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# Implementation of EMP in EIA Follow-Up of Oil and Gas Projects in the Niger Delta Region of Nigeria: A Case of Bayelsa and Rivers States

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The Environmental Management Plan (EMP) is an off-shoot of environmental impact assessment (EIA) and is used during the implementation of a project to manage physical, socio-economic and health concerns identified during the assessment. Oil and gas production activities in Nigeria take place in a very delicate ecological region of the Niger Delta. Since the introduction of EMPs for projects in the oil and gas sector in Nigeria, the extent of their implementation according to best practices is still poorly understood. The apparent limited knowledge on the implementation of EMPs puts environmental sustainability at great risk. This study evaluated the implementation of the Environment Management Plan of oil and gas production projects in the Bayelsa and Rivers States in the Central Niger Delta sub-region. Twelve case studies were selected from the region using a multi-level selection method which involved both random and purposive sampling techniques. The two states were purposively selected since they have the highest number of EMPs and the oldest history of oil production in Nigeria. The implementation of the EMPs within cases was scored using a check list which included 18 indicators developed based on the best practice principles of EIA follow-up. Findings show that the implementation of the EMPs is inadequate with an average score of 46.3%. The study concludes that the implementation of EMP is poorly handled and does not adequately address the approval conditions. The study recommends that more analysis and similar studies should be undertaken in other sectors and jurisdictions in order to better understand the implementation of EMP.

**Keywords:** EIA follow-up, Environmental Management Plan, oil and gas, Niger Delta, sustainable development.

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## Introduction

There is a general concern about the negative environmental impacts of oil and gas production activities. The ISO 14000 Environmental Management System (EMS) and the environmental impact assessment (EIA) are commonly applied to protect the environment from potential harm resulting from the production of oil and gas (E&P Forum/UNEP, 1997; Sneddon and Hopkins, 2002). The environmental management system (EMS) is designed and built into the overall management system of the organization to encompass the totality of its environmental practice and responsibility (Biltayib, 2006; Gallardo et al., 2016). The environmental impact assessment (EIA) on the other hand, is a precautionary environmental management strategy for protecting the environment against adverse impacts of projects commonly imposed by governments and international funding organisations (Umar, 2010; Morgan, 2012; Jha-Thakur & Fischer, 2016). Sometimes referred to simply as Environmental Assessment (EA), the process is undertaken with the aim of identifying, predicting and evaluating the potential impacts of a proposed project, as well as its alternatives in order to protect the environment from harm and enhance the project's benefits (Jones & Fischer, 2016).

When a proponent proposes a project or programme, an assessment is conducted in line with prevailing regulations and conditions, which consists of sequential processes that lead to the development of an environmental impact statement (EIS) containing details of the potential impact of the project on the environment along with possible mitigation measures (Nwafor, 2006). The EIS guides the regulator's decision during the authorization process whether to redesign, adopt a possible alternative, cancel or approve with associated conditions for managing the environment. The approval of projects, thus, involves the need to "follow-up" on the implementation of the relevant approval conditions ensuring that the proposed project or programme is executed in a manner that protects the environment from harm (Arts, 2007; Fatona et al., 2015). Morrison-Saunders and Art (2001) argue that without follow-up, EIA may remain an approval seeking exercise. Wood (2003) and Nwafor (2006) support this notion adding that the EIA process does not end with production of the EIS on the potential impacts of a project and related proposed

mitigations. Nigeria and other EIA jurisdictions of the world like South Africa, Western Australia, Kuwait, etc. develop and implement the environmental management plan (EMP) as a "follow-up" programme during the execution of the project (Morrison-Saunders & Arts, 2001; DEAT, 2004; Ogola, 2007; Baby, 2011; Mak'oniare, 2012). When the EIA process is approved by the authorizing body, the EMP is extracted from the report as an independent document for onward implementation (SPDC, 2004; Nwafor, 2006; Anyadiegwu, 2012). Therefore, the EMP is an action plan which covers the project's phases right out to its decommissioning. Anyadiegwu (2012) notes that the EMP indicates management measures for addressing adverse impacts of a project from its initiation to its closeout. Authorities, particularly government ministries, departments or agencies (MDAs), are vested with the responsibility and leadership to assess practices and to monitor the compliance with obligations at the time of implementation of EMPs. Under the current Nigerian EIA practice in oil and gas and other environmental laws, this responsibility is vested in the Federal Ministry of Environment and its agencies (Ogunba, 2004; Nwoko, 2013; Fatona et al., 2015; Badejo, 2015).

