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# Ecological Impact on Building a Refinery in Obuanagha Community in Yenagoa L.G.A Bayelsa State

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**Abstract**

*This study critically assesses some of the ecological implications of a proposed refinery to be built in Obuanagha Community of Yenagoa Local Government Area in Bayelsa State. It places the analysis in the wider context of oil and gas exploration activities across Nigeria, and especially in the ecologically delicate Niger Delta area, where such operations have long raised serious environmental fears. The paper also explores the introduction and application of Environmental Management Plans (EMPs) within the sector as part of responses to address possible negative environmental externalities. Ecological Impact Assessment (EIA) is defined as a structured process for identifying, predicting, and evaluating the potential environmental effects of projects likely to have significant impacts on ecological integrity. As a multi-stage process that crosses through various disciplines, the EIA process aims to incorporate environmental concerns into the planning and decision-making of projects, as well as promote transparency and stakeholder involvement. However, one has to keep in mind that the EIA process does not automatically prevent or allow projects with regard to their environmental impact; it simply guarantees the disclosure of potential impacts and then allows decision-makers—within certain regulatory boundaries—to proceed with projects even if less environmentally-friendly alternatives are chosen.*

***Keyword:*** *Environmental, Impact, Assessment, Drilling, Building.*

## Introduction

The EMP (Environmental Management Plan) is developed as an operational tool for resolving and minimizing the issues relating to physical, socio-economic, and health aspects associated with specific projects anticipated in project preparation stages through Ecological Impact Assessment (EIA). The application of EMPs is even more critical within the Nigerian context, especially in the ecologically sensitive Niger Delta region where oil and gas production have been concentrated. Although their formal incorporation into project planning in the oil and gas industry, to what extent EMPs are applied according to international good practice is not yet well understood. Such a discrepancy in practical know-how poses a large threat to the sustainability of the environment and efficacy of mitigation methods. Oil and gas activities have long been a concern for broader environmental implications, leading to the adoption of internationally understood frameworks like ISO 14000 Environmental Management System (EMS) and EIA procedures as means of protecting ecological integrity (E&P Forum/UNEP, 1997; Sneddon & Hopkins, 2002). Whereas the EMS is embedded in the overall management structure of an organization, relevant to a wide range of environmental responsibilities and practice (Biltayib, 2006; Gallardo et al., 2016), EIA is viewed as preventative compliance tool — often legislative or regulatory driven through governmental agencies and international funding bodies — used to systematically identify, anticipate, and assess potential environmental impacts from proposed projects and their alternatives (Umar, 2010; Morgan, 2012; Jha-Thakur & Fischer, 2016). This process is more widely known as Environmental Assessment (EA), which essentially aims at limiting environmental damage while maximizing related, positive impacts of the development (Jones & Fischer, 2016).

**The Concept of Ecological Impact Assessment**

Though a process commonly referred to as Ecological Impact Assessment (EIA) can be grouped in this category, it is usually defined much more broadly as a systematic screening tool to assess environmental impacts (direct or indirect) of proposed projects which are expected to have significant consequence on the quality of environment. As an inter-disciplinary and multi-stage process, it aims to be a way of ensuring that environmental factors are adequately considered at planning and decision-making stages. The EIA framework, at its core, allows for the identification of potential environmental impacts along a range of scenarios, and consideration in planning responses to predict and manage adverse impacts. We hope that it will drive a well-informed public debate about the environmental consequences of actions proposed by those in power. The EIA document itself is a technical instrument that not just looks into the physical environmental changes but also the associated social, cultural and health-related effects. When done correctly, the process allows for exploring alternatives in project choices and is used to formulate actions that help minimize environmental impact. Moreover, EIA fulfills an important procedural function by promoting transparency and encouraging public participation in the decision-making process. However, should we also not realize that EIA procedure itself does NOT force against changing or stopping the projects which have a serious negative impact on environment being and instead facilitates clear disclosure of potential impacts enabling those who decide on it — to select IS/IS NOT the 'green choice', even though all potentially worse option covering environmental considerations are chosen?

**Aim of Ecological Impact Assessment**

Environment impact assessment seeks to:

a) Ensuring that environmental assessment is applied in ensuring that the developmental options being considered are sound and sustainable environmentally, socially as well as economically.

b) Making sure that any potentially damaging environmental effects are identified early in the project cycle and incorporated into project design

c) Implement environmentally beneficial aspects of projects and reduce, avoid or offset negative effects.

