) of 1991 and 1999 and revised in 2002. Also, States and Local Government Councils which comprise the second and third tiers of government were encouraged under Decree 59 of 1992 to set up their own environmental protection agencies (SEPAs). In practice, most EIAs are prepared pursuant to FMEnv and DPR guidelines.

SELF-ASSESSMENT EXERCISE

- i. In what year was a formal EIA process first introduced? In what country?
- ii. What is the regulatory framework for EIA in Nigeria?
- iii. What is the name of the guidelines in the Oil and Gas sector?
- iv. What is DPR?
- v. Which agency is solely responsible for environmental protection at the State level in Nigeria?

4.0 CONCLUSION

In this unit, you have been introduced briefly to the history and origin of formal EIA, the regulatory frameworks for EIA in Nigeria and the lead agencies with mandate for the conduct of EIAs in Nigeria.

5.0 SUMMARY

This unit has explained the origin of the EIA practice and the laws governing its application in the Nigerian environment including the Oil and Gas sector of the Nigerian economy. You have now recognised the two principal agencies involved in the EIA process in Nigeria as the FMEnv and DPR, apart from the Environmental Protection Agencies (SEPAs) at the State levels. You can now state the principal regulators for EIA in Nigeria.

6.0 REFERENCES/FURTHER READING

Federal Ministry of Environment website <http://www.nigeria-law/org/Environmental> Impact Assessment Act No. 86 1992.htm.

Department of Petroleum Resources (1991). Environmental Guidelines and Standards (EGAS) of 1991.

Echefu, N. and E. Akpofure (?). Environmental Impact Assessment in Nigeria: regulatory background and procedural framework. UNEP EIA Training Manual, Law, policy and institutional arrangements. Case Study 7. Case studies from developing countries. P. 63-74.

MODULE 2 CLASSIFICATION AND CATEGORIZATION OF

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

- Unit 1 Classification of Environmental Impact Assessment (EIA)
- Unit 2 Other categorization of Environmental Impact Assessment (EIA)

UNIT 1 CLASSIFICATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

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- 2.0 Objectives
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 - 3.1.3 Development impact assessment
 - 3.1.4 Ecological impact assessment
 - 3.1.5 Risk assessment
 - 3.1.6 Social impact assessment
 - 3.1.7 Strategic impact assessment
 - 3.1.8 Health impact assessment
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

Environmental Impact Assessment can be classified based on the purpose and the theme of development. Environmental themes for the purpose of this training module are defined as broad categories of environmental concern. Although terminology varies, it is common to find that those same themes cross a wide range of Integrated Environmental Analyses. A given environmental theme can include many environmental issues that are interconnected in a wide variety of ways. Environmental issues are more specific concerns with which stakeholders can directly relate (eg. land degradation, air and water pollution, smog, greenhouse gas emissions, etc).

2.0 OBJECTIVES

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

- State the various types of EIA based on the purpose and theme or concern
- Describe each of the theme or concern

3.0 MAIN CONTENT

3.1 Various types of environmental assessments based on themes or concerns

The various types of impact assessments to be described in this unit include those on climate, population, development, ecology, risk, social, strategic, and health. The description of the various types of impact assessments listed above are as follows:

3.1.1 Climate impact assessment

A climate impact assessment will investigate the impact on man, plants and animals of climatic changes which may occur as a consequence of a change in climate. A change could occur due to changes in such environmental issues as depletion of the stratospheric ozone layer, increases in ground-level ultraviolet radiation, heat waves, extreme events such as droughts, flooding and accompanying ecosystem damages and health risks. A current climate impact assessment that is receiving worldwide attention is that due to global warming associated with green-house gas emissions.

3.1.2 Demographic impact assessment

Demography is the statistical and mathematical study of the size, composition (age, race, sex, or marital status), and spatial distribution of human populations and how these features change over time. A demographic impact assessment will examine the effects of population or its changes usually in a given area on socio-economic or health parameters of interest. For example, population changes in the labour market and migration. Most often, national and global population continues to rise, which makes population change an essential component to demographics.

3.1.3 Development impact assessment

This refers to a project-level EIA of a development activity in isolation, such as the establishment of a new 100 ha fish farm or the construction of a dam on a major river, and the impacts that would be exerted on the environment. A project-level EIA is relatively simple and reaches to meaningful conclusions. It informs decision-makers and other stakeholders of potential environmental impacts, and suggests ways to reduce or minimize the impacts that would arise from a development activity. It is intended to drive decisions in the context of the given project. It may not effectively include the cumulative effects (or total impacts) of the development in a region.

3.1.4 Ecological Impact Assessment (EcIA)

An ecological impact assessment will examine the effects of an event or activity, such as flooding, drought, oil spill, or wind farm on a receiving environment and its components of air, water, soil and biota. It assesses also the potential effects of a development on habitats, vegetation and species; particularly those protected by national and international legislation or considered to be of particular nature conservation importance. It is an essential or integral part of Environmental Impact Assessment (EIA).

3.1.5 Risk Assessment

Risk is usually defined as the product of the probability or uncertainty of something happening and its impact (consequence). A risk analysis is an analysis of both of these components, and is therefore more than just an impact assessment. Environmental risk assessment is the analysis and evaluation of the uncertainty of unwanted potential environmental effects which could be problematic and the various measures to reduce risk.

For example, the environmental risk and negative impacts of fish farming (aquaculture) could be an analysis of the probability and local impact of organic waste load from feed, drugs (antibiotics) used in pathogens and disease control, nutrient salts, or genetic effects and various measures to reduce them. An analysis of the risk factors in fish farming is beneficial in order to take a risk-based approach to fish culture. Animal welfare is a topic that also could be considered in risk assessment.

3.1.6 Social impact assessment (SIA)

Social impact assessment can be defined as the process of assessing or estimating, in advance, the social consequences that are likely to follow from specific policy actions or project development, particularly in the context of appropriate national, state or local environmental policy legislation.

Social impacts include all social and cultural consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society (Rabel J. Burdge and Frank Vanclay 1996). It is an essential part of all EIAs where it is evident that altering the environment also alters the social and cultural organisation of human populations.

Hence, it is considered as a key dimension of the EIA process. Examples of the close interactions can be found in the context of land tenure and rights, rural livelihoods and traditional practices.

3.1.7 Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment can be defined as the systematic and comprehensive process of evaluating at the earliest possible stage, the environmental effects of a policy, plan or programme and its alternatives (adapted from Therivel and Partidario 1996).

The SEA process applies primarily to development-related activities or initiatives that are known or likely to have significant environment effects. For example, those to be carried out individually in sectors or areas, such as agriculture, transport and energy or collectively through land-use change.

Why is SEA important?

SEA is particularly important as it extends the aims and principles of EIA very early in the decision-making process, beyond the project-level and when major alternatives are still open. Strategic impact assessment represents a pro-active approach to include all environmental considerations into the higher level of decision-making.

Please note that the terms “policy”, “plan” and “programme” also mean different things in different countries. Within the same country, the terms “plan” and “programme” may be used interchangeably. However,

generally policy is regarded as the overall directive which outlines, guides or sets a context for a proposed action which a government or organization intends to take. Usually, policy is implemented by plans and programmes which outline the actions, options and measures to be carried out in a sector or area.

How does SEA compare to or differ from EIA?

SEA and EIA have many similarities and a common foundation. SEA has developed largely in response to the levels and types of decision-making not covered by EIA.

However, SEA of policy, plans and programmes differs from EIA of projects in relating to higher-level of decision-making; having a broader range of alternatives open to consideration; and greater opportunity to include all considerations for the environment.

3.1.8 Health impact assessment (HIA)

Health impact assessment (HIA) is a multidisciplinary process to assess or determine the potential and sometimes unintended effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects in order to reduce the harmful effects on health and to increase the beneficial effects.

A multidisciplinary focus is also necessary because of the fact that the most valuable HIAs examine the effects of proposals in sectors outside of health, such as agriculture, education and commerce, where health effects are typically not a major consideration in the policy-making process. While ultimately it is the individual that experiences good or poor health, the environmental determinants of health, along with the context of health outcomes must be considered.

Three typical questions that can be addressed or requiring HIA are the following:

- What are the health consequences of the current set of agricultural subsidies?
- Do State-funded after-school programs yield significant health benefits?
- What are the health effects of national minimum wage on farm labour?

The goal of HIA is to identify "those activities and policies likely to have major impacts on the health of a population in order to reduce the

harmful effects on health and to increase the beneficial effects" (Northern and York Public Health Observatory, 2001).

SELF-ASSESSMENT EXERCISE

- i. State 4 types of EIA based on the purpose and theme of development or concern
- ii. Why is a project-level EIA relatively simple?
- iii. Describe Social impact assessment in one sentence.
- iv. What is the key word in Demographic impact assessment? (Possible answer: climate, population or rainfall).
- v. Why is Strategic impact assessment important?

4.0 CONCLUSION

In this unit you have been introduced to EIA classification with 8 examples. The classification is based on the purpose and theme or concern for each of the different types. You will need to differentiate, describe and distinguish the different types correctly during your self-study.

5.0 SUMMARY

This unit has equipped you with broader knowledge of EIA with respect to the different classification. With the aid of this unit you can now confidently define and discuss the different types in your own words.

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UNIT 2 OTHER CATEGORIZATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Regional Environmental Impact Assessment (EIA)
 - 3.2 Sectoral Environmental Impact Assessment (EIA)
 - 3.3 Life-cycle assessment
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In addition to the classification in Module 2 Unit 1, EIA can be categorised based on systematic analysis of environmental parameters, geographical region, carrying capacity limitations and sectoral planning. They are project level EIA, strategic EIA, regional EIA, sectoral EIA, and life-cycle assessment. The first two categories, project level EIA and Strategic EIA, have been explained in Unit 1. You can now proceed to understand regional EIA, sectoral EIA, and life-cycle Assessment.

2.0 OBJECTIVES

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

- Describe and appraise the three categorizations – regional, sectoral and life-cycle Assessment as part of EIA classification.

3.0 MAIN CONTENT

3.1 Regional Environmental Impact Assessment (EIA)

Regional EIA in the context of regional planning includes or integrates environmental considerations into development planning for a geographic region, usually at the sub-country level. This approach is referred to as the economic-cum-environmental (EcE) development planning. The approach facilitates adequate inclusion of economic development with management of renewable natural resources within the capacity that can be supported to achieve sustainable development.

Sustainable development is development that seeks to meet the needs and aspirations of the present without compromising the ability to meet those of the future.