The implementation of the EMP throughout the life cycle of projects, plans or programmes ensures that the social, economic and environmental concerns identified during the assessment are addressed, throughout the design, construction or implementation, operation and decommissioning phases of the project. These elements (economic, social and environmental) are considered as the basis for the measurement of sustainability described as the triple bottom line approach (Nieslony, 2004; Pope et al., 2004; Odukoya, 2006; Morelli, 2011; Morrison-Saunders et al., 2014). The implementation of EMPs to address impacts of a project help to preserve the environment for future generations expressed as intergenerational equity across environmental management literature (UNEP, 2002; Lawrence, 2003; Sneddon et al., 2006; McKenney & Kiesecker, 2010). The EMP also serves as a formalized way of linking projects to other environmental commitments of organisations such as the EMS (Morrison-Saunders & Arts 2001; Isaac et al., 2017). This underscores the importance of the EMP to engender sustainability. As a result of its contribution to achieving sustainability, it has been argued that if the goal of EIA is to achieve sustainability,

it can only be achieved through the implementation of the EMP. The significance of the environmental management plan (EMP) in environmental impact assessment (EIA) practice makes it a major requirement for many EIA regimes including Nigeria, South Africa, Western Australia, Kuwait, etc. (Morrison- Saunders & Arts, 2001; Baby, 2011). Since the introduction of EMPs for projects in Nigeria, there has been limited research on the extent of their implementation within the oil and gas sector. Such research is necessary for policy adjustment and practice improvement, which in turn threatens environmental sustainability within the country. Therefore, the aim of this study is to evaluate the extent of implementation of an environment management plan of oil and gas production projects in the Niger Delta.

## Literature Review

Different researchers have demonstrated that there is a cause for concern relevant to the extent of EMP implementation and use. Specifically in Africa, Ecaat (2004) reports a weak enforcement by authorities in Uganda. Similar reports emerge from various African countries, including the work of Sampong (2004) in Ghana, Tekeu (2004) in Cameroun and McCartney (2010) in Ethiopia. In Nigeria, Nwoko (2013, p.29) attempted a general evaluation of the EIA system and concluded that the implementation of the EMP is the 'weakest facet' of EIA in the country. However, a common characteristic of all these studies is the passive evaluation of the EMP as a component in a broader study of an EIA system. The problem with this approach is that it does not account for the extent to which the EMPs have complied with best practice principles of EMP follow-up, especially since these studies are not EMP specific and are originally designed to account for the effectiveness of an EIA system. This has created the need for the independent evaluation of the EMP to determine the extent to which they are implemented and also fill the knowledge gap on the degree to which implementation complies with the EMP best practice principles. This study contributes to filling this gap by applying a grading system to evaluate the implementation of the EMP of selected oil and gas projects in the Niger Delta region of Nigeria using the best practice framework.