**Process of Environment impact assessment**

The following are the Process of Environment impact assessment

**Screening:** This is the identification of whether or not an EIA is needed. This is probably based on size. It could also use site-specific information. For example, a relatively small newly destroyed diversion structure may not require an EIA while a large new headwork structure potentially would.

**Scoping**: During the same time frame as outline planning and pre-feasibility studies, at an early stage in the project cycle, scoping takes place. The scoping process is the first step in an environmental impact assessment (EIA) that shows which key environmental issues to consider—thus likely to be the most crucial part of an EIA. There are two reasons why scoping matters. First, in order to identify problems early enough to allow designing changes that can mitigate those issues prior to detailed work being performed which can incur significant costs. Second, in order to ensure that detailed prediction work is only done for important issues. An EIA is not always to conduct detailed studies of all Ecological Impacts for all projects. Scoping is a key step in the EIA process that provides important information into the proposed development and permits and ensures identification of generic issues to be studied, but must drill down even further on site specific aspects as well. If significant issues are highlighted in scoping and a full scale EIA seen by all parties as necessary then the scoping should include terms of reference for those this(ese) issue(s) which need separating out for further study. The primary EIA methodologies applied to scoping include baseline studies, checklists, matrices and network diagrams. These methods aggregate and synthesise knowledge and information in a transparent manner so that rational decisions can be made on which impacts are most important. We further discuss risk and uncertainty in the section Managing uncertainty.

**Prediction and mitigation:** Prediction and mitigation Once the scoping exercise is completed, identifying and prioritising major impacts to be studied in subsequent stages of an EIA for further consideration, prediction work can begin. This phase is the core element of an EIA. Both the scoping stage and previous steps will have identified one or more major options (might also be referred to as scenarios) that could each require their own prediction studies. Many of these mitigating measures are not physical changes but changes in management or institutions, or require additional investment for example to health services. Mitigation measures can also be institutional changes, such as the introduction or increase in irrigation service charges designed to create incentives for efficient water use (production). The most common adverse impacts of irrigation and drainage schemes and some appropriate mitigating measures are described in Table 6 in Chapter 4. It will also require good management of a full range of technical specialists with a special emphasis on this phase of an EIA:

- prediction methods;
- interpretation of predictions, with and without mitigating measures;
- assessment of comparisons.

*Checklists, matrices and networks diagrams; graphical comparisons and overlays all techniques conceived so as to enable the carrying out of an EIA or present the results of an EIA in a format helpful for comparison of options. The primary objective quantifiable methods available for option distinctions are weighting, to Ecological Impacts or economic cost-benefit analysis or both.*

**Management and monitoring**

The part of the EIS covering monitoring and management is often referred to as the

**Environmental Action Plan or Environmental Management Plan**

The term 'institutional' is used here in its broadest context to encompass relationships:

- Established by law between individuals and government;
- Between persons and groups participating in economic transactions; developed to articulate legal, financial, and administrative ties among public agencies; inspired by socio-psychological triggers among groups and individuals (Craine, 1971).

**Auditing**

The final step in an EIAs journey is to conduct an Environmental Audit some time after the works/project/programme, so that lessons they have learned can be used again. For this reason it is typically done by a different team of experts than those working on the majority of the EIA. The audit needs to also include technical, procedural and decision-making aspects of the EIA.

**Types of Ecological Impact Assessment**

**Environmental Assessment (EA)** is a systematic process for evaluating the environmental impacts of proposed plans, policies, programmes or projects before they are approved and implemented. Within this framework, Ecological Impact Assessment (EIA) is routinely applied to individual projects by people or corporations; Strategic Environmental Assessment (SEA) is related to higher-level policy, planning and programme decisions taken usually by government institutions. This difference reflects the range of levels at which environmental issues are incorporated in decision making, with both mechanisms targeted at ensuring consideration of potential ecological impacts before action occurs.