Regional EIA fulfils the need for macro-level environmental integration which can not be addressed effectively by the project-oriented EIA. It addresses the environmental impacts of regional development plans and thus incorporates project-level EIA of subsequent projects within the region. As such, it accounts for cumulative environmental effects at the regional level.

3.2 Sectoral Environmental Impact Assessment (EIA)

Sectoral EIA helps to address specific environmental problems that may be encountered in planning and implementing sectoral development projects. Sectoral level development plans have the integrated sectoral environmental concerns to be addressed and allows the scope of project-level EIA to be quite narrow. Hence, instead of project-level EIA, an EIA should take place in the context of sectoral or regional level planning.

3.3 Life Cycle Assessment

A broader approach to deal with environmental impacts in manufacturing is called life cycle analysis. This approach recognizes that environmental concerns are part of every step of the product manufacturing process. It therefore examines the environmental impacts of the product at all stages of the production or product life cycle.

The product cycle includes the product design, development, manufacturing, packaging, distribution, usage and disposal. Life cycle assessment is concerned with reducing or minimising environmental impacts at all of these stages in the production process. This concept allows manufacturing firms to minimise or reduce the life cycle environmental costs of their total product system. It gives sufficient scope to consider alternatives which could reduce costs. The concept also gave birth to the “reduce, reuse and recycle” popular slogan in environmental pollution abatement.

SELF-ASSESSMENT EXERCISE

- i. State 2 categories of other EIAs.
- ii. Project-level EIA is narrow in scope. True or False?
- iii. Describe the relationship between Sectoral level EIA and Project level EIA.

- iv. Which category of EIA accounts for cumulative environmental effects?
- v. What approach is used to deal with environmental impacts in product manufacturing?

4.0 CONCLUSION

From the descriptions in this unit, it is clear that EIA shall be integrated at all the levels i. e. strategic, regional, sectoral and the project level. Whereas the strategic EIA is a structural change, the sectoral and regional EIA refers to broader information processing and drawing complex conclusions.

5.0 SUMMARY

This unit has provided the classification and categories of EIAs that you should be familiar with in learning and understanding the meaning and various types or forms of EIA. You should be able to describe and discuss each of the types and distinguish their characteristics. You should also recall the purpose of each in ensuring development in a good environment.

6.0 REFERENCE/FURTHER READING

Puja Mondal (2015). Assessment: Definition, Roles and Classification. <http://yourarticlelibrary.com/tag/articles-on-eia> accessed on 03 August 2015

MODULE 3 KEY ELEMENTS OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Unit 1	Screening
Unit 2	Scoping
Unit 3	Identifying and evaluating project alternatives
Unit 4	Mitigating measures
Unit 5	EIA report and certification

UNIT 1 SCREENING

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Is EIA needed?
 - 3.2 Which activity and which does not require an EIA?
 - 3.3 Exemptions granted in Nigeria
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

Screening is a key activity to determine whether an EIA is required or not. Screening is the most common mechanism to determine whether or not a proposed activity requires an EIA and the level at which that assessment should occur.

2.0 OBJECTIVES

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

- Differentiate which proposed activity requires mandatory EIA
- Establish which proposed activity does not require an EIA
- Justify why an EIA may not be required in certain peculiar circumstances

3.0 MAIN CONTENT

3.1 Is Environmental Impact Assessment (EIA) needed?

Screening usually involves the review of the proposal against a checklist of projects to determine whether an EIA is a mandatory requirement. The legislation stipulates that an EIA has to be carried out in the case of activities which may have significant or adverse effects on the environment. Quick and early screening is easiest when mandatory lists are used. A proponent usually knows immediately whether or not EIA applies. As a general rule, screening decisions can and should identify the type of EIA study needed as quickly and as early as possible. This should facilitate efficient processing and authorization of the proposal. Most other screening decisions also should be relatively simple and straightforward, and do not require assembling large amounts of information.

Often, there is some uncertainty and an environmental assessment consultant may be required to help advise on the level at which the assessment is required. For example, screening of proposed projects with environmental objectives, such as reforestation schemes or installation of a wastewater treatment plant, is not always straightforward. Although such “green” projects may be environmentally beneficial overall, adverse impacts can occur that require appropriate mitigation measures. Sometimes, the decision might suggest other investigations. These include an Environmental appraisal, EIA or Environmental Audit.

Environmental Appraisal is a “low-level” investigation which focuses on individual issues and environmental inputs to design activities. EIA is a “high-level” process which involves a multi-disciplinary detailed study of the proposal and the environment within which it is to be developed. Environmental Audit is similar in scope to an EIA but it is applied to existing projects or activities rather than new developments.

3.2 Which activity does not require an Environmental Impact Assessment (EIA)?

In most countries, a designated screening procedure is followed to identify projects subject to EIA and, if appropriate, to assign them to a type of category. In Nigeria, the EIA Act of 1986 states the categories of activities for which an EIA is mandatory. These are listed in Category 1 of the Act and where it is not required on the basis of the magnitude or scale of operation in Category 2 or 3 (Table 1). For Category 2

activities, full EIA is not required unless within an Environmentally-Sensitive Area. Environmentally sensitive areas are areas with unique or critical resources and environmental conditions for example, proximity of a project to a protected area, a wetland, a flood plain or fadama, or an area rich in cultural resources or they have the potential for cumulative effects in association with other projects taking place or proposed for an area.

Environmental criteria can be used to assist case-by-case screening of projects that may have potentially significant effects or impacts and may require a full EIA or further investigations. The need for EIA is individually assessed on a case-to-case basis in sensitive locations, for example cash crop producing areas, water supplies, hospitals, etc.

Certain proposals require an extended screening process which in effect becomes a preliminary EIA approximate to a Category 2 study. This is also called initial environmental evaluation (IEE). This process is used when the requirement for EIA cannot be reasonably determined by the application of the screening procedures described previously. For example, an IEE may be required for a proposal that involves use of a new technology or discharge of wastewaters and substances that are hazardous to human health.

The project proponent or an independent EIA consultant acting on behalf of a proponent is required to submit a short description of the project and location to the relevant competent authority/ agency. The description should provide information on the scale or magnitude of the activity, planned use of technologies, hazardous substances, waste generation and handling, probable interaction with other activities within the same area, predicted pollution, accidents prevention etc. The project proponent or an independent EIA consultant acting on behalf of a proponent usually conducts the screening exercise in consultation with the competent/regulatory authority.

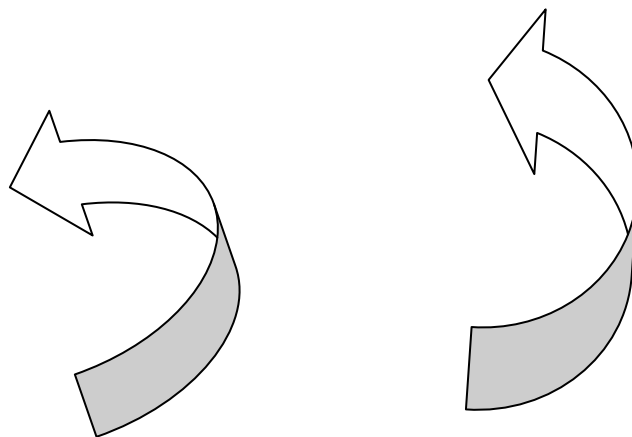
The competent or regulatory authority then examines the information provided from the screening exercise, often called the Environmental Screening Summary Note (ESSN) to determine whether the proposal or project is likely to have a significant effect on the environment in accordance with the guidelines for screening procedure. The flow chart on EIA procedure in Nigeria is shown in Figure 1.

Table 1: Category on mandatory EIA study in Nigeria.

Project category	Project type	Other considerations
1	Agriculture/Agro allied industry /manufacturing food Beverage,	

	Tobacco processing infrastructure: Ports, Housing, Airport, drainage and irrigation, railway. Transportation; resort and recreational development, Power generation , Petroleum, mining, quarries, waste treatment and disposal ,water supply, land reclamation and Brewery.	
2	Agricultural /rural development Reforestation / afforestation project, small scale irrigation, small aquaculture, saw milling, logging, rubber processing, fish processing Industry/infrastructure; Mini-hydropower development, any small scale industry development e.g textiles, chemical industry, power transmission , renewable energy development, telecommunication facility , rural water supply, public hospitals, road rehabilitation, Any form of quarry or mining.	If the project is located ; environmental sensitive area, e.g, coral reefs, mangrove swamps, small inland, Tropical rainforest areas prone to erosion, mountain slope areas prone to erosion , mountain slope areas prone to desertification, natural conservation areas, areas with protected /endangered species, areas of scientific interest. Etc, moves to category 1
3	Institutional development, health, family planning, nutritional and educational programmes.	If project involves physical interventions in the environment. Moves to category 2

Source: (FMEnv, 1995)