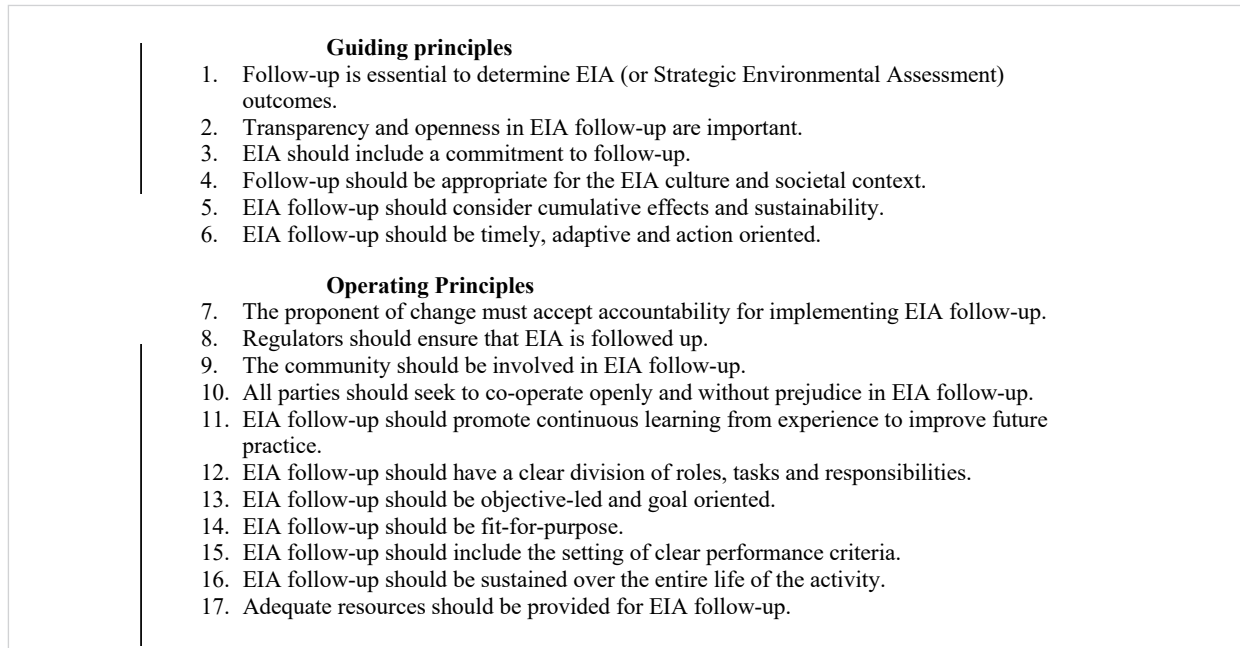
The need to achieve the goals of EIA led to the development of strategies to follow up after approval has been granted for a project. Various methods used to achieve this purpose have been described in Morrison-Saunders, Arts, Caldwell and Baker (2001). As stated earlier, the use of an environmental management plan is popular in some EIA jurisdictions, including Nigeria (Nwafor, 2006). The International Association for Impact Assessment (IAIA) also identifies the four activities of monitoring, evaluation, management and communication as key activities of follow-up (Morrison-Saunders & Arts, 2004b). During the IAIA follow-up conference in Hong Kong in 2000, the EMP was reported as an innovation to follow-up practice and an acceptable standard practice; additionally, its use of mitigation measures along with clearly defined management practices was considered an important aspect of EMP-based EIA follow-up (Morrison-Saunders and Arts 2001, p.3). Since then, the use of the EMP as follow-up in Nigeria and other countries' EIA regimes has been described in a range of literature (Nadeem & Hameed, 2010; Umar, 2010; Georgeades, 2012; Okpara, 2013; Morrison-Saunders et al., 2014).

Evaluation in the field of EIA has focused on the effectiveness of EIA systems. Some of the earliest works on EIA evaluation include the work of Sadler (1996) whose international study of the effectiveness of EIA focused on evaluating its processes in order to improve its practice. Various studies have evaluated the effectiveness of EIA tools and systems using a similar approach (Gibson, 2002; Morrison-Saunders & Pope, 2013; Thérivel, 2013; Shakil & Ananya, 2015). Shakil and Ananya (2015), for example, examined the entire EIA system in Bangladesh by evaluating all processes of EIA including follow-up. Due to a relatively limited scope of research, analysis of EMP implementation has been confined to the application of methods used in EIA (Morrison-Saunders & Arts, 2005; Macharia, 2005; Jha-Thakur et al., 2009; Bennett et al., 2016; Khosravi, Jha-Thakur and Fischer, 2018). However, researchers like Arts (2007) have continued to emphasize the significance of follow-up (EMP) to the achievement of the goals of EIA. These insights have generated scholarship interest in the implementation EMP and the need to develop approaches for evaluating the implementation of the EMP. The International Association of Impact Assessment conferences (IAIA 1999, IAIA 2000 and IAIA 2003) led to the development of best practice principles as shown

in Fig. 1 (Marshall et al., 2005; Morrison-Saunders et al., 2007). These follow-up best practices have been applied in analyses by some researchers including Nadeem and Hameed (2010) who used them to examine the EIA system of Pakistan. Theoretically, these principles are represented along the why, who, what and how questions.

They pertain to the need for follow-up, roles of major partners, the kind of follow-up activities and the way follow-up should be conducted respectively (Marshall et al., 2005, p.178). The present study applied these best practice principles to evaluate the implementation of the EMP in some selected oil and gas projects in Nigeria.