Proposals for projects and programmes undergo a structured assessment process to comply with the established regulatory requirements. These stages are a series of analytical steps that ends with the preparation of an Ecological Impact Statement (EIS) documenting the expected environmental effects relating to an action and mitigation measures (Nwafor, 2006). The EIS is an important decision-support tool for regulatory agencies, in their decisions of whether a project will be approved or approved with modifications, or replaced by an alternative method or rejected. Most importantly, project approval is not the terminal end of the EIA process and it requires post-follow up to see if environmental conditions during implementation are addressed (Arts 2007; Fatona et al. 2015). Morrison-Saunders and Arts (2001), Wood (2003) and Nwafor (2006) for instance argue that there are risks EIA can become a process leading to the approval of projects without adequate follow up systems. As a result, various jurisdictions such as Nigeria (Ogola, 2007), South Africa (Morrison-Saunders & Arts, 2001; DEAT, 2004), Western Australia (Baby, 2011) and Kuwait (Mak'oniare, 2012) have entrenched the Environmental Management Plan (EMP) as a post-approval instrument for implementing mitigation measures throughout project implementation. The project EMP is often distilled from an Environmental Impact Assessment (EIA) report and constitutes a separate (yet vital) framework that guides environmental management throughout all stages of the project lifecycle—from pre-construction through to mine closure (SPDC, 2004; Nwafor, 2006; Anyadiegwu, 2012). In most countries, ministries and departments or government agencies are responsible for overseeing compliance with the provisions of Environment Management Plans (EMP) (Ogunba, 2004; Nwoko, 2013; Fatona et al., 2015; Badejo, 2015), although Nigeria's Federal Ministry of Environment is a foremost driver in this regard.

Throughout the lifecycle of projects, management plans (EMPs) are implemented and ensure that environmental, social and economic concerns identified during the assessment phase are systematically addressed during design, construction and operation and eventual decommissioning. These three dimensions constitute the "triple bottom line" approach to sustainability (Nieslony, 2004; Pope et al., 2004; Odukoya, 2006; Morelli, 2011; Morrison-Saunders et al., 2014). The incorporation of mitigation approaches to project implementation supports the larger goal of maintaining environmental integrity for future generations, aligning with the tenet of intergenerational fairness discussed in the environmental management literature (UNEP, 2002; Lawrence, 2003; Sneddon et al., 2006; McKenney & Kiesecker, 2010).

Moreover, EMPs help to make individual projects coherent with the broader environmental commitments of an organization (e.g., EMS) and thus promote sustainable actions (Morrison-Saunders & Arts, 2001; Isaac et al., 2017). As it plays a key role in converting EIA results to practical consequences, the EMP has become an obligatory section of numerous regulations globally. Despite this, however, it has limited empirical evidence that measures its adoption and practical application — especially in Nigeria's oil and gas sector where it is formally adopted. This gap warrants systematic inquiry, especially in ecologically sensitive areas (like the Niger Delta), and this study specifically examines the implementation of EMPs for oil and gas production initiatives in Bayelsa State.

**Social Impact Assessment (SIA)**

Social Impact Assessment (SIA) is the systematic identification, monitoring and evaluation of the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programmes, plans and projects) It also considers wider social change processes induced by such interventions. SIA aims to ensure that human and environmental factors are adequately considered in decision-making for sustainable and equitable development. Nor is SIA focused on profit, but instead aims to create positive social outcomes while minimizing negative impacts on communities and societal structures.

**Ecological Impact assessment**

Reporting on economic development planning, the Ecological Impact Assessment (EIA) technique is inherently determined by the existing legal framework, the power and duties of regulatory bodies, as well as the types and scale of planned effects where ecological characteristics observed in the project area. Its application and effectiveness are context-dependent, differing from jurisdiction to project. EIA facilitates systematic appraisal of potential ecological implications and their integration with legislative standards and site-specific character, structured in the context of development planning.

**Biological Impact Assessment**

These impacts are insects, bacteria, virus, yeasts, spores, parasites and fungi. The diseases of virus include Rabies, AIDS, Bacteria-Anthrax, Tuberculosis, etc... other impacts includes overcrowding, poor ventilation, poor hygiene and lack of washing and waste disposal facilities.

**Chemical Impacts Assessment**

The effect usually classified as being irritant, damage to genes, toxic, allergic, carcinogenic and dermatitis. The intake or inhalation of variety of dusts in the industries like textile, flour, cement cause fibrotic or fibrogenic diseases in the lungs giving rise to diseases called pneumoconiosis- asbestosis, silicosis, bysisnosis.

**Mechanical Impact Assessment**

The man-machine relationship must be smooth and cordial, otherwise the worker is predisposed to fractures and dislocations, poor work output, fatigue, body ache, anxiety, stress, etc...

**Psychosocial Impact Assessment**

The factors that expose workers to this impact include repetitive assignments, overload, under load, unconducive work environment, etc... The behavioural effect of this impact is usually fatigue, peptic ulcer, and headache.