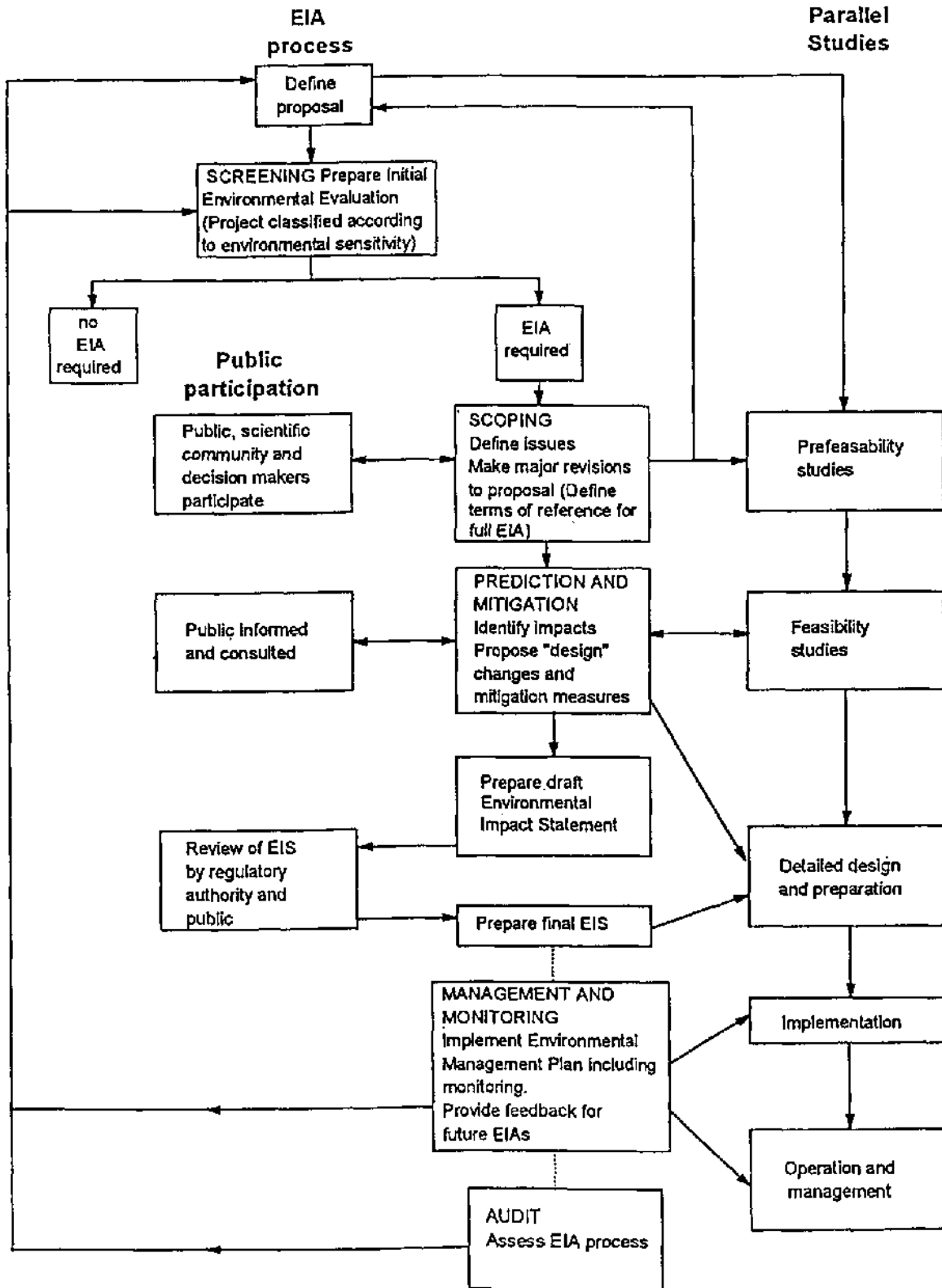


Figure 1: Flow chart on EIA procedure in Nigeria.

3.3 Exemptions granted in Nigeria

In Nigeria, apart from an exemption for EIA where the effects are minimal on the environment, a project may be allowed during a national emergency for which temporary measures have been taken by the government. A project may also be carried out in response to circumstances that in the opinion of the regulator is in the interest of public health and safety.

SELF-ASSESSMENT EXERCISE

- i. Is EIA needed for all proposed projects/activities? (Yes or No)
- ii. At what stage is screening essential?
- iii. Name one project/activity in an environmentally-sensitive area that does not require a full EIA.
- iv. The findings of a screening exercise are contained in what document or report?
- v. Give an example of a condition that justifies a waiver of EIA requirement?

4.0 CONCLUSION

In this unit we have examined screening as a key preliminary activity in deciding what proposal requires an EIA or not and the peculiar exemptions whenever necessary. You can now appreciate the need for focussing on what needs to be done and what is required by legislation.

5.0 SUMMARY

This unit has furnished you with the first key step in preparing an EIA. You should be able by now to discuss screening in the EIA process. In the next unit, you will understand the scoping exercise that follows screening and its purpose.

6.0 REFERENCES/FURTHER READINGS

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UNIT 2 SCOPING

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 What are the most significant issues?
 - 3.2 Involvement of the competent authority
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Readings

1.0 INTRODUCTION

The scoping exercise is the stage where the coverage of the EIA is decided. It commences early in the project cycle to assist in improving the project design and influence the environmental benefits of the proposed project or programme. Scoping is also a preliminary activity and earlier tasks in the project cycle that focus discussions on the environmental consequences. Usually a decision regarding a proposed activity will be taken on account of some clear selected issues of significance. You will be able to state why scoping is needed to decide what are the most significant and relevant impacts, how to predict them and how to measure them.

2.0 OBJECTIVES

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

- Identify the issues to be considered in scoping
- Formulate the Terms of Reference (ToR) or “EIA-scope draft report”

3.0 MAIN CONTENT

The overall aim of scoping is to identify from all project’s possible effects or impacts and from all the alternatives that could be addressed, the key or significant ones.

3.1 What are the issues to be considered?

The main issues to consider in scoping are:

- Appropriate boundaries of the EIA study
- Relevant key effects or significant impacts to be examined and concerns
- Reasonable set of alternatives and mitigation measures
- Define the data collection needs and field survey activities
- Determine the predictive techniques and environmental objectives that are to be employed
- Obtaining views and concerns from the participants in scoping, and
- To provide a timetable for undertaking the EIA alongside the project design process

Scoping provides the foundation for an effective and efficient EIA. It identifies the issues and impacts that matter and eliminates those that do not, resulting in the preparation of focused ToRs that ensure time and money are not wasted on unnecessary studies and investigations. Generally, internationally accepted principles of EIA good practice call for scoping to:

- inform and involve the stakeholders who are affected by or interested in the proposal;
- define the important issues and impacts that need to be studied further;
- identify the alternatives to the proposed action; and
- establish ToRs for carrying out an EIA study as described below.

Project proponents and regulators are often actors in the scoping exercise. The involvement of stakeholders or interested parties in the scoping phase is recommended for their views to enrich the scoping process. The involvement of the competent authority is also essential in the scoping exercise since the findings have to be discussed and approved for the activities spelt out in the ToR to be undertaken.

3.2 Terms of Reference (ToR) for an Environmental Impact Assessment (EIA)

The TOR embodies the scope of the proposed EIA study. This should establish clear requirements and timelines or time schedule for an EIA. The responsibility for scoping may rest with the authorising agency or a proponent. However, a special scoping group could be set up for

defining the scope of the study. The findings of the scoping exercise are submitted to the competent authority (regulator) as the “Terms of Reference” (ToR) for the EIA study. The proponent/developer carries out the EIA study, usually using environmental consultants.

SELF-ASSESSMENT EXERCISE

- i. What is Scoping in an EIA process?
- ii. Scoping exercise is Reporting. (True or False?)
- iii. What is the last task in Scoping?
- iv. Who should be involved in a scoping exercise?
- v. Why is it necessary for the regulator to be involved in the scoping exercise?
- vi. What do you understand as timelines for an EIA?
- vii. What is ToR in scoping?

4.0 CONCLUSION

In this unit, you have learned about the key issues to be considered in scoping as a result of the potential significant impacts that might arise from them in a proposed activity. You can now appreciate why they are the issues that should be addressed in the investigations to be carried out in the EIA.

5.0 SUMMARY

You have been equipped with how to examine the significant issues to be considered in an EIA process. You can now proceed to understand the availability of alternatives and the usefulness of generating options at all levels of decision-making.

6.0 REFERENCES/FURTHER READING

- DFID (1999). Environmental Guide. London: Department for International Development (DFID).
- Looijen, J. M. (2004). Environmental Impact Assessment, Lecture Notes, Workshop on Environmental Impact Assessment using GIS and MCE, Research Centre of Eco-Environmental Sciences, Chinese.

UNIT 3 IDENTIFYING AND EVALUATING PROJECT ALTERNATIVES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Formulation of alternatives
 - 3.2 No-action option or zero alternative
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In this unit, you will recall that there are usually alternatives to a proposed action, for example, multiple boreholes versus a dam for irrigation; changing the site of a dam or constructing a reservoir; and in the case of flood-control proposal, structural and non-structural options. Also, you can propose alternatives within a proposed action, such as alternative processes, layouts on location or other design aspects. Often, there are alternatives to proposed activity which could be more cost effective and environmentally-friendly. These options should be considered in any EIA.

2.0 OBJECTIVES

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

- Formulate and appreciate the consideration of alternatives to a proposed action
- Evaluate different types of alternatives that can be considered

3.0 MAIN CONTENT

3.1 Formulation of Alternatives

The development of alternatives and the assessment of impacts of a proposed activity for each of the alternatives are the core of any EIA. The examination of different ways of achieving an objective may assist decision-making in choosing a preferred or better option. Alternatives can allow for lowered costs and better considerations for the environment by reducing the environmental consequences. It is useful to

evaluate the usefulness of alternatives at all levels of decision-making in an EIA.

Alternatives could be evaluated based on economic costs and concerns, site/location option, facility alternatives (process, desired products, changes in technology, etc), and least impact and greatest benefits options. The selection of each alternative should compare the environmental impacts of each alternative and selection of the least environmental damaging option. There are also policy alternatives such as hydropower or nuclear power; fossil fuel or renewable energy usage; organic farming or large-scale usage of inorganic fertilizers; feeder road or highway, etc.

A delayed project option is also an alternative which implies that the proposed activity should be postponed until prevailing conditions are favourable for its implementation. Such conditions could include ongoing community conflicts, war, unacceptable or unattractive economics, high inflationary trends, and unfavourable political environment among several others.

3.2 Zero action alternatives in selection of activities

The “no-action” option or zero alternatives is also an alternative, which is frequently unattractive to proponents and developers but could be the most viable environmental option. It is a do-nothing approach which could mean no development, for example in environmentally sensitive areas. This often leads to consideration of alternative site/location and other associated choices that might be required in such cases. The “no-action” option should be included to provide an objective baseline against which the other alternatives can be measured and compared.

SELF-ASSESSMENT EXERCISE

- i. Is a borehole an alternative to a tube well on a farm?
- ii. A delayed project means the cancellation of a proposed activity/project (True or False?)
- iii. What is a “no action” alternative?
- iv. What is an alternative in EIA?
- v. Name one means of evaluating an alternative.
- vi. Based on the debate on climate change, propose alternatives to the following proposed activities: Coal-fired power plant, and a nuclear plant.

4.0 CONCLUSION

In this unit, you have learnt about formulating alternatives and the usefulness of generating options at all levels of decision-making to

reduce to the minimum the adverse environmental consequences. You have also learnt that “no-action” option or zero alternatives is also an alternative, which is frequently unattractive to proponents and developers but could be the most viable environmental option.

5.0 SUMMARY

You can now appraise alternatives in any proposed environmental activity and apply their usefulness in addressing identified significant impacts or effects in environmental activities. Alternatives can allow for lowered costs and better considerations for the environment by reducing the environmental consequences.

6.0 REFERENCES/FURTHER READING

Looijen, J. M. (2004). Environmental Impact Assessment, Lecture Notes, Workshop on Environmental Impact Assessment using GIS and MCE, Research Centre of Eco-Environmental Sciences, Chinese Academy of Science, 58pp.