**Fig. 1.** Follow-up principles



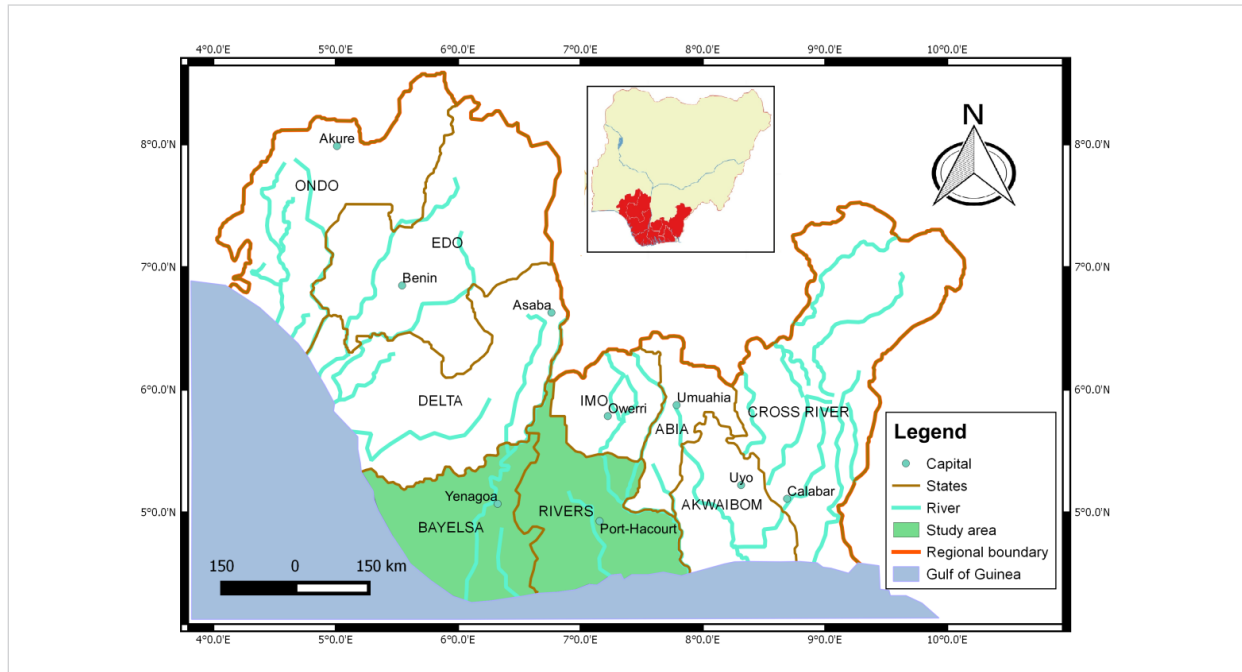
(Source; Morrison-Saunders et al., 2007; Nadeem & Hameed, 2010)

## Materials and Methods

The Niger Delta refers to the geopolitical area comprising nine states recognised by Nigerian law as oil producing states (NNDC Establishment Act, 2000; Iniaghe et al., 2013; Boris, 2015). It is located between latitudes 4° and 8° north of the equator and longitudes 5° and 9° east of the Greenwich meridian (Fig. 2). It refers to the geopolitical area covered by Abia, Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers States. The region is subdivided into west, central and east Niger Delta. The west comprises Delta, Edo and Ondo. The central comprises Abia, Bayelsa, Imo and Rivers while the east comprises Akwa Ibom and Cross River (Alaminiokuma et al. 2011; Koinyan et al. 2013). This study focused on the central Niger Delta. It has the oldest history of oil and gas production in the entire Niger Delta

region and contains the typical complexities of the impact of oil and gas production activities which makes it a suitable source of data for the study (Onosode, 2003). This study was limited within Bayelsa and Rivers States, which lie in the south of the central Niger Delta and at the extreme limit of the Niger Delta (Fig. 2). These two states have a higher concentration of oil and gas production activities in the central Niger Delta with recurrent reports of adverse impacts of oil and gas production activities. The area comprising Bayelsa and Rivers states is located between latitudes 04° 15' north, 05° 23' south and longitudes 05° 22' west and 07° 85' east. It shares boundaries with Imo and Delta States in the North, Akwa Ibom states in the East and the Atlantic Ocean in the west and south.