**Objectives of the Ecological Impact Assessment**

The goals of the Ecological Impact Assessment studies for the Obuanagha Field Development Project include, but are not limited to, the following:

- Get basic information about the environment and the health, social, and economic conditions of the communities that will host the project;
- Use the baseline data to talk about and describe the region of inquiry; • Find out what environmental factors are sensitive in the project region;
- Figure out and look at what the anticipated project activities might do to the environmental sensitivities that have been found and how they might affect each other;
- Suggest the right ways to lessen the damage and establish an Environmental Management Plan (EMP). ## Where the project will take place

The Obuanagha field is in the south-western part of license block OML 22 and goes into license block OML 23. It is about 36 kilometers east of Gbaran CPF. The field is part of the GbaranUbie Node, which is a collection of oil and gas fields. The Obuanagha area is bordered by the Orashi and Nun Rivers and their smaller streams. The Obuanagha field is mostly in the Yenagoa Local Government Area of Bayelsa State and the Ahoada West and Abua/Odual Local Government Areas of Rivers State.

**Legal and Administrative Framework**

In Nigeria, the assessment of Ecological Impacts of development projects in oil and gas industries are governed by a body of legal instruments, policy guidelines and standards. These regulations can fall under the following categories:

**Legislations guiding Environmental management in Nigeria**

The Mineral Oil (Safety) Act CAP 350 LFN 1990

Mineral Oil (Safety) Act CAP 350 LFN 1990 Sections 37 and 40 provide for the provision of PPE, and safety protocol for workers involved in drilling/P.

***Federal Environmental Protection Agency (Now FMEnv) Act No. 58,1988***

This Act was promulgated in 1988 (with the amendment of Act No. 59 of 1992) and it provides for the establishment of Federal Environmental Protection Agency as an apex organization in respect to matters pertaining to protection and conservation of environment and natural resources The Act also requires Ecological Impact assessment (EIA) — similar to Environment EIA — for all new major projects. As part of its juridic functions, FEPA provided the procedure, guidelines and standards for the development of EIA noting with emphasis on relevant and potential impact from an such project. The procedure also outlines the generic steps that need to be taken (in the EIA process) for adequate consideration of environment in project execution from conception to commissioning stage.

***EIA Sectoral Guidelines for Oil and Gas Industry Projects, 1995***

The EIA Sectoral Guidelines for Oil and Gas Industry Projects, 1995 was issued by FEPA in fulfillment of its mandate. It is found in the Procedural Guidelines (pg. Category I projects (execute above mandatory study activities) is described under item15, sub-item (a), page 10 (Petroleum) Oil and Gas Fields Development, which makes it compulsory to carry out the EIA for the proposed project (8). The Procedural Guidelines also describe the stages (in the EIA process) from project conception to commissioning which needs to be followed for appropriate consideration of environment in project execution. The details of the writing format of EIA as required by FMEnv is provided in Annex C. These guidelines are meant to help to appropriately conduct EIA studies of projects in line with the EIA Act.

***Ecological Impact Assessment Act CAP Ell LFN 2004***

The Act lays forth general rules, steps, and ways to make sure that Ecological Impact Assessment is done before some public or private undertakings. The Act's goals are to encourage the use of policies that are in line with all laws and decision-making processes that can help reach the aim and objectives. The Act also encourages the creation of ways for people and organizations to share information, notify each other, and talk to each other when proposed projects or activities are likely to have a big impact on the environment of neighboring towns and villages or on the environment of the state or country as a whole.

**Negative impacts of EIA**

Assessment of submersion depth is part of the data that reflect how much environmental conditions has been changed for project activities. Overall, the potential negative environmental impacts of project activities were reasonably small. Some of the project activities that may have negative impacts include but are not limited to:

- Movement of equipment and personnel, Rig movement
- Route & location clearing Dredging & Sand filling, Pilling, Concrete and asphalt works, Excavation, Backfilling, Pipeline coating, Stringing & welding; NDT and cathodic protection and Base camp activities.
- Drilling and well hook-up.
- Well & pipeline testing, Cathodic Protection.
- Commissioning & Handover

**Significance Negative Impacts** of the proposed project include but not limited to the following:

- Third party agitation
- Increase in road traffic, potential accidents and injuries
- Loss of livelihood
- Damage to road infrastructure
- Influx of people causing Pressure on health and other Infrastructure
- Reduction in air quality
- Loss of aquatic species (Fisheries, Planktons and benthic fauna)
- Increase in noise and vibration
- Increase in refined hydrocarbon contents of soil and vegetation
- Increase in crime rate
- Contamination of groundwater
- Increase in prostitution

**Positive Impacts of EIA of the proposed project but not limited to the followings:**

- Potentials for skills acquisition
- Opportunity for direct and indirect Employment
- Opportunity for wealth creation