UNIT 4 MITIGATING MEASURES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Appropriate mitigation measures
 - 3.2 Monitoring plan
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In this unit, we will examine mitigating measures which are the options to avoid, minimize, or reduce identified negative impacts of a proposed activity. They are remedies designed to limit the severity of environmental effects or impacts.

2.0 OBJECTIVES

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

- Propose some appropriate mitigation measures to address common potential environmental impacts arising from project level activities
- Build the mitigation measures into a monitoring plan

3.0 MAIN CONTENT

3.1 Appropriate mitigation measures

An evaluation of predicted impacts will usually follow the identification of the potential impacts of a proposed activity. You will recall that in the formulation of alternatives in Unit 3, the significance of impacts can lead to the choice or selection of the least environmental damaging option. Each significant impact has to be mitigated in the most cost-effective manner to ensure the sustainability of the project or activity. In practice, impacts are evaluated using appropriate weightings as high, medium or low in significance. No additional mitigation measures are required for impacts of low significance while medium and high significance impacts need to be appropriately mitigated.

An example of a section of a summary table for impacts and proposed mitigation measures as a result of the establishment of a 400 ha Oil Palm plantation in the Delta State is given below:

Impact	Mitigation measures
400 ha of prime forest would be lost to accommodate the palm oil plantation	A no-option, no project alternative will mean to abandon this agricultural project.
Valuable community farms have to be relocated	Pay compensation to community and individual farmers at approved rates.
A bird sanctuary within the land area will be disturbed and lost	Fence off the sanctuary to preserve it and monitor the impact on bird population.
Access to a river used by a community for drinking and other purposes will be blocked	Provide boreholes and a small treatment plant for the community.
The project will block the movement of monkeys from the north to the south of their feeding ground	Provide a wildlife corridor from the north to south along the entire length of the plantation.

You should suggest additional predictable impacts along with their appropriate mitigation measures as a useful exercise to develop your skill and enhance your understanding.

3.2 Monitoring Plan

A monitoring plan contains a listing of the tasks to be addressed in order to implement the mitigation measures agreed on for a proposed activity/action. It includes the names/titles of the actors to be responsible for them at the operational phase of the project to ensure compliance. It must be prepared with time frames and implemented as scheduled in the EIA report. The example above show clearly that mitigation measures are of little value unless they are implemented as planned. Therefore, monitoring must include the effectiveness of the mitigation measures. Hence there is a clear link between mitigation and monitoring.

SELF-ASSESSMENT EXERCISE

- i. Describe what you understand as mitigation measures.
- ii. What impacts/effects need to be mitigated in an EIA activity?
- iii. No additional mitigation measures are required for impacts of low significance (True or False?)
- iv. What is a monitoring plan?
- v. What is the link between mitigation and monitoring?

4.0 CONCLUSION

You have been introduced to identifying and predicting impacts from a typical project and proposing appropriate mitigation measures. You can also appreciate the need for monitoring plan to ensure that mitigation measures are implemented at the operational phase of the project.

5.0 SUMMARY

This unit, like the others in this module has equipped you with the key elements in EIA. You should be confident to attempt screening, scoping, identifying project alternatives and proposing mitigation measures at this stage. Further self-study using the references should provide you with additional information for your practice. You should ensure that you practise using common project examples to enhance your skill in conducting an EIA.

6.0 REFERENCES/FURTHER READING

Fouracre, P. (ed) (2001). Environmental Impact Assessment and Management, Rural Travel and Transport Program, Rural Transport Knowledge Base.

Global Environment Outlook Resource Book (2007): A training manual of integrated environmental assessment and reporting. United Nations Environment Programme (UNEP).

Published by the United Nations Environment Programme and the International Institute for Sustainable Development, Printed in Canada.

UNIT 5 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT AND CERTIFICATION

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 EIA report
 - 3.2 Approval / Certification
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

Reporting is the compilation of the findings from an EIA activity or exercise. You will be equipped further on the writing in this unit and in Module 4 Unit 6 on the entire documentation process in an EIA.

2.0 OBJECTIVES

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

- Develop an Environmental Impact Assessment (EIA) report
- Explain the Approval / Certification process

3.0 MAIN CONTENT

3.1 Environmental Impact Assessment (EIA) report

An EIA report contains the findings of an EIA process for a proposed project / activity. It is a formal document or set of documents, sometimes referred to as the Environmental Impact Statement (EIS) depending on the applicable procedure in each country. EIA report summarizes the results of this process and provides information that relates to project design, environmental-setting, permitting and other types of authorization. In addition, the extent to which EIA-derived information is taken into account and influences project approval or regulatory decisions determines what happens “on the ground” during project construction and operation. The report is meant for the attention of decision-makers and interested stakeholders and the wider public.

It should be written in a simple manner and in plain English to ensure decision makers and others understand the key issues and impacts and how they can be mitigated. It is not and should not be an academic report on the effects of a proposal. Often, the regulator or competent authority will provide guidelines for the preparation of the draft report. A format provided by the competent authority in Nigeria, the Federal Ministry of Environment (FMEnv) is shown in Table 2. The content of the report in the minimum should include the following:

Table 2: - Content of an environmental impact assessment report (FMEnv, 1995).

Table of contents <i>List of acronyms</i> Executive Summary Acknowledgement EIA Preparers	Chapter 5 – Associated and Potential <i>Environmental Impacts</i> <i>Impact Prediction Methodology</i> <i>Significant Positive Impacts</i> <i>Significant Negative Impacts</i> <i>Site Preparation and Construction Impacts</i> <i>Transportation Impacts</i> <i>Raw Material Impacts</i>
Chapter 1 – Introduction <i>Terms of Reference</i> <i>Background Information</i>	<i>Project-Specific Incremental Environmental -Changes (if any)</i> <i>Project-Specific Cumulative Effects</i> <i>Project-Specific Long /Short-Term Effects</i> <i>Project-Specific</i>
Chapter 2 – Project Justification <i>Need for the Project</i> <i>Value for the Project</i> <i>Envisaged Sustainability</i>	<i>Reversible/Irreversible Effects</i> <i>Project-Specific Direct/Indirect Effects</i> <i>Project-Specific Adverse/Beneficial Effects</i> <i>Project-Specific Risk and Hazard Assessments</i>
Chapter 3 – Project and Process Description <i>Type of Project</i> <i>Input and output of Raw Materials and Products</i> <i>Location</i> <i>Technological Layout</i> <i>Construction</i> <i>Production Process</i> <i>Production Operation and Maintenance</i> <i>Project Schedule</i>	Chapter 6 – Mitigation Measures/Alternatives <i>Best Available Technology</i> <i>Liability</i> <i>Compensation/Resettlement</i> <i>Site Alternative, Location, Routes</i> <i>No Project Option</i>
Chapter 4 – Description of the Environment <i>Baseline Data Acquisition Methods</i> <i>Study Approach</i>	<i>Table Listing Impacts with Corresponding -Mitigation Measures</i>

<p><i>Geographical Location</i> <i>Field Data</i> <i>Climatic Conditions</i> <i>Air Quality Assessment</i> <i>Noise Level Assessment</i> <i>Vegetation</i> <i>Cover</i> <i>Characteristics</i> <i>Potential Land Use and</i> <i>Landscape</i> <i>Patterns</i> <i>Ecologically Sensitive Areas</i> <i>Terrestrial Fauna and Wildlife</i> <i>Soil Studies</i> <i>Aquatic Studies, including</i> <i>Hydrology and Fisheries</i> <i>Groundwater Resources</i> <i>Socioeconomic Studies</i> <i>Infrastructure Services</i></p>	<p><i>Compliance with Health and Safety</i> <i>Hazard Requirements</i></p> <p>Chapter 7 – Environmental Management Plan</p> <p><i>Monitoring Schedule</i> <i>Monitoring Methodology</i> <i>Parameters to be Monitored</i> <i>Scope of Monitoring</i></p> <p>Chapter 8 – Remediation Plans after -Decommissioning, Closure, Abandonment</p> <p>Chapter 9 – Conclusion</p> <p>Bibliography Appendices</p>
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- A description of the proposed activity;
- A description of the existing environmental situation, including specific information necessary for identifying and assessing the environmental effects of the proposed activity;
- A description of alternatives as appropriate;
- An assessment of the potential effects or impacts of the project/activity and alternatives;
- Identification and description of measures available to mitigate adverse environmental effects/impacts of the proposed activity and alternatives and an assessment of such measures;
- An Environmental Management Plan
- A brief non-technical executive summary and recommendations – brief description of the proposed activity, potential significant environmental impacts, mitigating and ameliorating measures, and environmental management plan.

A draft EIA report is submitted to the competent authority along with an application for project authorisation. In the Nigerian EIA system, this is followed by a review process involving public display of the document for a prescribed period of 21 days and an advertised call for submission of comments by interested parties. An in-house review is conducted by the regulator after which a public review is organised to present the key

findings of the EIA study, receive public comments and those of interested parties and a panel of invited reviewers. All comments are discussed after which the draft EIA report is evaluated for compliance with guidelines set by the regulator by the invited review panel. The review panel then make a recommendation to the competent authority based on the conformity of the draft document with EIA guidelines and procedures, public presentation and comments received for the approval or rejection of the proposed activity.

3.2 Approval/Certification

When found satisfactory, the proponent is required to reflect all the comments received at the public review and hearing within an agreed period, and submit a final document. Upon receipt of a satisfactory final document, the regulator issues an approval for commencement of project implementation.

SELF-ASSESSMENT EXERCISE

1. What does a draft EIA report contain?
2. For whose attention is it prepared?
3. An EIA report should be written like a thesis. (True or False?)
4. Mention two participants at an EIA review meeting.
5. Who gives the approval for project/activity commencement?

4.0 CONCLUSION

In this unit, you have observed how an EIA document is prepared and the various issues it should generally contain to satisfy the requirements of a competent authority for a review exercise and finally an approval for project/activity commencement.

5.0 SUMMARY

In this Module, you have learnt what should be the content of an EIA report. You should be able to identify all the 5 key elements we have examined in any good EIA report and develop one by yourself following the examples you have learnt. You should think of a proposed project and use the step by step approach outlined to develop a document. This is a useful practice to ensure that you fully learn and can conduct an EIA.

6.0 REFERENCES/FURTHER READING

EIA Report (2004). EIA for the Agbami Field Development, Vol. 1. Submitted by Star Deep Water Petroleum Ltd.

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MODULE 4 BASIC GUIDELINES AND PROCEDURES OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Unit 1	Preliminary activities
Unit 2	Impact identification
Unit 3	Baseline study
Unit 4	Impact evaluation
Unit 5	Mitigation measures
Unit 6	Documentation, decision making & Post audits

UNIT 1 PRELIMINARY ACTIVITIES – SCREENING AND SCOPING

CONTENTS

1.0	Introduction
2.0	Objective
3.0	Main Content
	3.1 Preliminary activities – Screening and Scoping
4.0	Conclusion
5.0	Summary
6.0	References/Further Reading

1.0 INTRODUCTION

Depending on the importance of EIA in the national development, national EIA procedures may vary from country to country. However, the procedures used by different countries and their agencies follow a

similar pattern to the US NEPA. A general framework is shown in Figure 2.0 which illustrates the various steps in the process as adapted from Wood (1995). The process is the various assessment activities and stages that a new proposal undergoes from inception to approval for implementation.

In this unit, you will recall the key elements in the EIA process in Module 3. We will focus on the stage or position of EIA tasks spelt out in EIA Guidelines and Procedures which are broadly similar in various countries. In Nigeria, FEPA (1995) and DPR (1991 and 1999) contain the requirements for project EIAs and the Oil and Gas sector respectively.

2.0 OBJECTIVE

In this unit, we shall be able to:

- recall preliminary activities in the EIA process, those of screening and scoping

3.0 MAIN CONTENT

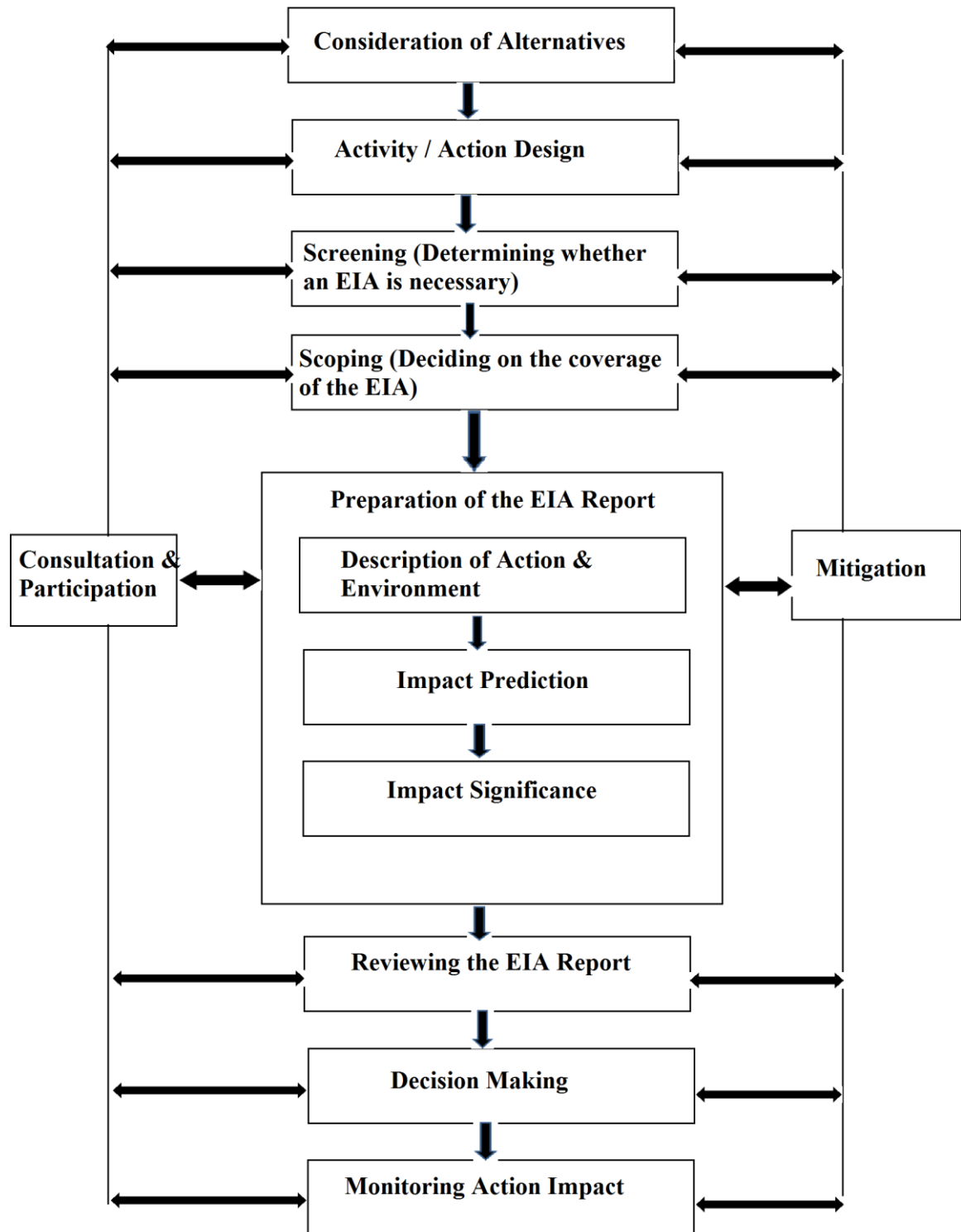
3.1 Preliminary activities – Screening and Scoping

Upon the expression of interest to undertake a proposed project, by a letter to the regulator, a proponent/developer is expected to commence a screening exercise to determine whether or not an EIA is required or mandatory. The Screening exercise usually involves the review of the proposal against a checklist of projects to determine whether an EIA is a mandatory requirement. This should be done in consultation with a regulator with mandate for the EIA process. A study team or consultant could be charged with this task. The screening exercise ends with the preparation of an Environmental Screening Summary Note (ESSN) which should state whether or not the proposal or project is likely to have significant effects/impacts on the environment in accordance with the guidelines for screening procedure.

If an EIA is found necessary, scoping is the next activity. This is to identify all project's possible effects or impacts and from all the alternatives that could be addressed, to decide what are the most significant and relevant impacts.

Figure 2: Environmental Impact Assessment Process

(Adapted from Wood, 1995)



SELF-ASSESSMENT EXERCISE

- i. What is involved in a screening exercise?
- ii. Who could undertake the screening exercise?
- iii. Who is a project proponent?

- iv. Who confirms if a project requires a screening exercise or not?
- v. What is the exercise after screening called?

4.0 CONCLUSION

In this unit, you have learnt the essence of the preliminary activity called screening and why it is required to decide whether or not a proposed activity/action requires an EIA. You should now state without any doubt the first activity in the EIA process.

5.0 SUMMARY

This unit has explained the first step in the EIA basic guidelines and procedures as required in the EIA process for many countries. You should be familiar with the next step or stage which is called Scoping.

6.0 REFERENCES/FURTHER READING

- DFID (1999). Environmental Guide. London: Department for International Development (DFID).
- Fouracre, P. (ed) (2001). Environmental Impact Assessment and Management, Rural Travel and Transport Program, Rural Transport Knowledge Base.
- Looijen, J. M. (2004). Environmental Impact Assessment, Lecture Notes, Workshop on Environmental Impact Assessment using GIS and MCE, Research Centre of Eco-Environmental Sciences, Chinese Academy of Science, 58pp
- Wood, C.M., (1995). Environmental Impact Assessment, A comparative review. Longman Group Ltd, London, UK, pp. 337.

UNIT 2 IMPACT IDENTIFICATION

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Preliminary identification of potential effects
 - 3.2 Preliminary screening for impact importance
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In this unit, you will appreciate the possible occurrence of effects/impacts and their magnitude and significance in a project activity and how to identify such effects.

2.0 OBJECTIVES

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

- discuss preliminary identification of potential impacts
- discuss preliminary screening for impact importance

3.0 MAIN CONTENT

3.1 Preliminary Identification of Potential Impacts

Potential effects or impacts are distinguished according to the three phases of a proposed activity:

- Construction phase
- Operation phase
- Decommissioning phase

The process of impact identification is based upon an understanding of how the proposed activity might interact with its receiving environment. A good knowledge of the existing environment is essential as baseline for the future state of the same environment without the proposed project. How the proposal interacts with the future environmental setting must be examined in terms of the three phases and any important maintenance activities. A selection of potential effects is done on the

basis of the possible occurrence of the effects on the one hand and their magnitude and significance on the other.

For the identification of environmental effects/impacts of a proposed activity several examples of checklists, impact matrices, flow diagrams, and guidance documentation exists on the broad effects that different types of projects may cause. However, they are no substitute for an expert understanding of the potential interactions between the project and its environment (Fouracre 2001). These include biophysical (geology, soil, vegetation, surface and ground water), marine ecology and birds, coastal habitats, air, vibration and noise and aesthetics, and socio-economic components (population, infrastructure, transportation, health and security, social- cultural structures) of the project environment. Also, different priorities can be assigned to different effects.

A checklist of effects normally considered as significant in the California Environmental Quality Act (CEQA) is reported in Looijen (2004). However, generally a proposed activity will have a significant effect if it will involve any of the following:

- Conflict with laws, regulation or accepted standards (FMENV, DPR, National and International Guidelines and Standards);
- Conflict with adopted environmental plans and community goals;
- Inconsistent with government policy objectives;
- Conflict with established protected sites, wetlands, or environmentally-sensitive areas;
- Cause substantial flooding, erosion, landslide, or siltation/sedimentation
- Displace a large number of people, villages or communities
- Induce explosive growth or migration of population
- Cause traffic bottle neck that will substantially disrupt circulation in relation to existing road traffic load and capacity
- Convert prime agricultural land to non-agricultural use or impair their productivity
- Disrupt or adversely affect a religious site or cultural resource
- Substantially degrade, diminish or destroy habitat for fish, wildlife or plants
- Substantially interfere with fishing/fisheries and other uses of a water body
- Substantially interfere with the movement of resident or migratory fish or wildlife
- Degrade or destroy large areas of forest resource
- Substantially degrade or deplete ground water resources
- Contaminate or pollute a public water supply

- Substantially degrade and impair water quality
- Violate any ambient air quality standard
- Substantially increase ambient noise levels
- Constitute a potential public health hazard to people, animals or plants
- Have unacceptable demonstrable negative aesthetic effects

3.2 Preliminary screening for impact importance

The first level of impact assessment involves the preliminary identification and screening of potential environmental impacts from proposed activity-environment interactions. This is based on an understanding of the activities and the nature of interaction with environmental components. A number of approaches are available for impact assessment including the Leopold matrix, Overlays, and Battelle environmental evaluation system. A number of models are available to assist in quantitative identification. A modified Leopold matrix may be used for the identification and screening. The matrix was designed for the assessment of impacts associated with almost any type of construction project. Its main strength is as a checklist that incorporates qualitative information on cause-and-effect relationships but it is also useful for communicating results. The matrix arrays project activities against environmental components and supports a methodical and objective identification of the impacts each activity may have on each biophysical and socio-economic component.