- Potential for development of infrastructures and economic enhancement.
- Provision of market
- Building of hotel
- Building of private bank
- Cost of land increase
- Provision of social amenities like; light, water.
- Building of Eateries.
- Building of multi-purpose hall
- Provision of hospital
- Building of good road network
- Provision of landscape for rentage
- Increase in population
- Ease of transportation

**Mitigation Measures**

To ensure that all negative impacts are reduced to the barest minimum in the execution of the Obuanagha Field Development Project, the following mitigation measures shall be applied:

- SPDC shall ensure adequate consultation with all stakeholders especially communities
- SPDC shall carry out sound community sensing to evaluate existing relationship between SPDC & fence line communities, collate legacy projects & agree with community on ways of addressing them to change the perception to positive.
- Land take shall be limited to the minimum required.
- Stakeholder's engagement shall be sustained through the project lifecycle.
- SPDC shall discuss and agree on sustainable community development project and implement agreed projects, these will serve the whole fence line communities without bias.
- Relevant stakeholders/legacy issues shall be identified
- Regular consultation with stakeholders (Govt, Community, NGOs, CBOs etc.) shall be carried out to understand community perceptions, issues and concerns
- Alternative income generating activities through skills acquisition that will empower communities shall be introduced and supported.
- SPDC shall ensure all project vehicles observe the speed limits and large vehicles have warning lights to alert other road users.

There is wide recognition by most governments and donor agencies that EA has made a contribution to improving project design. Past weaknesses of EA largely relate to inadequate techniques and not listening to evidence at the implementation stage (ESSA Technologies 1994). The main benefits of the EA process to project sponsors identified in a review of contemporary environmental practices included (ESSA Technologies 1994: 16):

- Reduced cost and time of project implementation.
- Cost-saving modifications in project design.
- Increased project acceptance.
- Avoided impacts and violations of laws and regulations.
- Improved project performance.
- Avoided treatment/clean up costs.

The benefits to local communities from taking part in environmental assessments include:

- A healthier local environment (forests, water sources, agricultural potential, recreational potential, aesthetic values, and clean living in urban areas).
- Improved human health.
- Maintenance of biodiversity.
- Decreased resource use.
- Fewer conflicts over natural resource use.
- Increased community skills, knowledge and pride.

**Environmental Management Plan**

The EMP is a detailed plan that provides an outline of core elements, operating procedures and instructions to address the key environmental effects of the project. It includes an Environmental Monitoring Plan intended to serve as the technical scope for planned systematic observation of key environmental receptors and waste streams in Iseni field The EMP is designed to provide assurance that all identified impacts or potential impacts are minimised to as low as reasonably practicable (ALARP) and provides a systematic mechanism for measuring the success of mitigation/enhancement measures. Furthermore, it serves as a compliance mechanism for adherence to not only statutory regulations but also the corporate safety, health and environmental standards of Shell Petroleum Development Company (SPDC). The EMP thus essentially offers a unified arrangement of managerial tools used by the organization to

oversee and manage its environmental performance, full circle within a given project"s lifecycle.

## Conclusion

The Obuanagha Field Development Project was developed with the Ecological Impact Assessment (EIA) to meet applicable local, national and international regulatory requirements. This study took a multidisciplinary approach combining field studies and laboratory analysis, as well as review of previous reports in conjunction with up-to-date environmental data to conduct a detailed assessment of the biophysical attributes and sensitivities within the proposed project area. The Obuanagha field will provide gas supply to the Nigeria Liquefied Natural Gas (NLNG), and it is strategically positioned where Gbaran Central Processing Facility (CPF) can be optimized with gas and condensates, thus improving utilization of our facilities. Beyond these operational advantages, the project will also likely yield beneficial socio-economic developments through increased business and job opportunities—especially for unskilled labor—and expanded contracting opportunities. Although it identified some adverse environmental impacts, these were mainly of a transient nature which can be adequately addressed through the implementation of recommended control measures. Both movements, thus the EMP and the Environmental Monitoring Plan are integrated to ensure that impact is within acceptable limits so as to support Environmentally and Socially Responsible Execution of Projects. Consequently, the EMP is stated to be a vital tool for implementation guidance and post-project environment monitoring and as such the clearance of EIA report for project execution was warranted.

## Recommendations

The following recommendations were made;

1) The government should set up an organized body to regulate the activities of Refineries as it is done in other sectors

2) Employers in the Refineries should send their workers for periodic training on how to identify and control hazards and also practice safety at work

3) Employers should provide PPE for their workers and make it compulsory for them to use

4) Employers should practice work shift by rotating their workers on daily basis to reduce stress, long hours and reduce exposure to hazardous substances

5) Employment of workers should not be based on nepotism.

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