Environmental impacts or effects may be divided into different categories such as beneficial or adverse effects; direct or indirect effects; reversible or irreversible effects, short-term or long-term effects; cumulative effects; transboundary effects etc. Entries in Leopold matrix cells represent the nature and preliminary ranking of the severity of impacts. Ranking of the severity is based on scales and symbols such as: Major (2), Minor (1), Negligible and/no effect (0), and positive (+). Objectivity is critical in impact identification and evaluation and the higher the level of objectivity that can be obtained, the better the method employed.

In this preliminary screening, all potential impacts, whether likely or unlikely are considered.

SELF-ASSESSMENT EXERCISE

- i. Impact identification is based upon an understanding of how the proposed activity might interact with its receiving environment (Yes or No?).

- ii. There are no substitute for an expert understanding of the potential interactions between the project and its environment (True or False).
- iii. Which is odd in the following as a biophysical component: soil, vegetation, air, habitats, and rice?
- iv. Objectivity is critical in impact identification and evaluation (True or False).
- v. What are the three project phases mentioned in this unit?

4.0 CONCLUSION

In this unit, you have learnt the first step in the identification and screening of effects/impacts from a proposed activity. You now know that identification is based upon an understanding of how the proposed activity might interact with its receiving environment. This skill can be acquired through practical experience. You have also learnt the importance of being objective in impact identification by the use of methods like the Leopold matrix designed to assist in the exercise.

5.0 SUMMARY

You will recollect that this unit has exposed you to preliminary identification and screening of effects/impacts especially objectively through an objective process using models or matrices. You should appreciate the use of quantitative methods in this exercise to remove any doubt in the screening exercise and achieve the identification of the most significant impacts.

6.0 REFERENCES/FURTHER READING

Fouracre, P. (ed) (2001). Environmental Impact Assessment and Management, Rural Travel and Transport Program, Rural Transport Knowledge Base.

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UNIT 3 BASELINE STUDY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Description of the baseline environment
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In this unit, you will learn the importance of a baseline study of an existing environment as essential and fundamental information for any comparison with the same environment upon its modification or alteration by a proposed project/ activity. It forms the basis for observing the project effects/impacts on the receiving environment and guides future activities and decision making on the same environment.

2.0 OBJECTIVES

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

- Collect the information to describe the baseline environment of a proposed activity
- Report on seasonal differences

3.0 MAIN CONTENT

3.1 Description of the baseline environment

The description of the biophysical and socio-economic characteristics of the baseline environment includes details of the physical environment within and around a proposed project location/site. Baseline data acquisition methods will involve desktop study of existing literature on the general area, recent surveys, satellite imageries, and field data acquisition. In Nigeria, data acquisition should cover the two seasons (dry and wet seasons) in order to observe seasonal differences if any. The scope of data acquisition often includes data on the following:

- Climatic conditions – air temperature, rainfall, relative humidity, pressure, winds, wind speed and direction, sun radiation, tides and ocean currents, waves, etc

- Air quality assessment – field measurements of various air pollutants –Emission inventory, Volatile Organic Carbon (VOC), Nitrogen Oxides (NO_x), Suspended Particulate Matter (SPM), Carbon Dioxide/Monoxide (CO₂/CO), Ozone, Ammonia (NH₃), Hydrogen Sulphide (H₂S), Sulphur Oxides (Sox)
- Noise level assessment – ambient noise levels
- Geology of the area –tectonic evolution, geomorphic features, etc
- Vegetation cover characteristics – floristic characteristics
- Potential land use and landscape patterns
- Ecologically sensitive areas – wetlands, floodplains, fadama, etc
- Terrestrial Fauna and Wildlife – Biological resources (species list, species diversity, species abundance population density, species dominance/frequency of occurrence, biologically important larval forms, etc
- Soil studies – soil types, particle size distribution, soil chemistry, etc
- Aquatic studies, including hydrology, fisheries, bathymetry, sedimentology, etc
- Groundwater resources
- Socio-economic studies –Demography (population, age-sex structure/distribution, household size, etc); mortality and disease prevalence; housing characteristics; waste management; occupation, income and employment level; level of literacy; etc
- Infrastructure services – source of water, health facilities, educational facilities, electricity supply, etc

Appropriate quality assurance and quality control methodologies should be instituted to check and verify field sampling program, sample custody/transfer, and chemical/laboratory analyses etc. All data should also be subjected to appropriate verification and statistical tests. The EIA study often involves a team of experts and specialists/professionals in the various disciplines to cover all the areas of information to be collected, collated, analysed and interpreted from the environment for a proposed activity/action.

SELF-ASSESSMENT EXERCISE

- i. Baseline study is a collection of information on the proposed project environment (True/False)
- ii. Such information could be obtained solely from the Internet (True/False)
- iii. Field survey is an essential part of baseline data acquisition (Yes/No)
- iv. Land survey is the first exercise in baseline acquisition (True/False)

- v. Biophysical characteristics should be fully documented in baseline acquisition (True/False)
- vi. Satellite data could be part of baseline data (True/False)
- vii. Ground truthing should be part of quality assurance (True/False)
- viii. For aquatic/ water surfaces the quality characteristics should be measured (Yes/No)
- ix. Why should data acquisition cover the two seasons in Nigeria?
- x. Quality assurance and control are essential for data verification (Yes/No).

4.0 CONCLUSION

In this unit you have learnt what constitutes the content of baseline/background information on the environment for an EIA and how they are acquired through existing literature, record of surveys and specific field data surveys. The studies provide a full description of the state of the environment.

5.0 SUMMARY

This unit has explained the content of a baseline study. You should be able to initiate and propose a baseline study for a simple EIA project, for example a project-level EIA following the outline given in this unit. You should practise writing down the various elements with the appropriate kind of information required.

6.0 REFERENCES/FURTHER READING

- Federal Ministry of Environment (FMEnv) (1995). Content of EIA Report.
- Looijen, J. M. (2004). Environmental Impact Assessment, Lecture Notes, Workshop on Environmental Impact Assessment using GIS and MCE, Research Centre of Eco-Environmental Sciences, Chinese.

UNIT 4 IMPACT EVALUATION

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Assessment and evaluation of identified potential impact
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

Impact evaluation has been described differently over the last few decades. Generally, impact evaluation assesses the changes that can be attributed to a particular activity/action such as a policy, program or project. It may include both the intended changes as well as the unintended ones. It seeks to answer cause-and-effect questions. In other words they look for changes in outcomes that are directly attributable to a policy, program or project. Impact evaluation could be carried out immediately following the implementation of an activity /action or later (5-10 years) after the implementation to allow time for the impact to appear. It could also involve an evaluation of all activity/action within a given sector or geographical area.

2.0 OBJECTIVES

At the completion of this unit, you be able to:

- Practise the identification of potential impacts from a project-level EIA;
- Investigate potential impacts from similar activity/action;

3.0 MAIN CONTENT

You should recall from unit 2 of this module that the first level of impact assessment involves the preliminary identification and screening of potential environmental impacts from proposed activity-environment interactions. This is based on an understanding of the activities and the nature of interaction with the environmental components. Also, a selection of potential effects/impacts is done on the basis of the possible occurrence of the effects/impacts on the one hand and their magnitude and significance on the other. For the identification of environmental effects/impacts of a proposed activity several examples of checklists,

impact matrices, flow diagrams, and guidance documentation exists on the broad effects that different types of projects may cause.

We also considered the identification of potential significant effects/impacts using a checklist that outlined significant effects/impacts from a proposed activity. In order to assess and evaluate identified potential impacts from a project-level EIA, we will use as our example the Field Development Plan Project (FDP) of Jones Creek in the Niger Delta. The different phases of Jones Creek FDP project development activities are presented in Table 3 while the environmental components and associated impact indicators are presented in Table 4. From the project activities and the knowledge of environmental components with its associated impact indicators, the potential impacts were identified and classified as negative/adverse or beneficial as presented in Table 5.

In order to determine whether a negative/adverse impact of the project is significant to warrant mitigation, the judgment of significance was based on one or more of the following:

- Comparison with laws, regulation or accepted standards (FMENV, DPR, National and International Guidelines and Standards);
- Consultation with the relevant decision makers –FMENV/DPR, Environmental agencies;
- Preference to pre-set criteria such as protected sites, features or species
- Consistency with government policy objectives;
- Acceptability to the local community or the general public;
- Pre-determined Institutional criteria such as World Bank or World Health Organization (WHO) safety standards;
- Accumulated knowledge, experience, information and best professional judgment of the Environmental assessment team; and
- Knowledge of the valued ecosystem components

You should observe that the sources of impacts were identified for the 3 project phases that are construction, operation, and decommissioning / abandonment (Table 5). Often, potential impacts at especially the construction phase are of a temporary nature (e.g. air pollution from construction equipment due to dust and gaseous emissions) while those at the operational phase may be persistent and should be mitigated.

Table 3: Phase of Project Development Activities

S/N	Development Phase	Activities
1.	Site Investigation/Preparation	Bush clearing/Stumping/Stripping, Spoil Disposal, domestic and industrial waste.
2.	Resources Extraction	Drilling/Work over/Completion, Waste Disposal.
3.	Flow station Upgrade	Heavy equipment transport, oil, grease, lubricants, scrap metal, domestic and industrial wastes.
4.	Flow line Construction	Trenching, welding, wrapping and coating, Painting and Spoil Disposal
5.	System Operation & Maintenance	Corrosion Control, Emissions, Oil Spills & Leaks, Noise & Vibration.
6.	Abandonment	Scrap Metals, Plastics/Glass, Industrial Refuse, Sludge, Oil & Grease

Table 4: Environmental Components and Associated Impact Indicators

S/N	COMPONENTS OF ENVIRONMENT	IMPACT INDICATORS
1.	Climate	Humidity, Temperature, Rainfall, Wind
2.	Air Quality	Particulates, No _x , SO _x , CO ₂ , THC, H ₂ Ss
3.	Water Quality	Solids (TDS, TSS), Turbidity, Toxicity
4.	Hydrology	Drainage/Discharge, Hydrologic Balance, Sedimentation, Shoreline Erosion
5.	Hydrogeology	Groundwater level and Quality
6.	Soil/Land Use	Erosion, Farming, Hunting, Recreation
7.	Ecology	Diversity and abundance of Aquatic and Terrestrial Flora & Fauna
8.	Fisheries	Productivity, Diversity & Abundance
9.	Archaeology	Cultural relics, sites
10.	Noise & Vibration	Night-time disturbance, hearing loss, communication interference
11.	Socio-economic	Population, income, settlement pattern, health, safety and security
12.	Wildlife & Forestry	Conservation areas, habitats and sensitive areas

Table 5: Identified Potential Impacts of Jones Creek FDP Campaign on Project Environment

SOURCES OF IMPACTS	TYPES OF POTENTIAL IMPACTS	ADVERSE	BENEFICIAL
<u>Site Preparation/ Construction Phase</u> Movement of Personnel, Equipment/Materials to site	Accidents/Injuries/Traffic delays from increased vehicle movements	✓	
Drilling operations – Cutting recovery / acidification and mixing	Soil, surface water and groundwater quality contamination	✓	
Increased Noise levels from construction equipment/generation	Disturbances and Nuisance and lowering of air quality through emissions	✓	
Well testing – flaring	Pollution of site air quality and potential for accidents	✓	
Influx of workers and job seekers	Increased population leading to increased demands on the goods and services and infrastructure of the community	✓	✓
Employment of natives and increased business activities	Injection of money into the Local economy from purchase of goods and services		✓
Employment of Local inhabitants	Increase in earning power of individuals and injection of capital into the local economy		✓
Drilling fluid disposal (spent mud & waste water)	Soil contamination, surface water contamination, underground water contamination	✓	
Accidental spills (oil and chemicals)	Soil contamination, surface water contamination	✓	
<u>Operation/Production Phase</u> Loss of containment due to corrosion, malfunctioning of equipment and sabotage	Soil, water an underground water contamination	✓	
Bush Clearing/ Stumping /Spoil Disposal	Vegetation clearance, Alteration of topography, Increased surface turbidity	✓	
Resource Extraction: Drilling/ Walkover/Completion/Waste disposal – cuttings, acidification and mixing	Soil, surface water and ground water contamination	✓	
Flow station upgrade/Well Testing – Flaring	Air Quality degradation of site of operation	✓	
Dredging activities	Alters aesthetics and geomorphology of the local site, increased turbidity, back erosion and impacts on benthic fauna	✓	✓
<u>Commissioning/Abandonment /Site Restoration Phase</u> Removal of steel structure, materials, demolition of camp site, etc	Health and Safety concerns Stabilization and Erosion control and disposal of wastes	✓	✓
Increased revenue from improved and increased oil and gas production	More revenue to Government (Federal and States) for development projects and improved standard of living		✓

The potential impacts for the proposed Jones Creek FDP project activities against environmental components were assessed and evaluated. This was done in order to demonstrate clearly the potential impacts of the project activities on existing environment components of Jones Creek Field. The pattern adopted for the ranking of potential impacts is discussed below.

The ranking of impacts (on scale of severity) on a scale of 1 – 10, was interpreted as follows:

- 1 – 2 - low or insignificant impact
- 3 – 4 - medium low
- 5 – 6 - medium
- 7 – 8 - medium high
- 9 – 10 - high

In assessing impacts, consideration is taken of the inherent judgmental subjectivity involved. Consequently, the analytical results of field studies and observations of existing facilities and practices have been used to assess the level of impacts of the proposed project. In an effort to reduce the subjectivity inherent in the Leopold matrix approach, a panel of experts was assembled to independently rank (on a scale of 1–10) the impacts of various activities on selected environmental indicators. The independent scores were then analyzed statistically. The results of the scores were judged as follows:

- If the variance, $\sigma^2 \leq 5\%$ of the mean, subjectivity is minimal and the score is good,
- If the variance, $\sigma^2 \geq 5\%$ but $\leq 10\%$ of the mean, the score is fair, and the scorers were given the opportunity to review their scores.

The process employed in this example is called the Delphi technique. The process was repeated to ensure consistency. The parameters with high level of scores (5 and above) were then considered for detailed impact assessment and mitigation. The result of the screening exercise is shown in the matrix (Table 6) which shows the Impact Assessment Matrix evaluation. In each cell of the matrix, the number before the slash indicates the magnitude of the possible impact (10 denotes greatest magnitude) while the number after the slash indicates the importance/extent (e.g. regional versus local).

SELF-ASSESSMENT EXERCISE

Following the example given, write the positive and negative potential impacts of a proposed major project on vegetable farming on the banks of Kaduna River. Limit the potential impacts to the initial stage of establishing the farm (construction phase). You may wish to present your answer as in Table. You may wish to compare your listing with those of your colleagues and discuss same with your facilitator.

4.0 CONCLUSION

In this unit, you have recalled the first step in the identification of effects/impacts from a proposed activity. You have linked the identification with evaluation of significant potential effects/impacts in this unit. You should now appreciate that identification is based upon an understanding of how the proposed activity might interact with its receiving environment. This skill can be acquired through practical experience. You have also learnt the importance of being objective in impact identification and evaluation by the use of methods/matrices like the Leopold matrix, Delphi technique, etc designed to assist in the exercise.

5.0 SUMMARY

This unit has explained impact evaluation as an assessment of the changes that can be attributed to a particular activity/action. We have also examined how the evaluation of identified potential effects/impacts is carried out using quantitative methods. You should be able to identify potential significant effects/impacts from any proposed activity from an understanding of how the proposed activity might interact with its receiving environment.

Table 6: Impact Assessment Matrix

PHASE DEVELOPMENT ACTIVITIES																
	Site Preparation				Drilling		Flow line Construction				System Operation & Maintenance			Abandonment		Remark
	Site Extension/Clearance of shrubs	Dredging	Water Traffic	Spill Disposal	Waste Disposal	Emission	Dredging	Spill Disposal	River Crossing	Oil Spill/Leakages	Corrosions Control	Emissions	Spill & Leaks	Scrap Metals	Industrial Refuse	
1. AIR QUALITY																
SO _x	3/2					4/2						5/4				
NO _x	4/2					5/2						5/4				
2. WATER QUALITY																
Solids (DS & SS)		6/4	5/5	6/3			5/4	6/4	5/2							
Turbidity		6/6	7/8	6/3			5/4	6/4								
Toxicity		5/4			6/2		5/4	5/2	3/3			3/3				
Eutrophication		5/6					5/4									
3. HYDROLOGY																
Drainage		5/5		6/5			5/4	4/2								
Hydrologic Balance		4/4														
Siltation		7/7	5/4	6/2			7/7	6/3								
Shore line Erosion		6/8	5/6	5/2			3/3	6/3								
4. HYDROGEOLOGY																
Ground water level																
Ground water Quality					6/2											
5. SOIL/LAND USE																
Soil Erosion	3/2	3/2					3/3	4/2								
Farming		6/2		6/4	5/2		6/2	3/3				3/3				
Subsidence				5/3												
Hunting																
6. ECOLOGY																
Floral & Fauna – Diversity & Abundance	3/6			5/3	6/2							6/2				
Endangered Species																
7. FISHERIES																
Productivity	2/2	7/3	3/2	2/2	3/2		7/3	2/2	3/3	5/2	2/2	5/2		2/2		
Catch and Yield	2/2	7/3	5/3	1/1	1/1		7/3	1/1	2/2	2/2	1/1	2/2		2/2	3/2	
Diversity & Abundance	1/1		2/2		2/2				1/1	2/2	2/2	2/2		2/2	4/1	
Fish Kill	1/1	5/3			6/3		5/3	5/2	3/2	3/2		3/2				
8. NOISE																
Hearing Loss	1/1	6/2	2/2				6/2									
Sleep Disturbance	1/1		3/2					2/2				6/3				
Communication Interference	1/1	5/2	1/1				5/2	2/2				5/3				
9. SOCIOECONOMIC																
Population																
Settlement Pattern					4/2											
Health & Safety			6/3	2/2	2/2		6/3	2/2	6/3	5/4	6/3	5/4		3/2		
Income	6/3	5/2		1/1			4/2	1/1	6/2	2/2	5/3	2/2				
Aesthetics	1/2	6/2		2/2	6/2		6/2	2/2								
10. WILDLIFE/FORESTRY																
Diversity & Abundance																
Habitats																

6.0 REFERENCES/FURTHER READING

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UNIT 5 MITIGATION MEASURES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Mitigation and Enhancement
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

In this unit, we will recall and identify mitigation options as measures taken to limit or ameliorate the severity of environmental effects of a proposed action. In Module 3, unit 4, we discussed mitigation as a key element in the EIA process. It is inherent in all aspects of the EIA process. We also practised the formulation of mitigation measures following the prediction and assessment of relevant effects from a proposed 400 ha Oil Palm plantation in the Delta State.

2.0 OBJECTIVES

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

- Identify mitigation options from the prediction and assessment of relevant effects/impacts
- Develop mitigation measures for identified relevant effects/impacts of a simple agricultural project

3.0 MAIN CONTENT

3.1 Mitigation and Enhancement

Mitigation stands for measures taken to limit the severity of environmental effects/impacts of a proposed action. They are the measures envisaged to avoid, reduce, and where possible remedy significant adverse environmental effects. They are generally thought through, carefully planned, and integrated in a coherent way to ensure that they are really effective and do not conflict with each other or merely shift a problem from one medium or area to another.

The ways of identifying mitigation measures and alternatives seem to be project specific. A useful approach might be to divide the proposed activity into sub-activities (e.g. construction phase, operation phase and decommissioning phase), and then search for possible variants for each of the sub-activities. These variants could then be clustered into relevant alternatives. Looijen (2004) reported the guidance on mitigation measures provided by the UK Government as follows:

- Site planning
- Technical measures, e.g.
 - Process selection
 - Recycling
 - Pollution control and treatment
 - Containment (e.g. bunding of storage vessels)
- Aesthetic and ecological measures, e.g.
 - Mounding
 - Design, colour, etc
 - Landscaping
 - Tree planting
 - Measure to preserve particular habitats or create alternative habitats
 - Recording of archaeological sites
 - Measures to safeguard historic buildings or sites

Mitigation measures are usually discussed and documented for each environmental aspect and related effects. Environmental mitigation can often result in reduced project costs and lower community costs when incorporated as a fundamental part of the project design. Very often, simple design changes such as the type of bridging strategy or the time of year that major earth moving activities take place (e.g. dry season instead of wet season) can have a dramatic effect upon improving environmental performance. In all cases, the mitigation or enhancement measures identified should be capable of being delivered in a cost-effective manner and be fully justified.

From the example developed for mitigation measures for a 400 ha Oil Palm plantation in Module 3, unit 4, mitigation options could be one of the following: Alternative ways of meeting a need; changes in planning and design; monetary compensation for unavoidable losses; replacing, relocating or rehabilitating; or improving monitoring and management. In all cases, mitigation measures must be implemented to be of any value.

There are residual impacts. These are defined as those impacts that remain even after the mitigation measures have been applied or following the implementation of mitigation measures. They are those

impacts that cannot be fully mitigated and thus will still remain during the lifetime of the project. They could occur in any of the three project cycle: design, operation or construction. For example, changes in landform, removal of natural vegetation, and intrusion of man-made structures.

SELF-ASSESSMENT EXERCISE

Please read carefully the abstract below on an EIA for a planned Pineapple plantation in Badagry, in Lagos State.

An Environmental Impact Assessment (EIA) study was initiated in Badagry in Southwest Nigeria to assess the environmental and social impacts of a planned 400 ha Pineapple plantation. The aim of the project was to grow and export good quality Pineapple to Europe and USA. The proposed site is located about 16 km from Agbara, a booming and well established industrial and residential zone.

A thorough scoping exercise showed that the project has a number of potentially positive impacts such as employment opportunities for low-income farmers and teeming youth population, introduction of modern technology, provision of feeder road to numerous small-scale farmers, etc. The potentially negative impacts include soil degradation, land erosion, loss of arable land for staple crops, water resource depletion, water pollution, human health problems, emergence of new pests and waste disposal.

Water resource depletion was found to be the most serious problem as the farming system will rely on irrigation for all-year round production and fruit processing and the ground water potential of the surrounding area is already overwhelmed by unregulated industrial extraction. The industrial estate and local community depend on the same ground water for their industrial and domestic use resulting in potential conflicts. The Scoping exercise suggested that an alternative site should be identified to implement the project at full scale or reduce its size so as to make the project sustainable at the proposed site.

- i. Write out the five (5) most significant potential adverse effects/impacts of the proposed Pineapple plantation on the proposed site.
- ii. For each of the identified potential significant effect/impact suggest mitigation measures to reduce, minimise or ameliorate the effect.

- iii. Suggest and justify alternatives to the proposed agricultural project or site taking into consideration the aim of the project to grow and export good quality Pineapple.

You should discuss answers to the questions with your colleagues and Facilitator to ensure you have a good grasp of the issues.

4.0 CONCLUSION

In this unit, you have recalled mitigation as a key element in EIA. The importance of mitigation options to reduce the severity of adverse effects on the environment of a proposed activity has been emphasized to ensure the compatibility of such activity with the environment and ensure its long-term acceptability. It is inherent in all aspects of the EIA process.

5.0 SUMMARY

Mitigation and enhancement measures are useful to reduce, minimise, ameliorate or totally eliminate identified/ predicted significant potential negative effects/impacts from a proposed activity. It allows for brainstorming on feasible cost-effective alternatives resulting in cost saving and best protection for the environment and acceptability where sited in the community. It has been emphasized that environmental considerations add value to the sustainability of proposed environmental activity apart from complying with applicable legislation.

6.0 REFERENCES/FURTHER READING

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UNIT 6 DOCUMENTATION, DECISION MAKING & POST AUDITS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Documentation
 - 3.2 Decision making
 - 3.3 Post audits
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

The final stages in the EIA process involve documentation, decision making and post audits. They are part of the guidelines and procedures for the conduct of a good EIA. In this unit, you should learn the requirement for documentation for record purposes and to aid decision making and the value of post audits.

2.0 OBJECTIVES

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

- Justify the need for documentation in the EIA process;
- Appraise the decision making process in EIA;
- Demonstrate the importance of post audits in EIA.

3.0 MAIN CONTENT

3.1 Documentation

A number of reports are prepared in the conduct of an EIA to describe the work done and findings in the EIA. These include the reports at different stages of the EIA process such as:

- Environmental Screening Summary Note (ESSN) – from the screening exercise
- Terms of Reference (ToR) for an EIA – from the scoping exercise

- Baseline study – from the detailed description of the existing environment
- EIA report

These reports are the working documents prepared to provide clearly stated and argued recommendations for immediate action when supplemented by a list of project alternatives with comments on the environmental and economic impacts of each.

3.2 Decision making

Exchange of information, views, and comments take place at the various stages of the EIA process through formal and informal meetings between all stakeholders involved (proponents, consultants, community leaders, youth organizations, non-governmental organizations, other interested civil organizations and regulators) to increase the acceptance of the proposed activity. The decision making process is often preceded by a scientific and technical review of the EIA by various experts or group of experts, in-house team review, competent authority review and public review (public participation by meetings and hearings). Decision making begins when the working documents reaches the decision-maker. The decision maker will accept one of the project alternatives, request supplementary information and/or study, issue provisional approval if request for additional information is minor in nature, or reject the proposed action altogether with clearly stated reasons.

3.3 Post audits

Post audits are conducted to determine how close to reality the EIA predictions were. This is carried out in the post-EIA study period as checks to ensure that identified problems are receiving adequate attention. They also assist in the process to highlight and identify unanticipated problems that should be addressed. Such post audits provide references and lessons learned for the benefit and enrichment of similar future environmental activities.

SELF-ASSESSMENT EXERCISE

From the example of the result of the scoping exercise for the 400 ha Pineapple plantation in this Module Unit 5, write the Terms of Reference (ToR) for carrying out the EIA study.

You will need to recall your study of Module 3, Unit 2, on Scoping as the stage where the coverage of the EIA is decided. Scoping identifies the issues and impacts that matter and eliminates those that do not,

resulting in the preparation of focused ToRs that ensure time and money are not wasted on unnecessary studies and investigations.

Your short write-up should include the following:

- define the important issues and impacts that need to be studied further;
- inform and involve the stakeholders who are affected by or interested in the proposal; and
- identify the alternatives to the proposed action;

You are encouraged to exchange views with your colleagues and Facilitator on this exercise.

4.0 CONCLUSION

In this unit, you have examined the final stages in the preparation of an EIA to appreciate the need for documentation and appropriate reporting in the whole process. Apart from involving various stakeholders with diverse views and interests which have to be recorded and placed in the public domain, the findings and various reports provide the legal requirements for satisfying the competent authority for approval or certification of the entire process.

5.0 SUMMARY

This unit has explained the need for reporting in the EIA process for adequate documentation to satisfy legal requirements and provide information for future reference on the conduct of a good EIA study. It has mentioned the usefulness of Post audits for comparison of predictions to reality in the receiving environment.

6.0 REFERENCES/FURTHER READING

Asnake Mekuriaw and Belay Teffera (2013). The role of Environmental Impact Assessment for sustainable development in: IAIA13 Conference Proceedings' Impact Assessment *the Next Generation*. 33rd Annual Meeting of the International Association for Impact Assessment 13–16 May 2013, Calgary Stampede BMO Centre | Calgary, Alberta, Canada (www.iaia.org)

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MODULE 5 ROLE AND FUNCTION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

UNIT 1 ROLE AND FUNCTION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Role of Environmental Impact Assessment (EIA)
 - 3.2 Function of Environmental Impact Assessment (EIA)
- 4.0 Conclusion
- 5.0 Summary
- 6.0 References/Further Reading

1.0 INTRODUCTION

The primary purpose of the EIA process as conceived from inception in the 70s is to encourage the consideration of environmental issues in planning and decision making and to ultimately arrive at actions /activities which are more environmentally-friendly and compatible. The concept of EIA evolved in the period as a result of a fundamental change in the way of thinking about environment and development. Human intervention and manipulation of the environment to achieve some development is as old as mankind itself. However, the scale and complexity of such development are unprecedented in history (e.g. large agricultural plantations for single tree crops, large dams, metro lines, deep-sea oil exploitation, nuclear plants, etc) in which environmental problems manifest themselves. This raised the collective awareness of the public and government to adverse effects / impacts from unrestrained and unregulated development.

2.0 OBJECTIVES

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

- Justify the role of EIA in development planning;
- Appraise the function of EIA in modern development.

3.0 MAIN CONTENT

3.1 Role of Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is the official appraisal process to identify, predict, evaluate and justify the ecological, economic, social, and related biophysical effects of a proposed policy, program or project on the environment. It evolved in the 70s in conformity with attempts and need to replace unrestrained economic growth approach by the concept of sustainable development. This is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Report 1987). One of the basic premises for sustainable development is the recognition that environment and development are not mutually exclusive but complementary and interdependent and actually, in the long run, mutually reinforcing (Ahmad and Sammy, 1985). In most countries, it has long become the norm to emphasise environmental considerations in decision-making in order to achieve sustainable development.

As a legal requirement in most countries, the EIA process satisfies statutory provision. In compliance with such provisions, EIA study is conducted particularly for large infrastructural activities in the mandatory category before approval/certification is granted for implementation/construction by the competent authority.

EIA has an educational role in creating and emphasizing awareness on the importance of the environment in our daily activities and action. It enlightens on the delicate balance between financial and environmental considerations in routine daily choices. It also sensitizes on the cumulative impacts of those choices on the environment.

In providing and allowing for considerations of alternatives, the EIA process guarantees some commitment to best practice, objectivity and unanticipated benefits in project/activity planning and implementation. This also minimizes unanticipated problems.

3.2 Function of Environmental Impact Assessment (EIA)

EIA provides the following beneficial functions:

- As a management tool, EIA provides insight on alternatives and weighing of options before any commitment to aid decision-making;
- The EIA process allows for cost-savings on projects and reduction in delays;
- It allows for judicious use of natural, economic, and human capital;
- As a planning tool, it minimizes the risks of environmental disasters;
- It allows for increased protection of human, animal, and plant health in the environment;
- It allows for the participation of all stakeholders, interested parties, opinion leaders, youths, non-governmental organizations, community-based organizations and the general public in decision-making on the environment;
- It calls for and increases government responsibility on environmental issues on the local, national and global scale by adherence and enforcement of environmental agreements especially those tied to grants, donations, foreign direct investments, and international assistance for development.

SELF-ASSESSMENT EXERCISE

From your study in this unit, write out 5 roles and 5 functions of a good EIA process.

4.0 CONCLUSION

In this unit, you have re-examined the EIA process and able to justify its role and appraise its function in ensuring environmental considerations in decision-making for especially project development. You can sensitize your colleagues and the general public on the importance of environmental considerations in daily routine decision-making to ensure a healthy environment for all.

5.0 SUMMARY

EIA is a very useful planning and management tool in our ever-changing environment due the numerous policies, plans, and programs demanding public and private attention to meet societal and global needs. Its role and function in controlling and ensuring sustainable development lies heavily in its contribution to sound decision-making for now and the future inherent in its process. In allowing for wider participation, it engenders trust and commitment of various stakeholders for its acceptability.

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