**Fig.2.** Niger Delta region highlighting Bayelsa and Rivers states



(Source: GIS Unit, Department of Geography, University of Nigeria Nsukka)

The study utilized case studies, an approach that is consistent with research development in the field of environmental management and indeed the EMP, and has been widely reported in similar studies (Włodarczyk, 2000; Gomm et al., 2000; Sager, 2001; Ross et al., 2001; Morrison-Saunders et al., 2003; Macharia, 2005; Schneider, 2013; Phylip-Jones & Fischer, 2013; Gallardo et al., 2015). This approach allows researchers to draw deeper into the issues of interest of the study and enrich their findings to enhance the development of theories as well as support the existing ones (Sager, 2001). This is supported by the definition by Merriam (2009), that a case study is a deep and intensive analysis and description involving a closed system. In a similar view by Yin (2009), case studies try to find answers to why and how in order to explain a set of events existing outside the behavioural control of the researcher regarding the actors or events. Gallardo et al. (2015) reported that a case study could help to enhance the quality of follow-up activities and the way they are carried out under similar contexts.

A checklist was developed with 18 indicators based on the best practice principle of EIA follow-up (Fig. 1) and each case study project was scored on every indicator

on the checklist. The procedure involved the retrieval of the files of the case study projects from the database of the Federal Ministry of Environment to check for evidence of implementation according to the indicators on the checklist. The files, typically, contain a comprehensive project history starting with project conception, pre-assessment activities, assessment, approval and conditions, implementation activities, monitoring activities, auditing reports and other details on the proponents. The implementation activities including monitoring provided details on how specific approval conditions were implemented and the audit reports show the implementation outcome, which is useful for the intended evaluation. The information from the files served as documented evidence of implementation and were used to verify the implementation level and its conformity to the best practice principle. The 18 indicators developed from the best practice principle were scored based on the file evidence on a particular indicator. Each indicator was scored 0–1, with 1 being the maximum, and the total marks scored were converted into percentages.

The percentage scores were compared and categorised based on Table 2 as modified from the World Bank (1996)

**Table 1.** Check list/assessment

Guiding principles	Basis of analysis and judgment
1. Follow-up is essential to determine EIA outcomes.	1. Evidence of continuous impact mitigation monitoring
2. Transparency and openness in EIA follow-up.	2. Evidence of public participation
3. EIA should include a commitment to follow-up.	3. Evidence of condition to implement the EMP
4. Follow-up should be appropriate for the EIA culture and societal context.	4. Evidence of EMP compliance to laid down guidelines
5. Consideration of cumulative effects and sustainability.	5. Evidence of consideration of cumulative impact monitoring
6. EIA follow-up should be timely, adaptive and action oriented.	6. Evidence of keeping to timelines
7. The proponent of change must accept accountability for implementing EIA follow-up.	7. Evidence of adaptive implementation
8. Regulators should ensure that EIA is followed up.	8. Evidence of commitment of proponent to the implementation
9. The community should be involved in EIA follow-up.	9. Evidence of efforts of the regulator to ensure EMP implementation
10. All parties should seek to co-operate openly and without prejudice in EIA follow-up.	10. Evidence of involvement of the community in impact mitigation monitoring (IMM)
11. EIA follow-up should promote continuous learning from experience to improve future practice.	11. Transparency in involvement of all stakeholders
12. EIA follow-up should have a clear division of roles, tasks and responsibilities.	12. Evidence of recommendation to improve the process in subsequent EMPs
13. EIA follow-up should be objective-led and goal oriented.	13. Evidence of clear division of roles, tasks and responsibilities
14. EIA follow-up should be fit-for-purpose.	14. Evidence of commitment to maintaining environmental quality
15. EIA follow-up should include the setting of clear performance criteria.	15. Evidence of the EMP design to support anticipated impacts of the specific nature of a project
16. EIA follow-up should be sustained over the entire life of the activity.	16. Evidence of linking the EMP to baseline and other measurement criteria
17. Adequate resources should be provided for EIA follow-up.	17. Evidence that the EMP is implemented throughout the lifetime of a project
	18. Evidence of the availability of adequate provision of resources to implement the EMP

Source: field work

**Table 2.** Grading interpretation for case study assessment

Criteria	Judgment Standard
Excellent 90–100%	Implementation exceeds the one required by the approval and is comparable to the International best practices, for example, if the implementation addresses all important tasks and responds to unpredicted impacts.
Good 70–89%	Implementation work fully meets the conditions of approval. For example, implementation is acceptable by the parties involved (community, regulator and proponent) and monitoring is adequate to identify minor inadequacies for the purpose of addressing them.
Adequate 50–69%	Implementation barely meets approval. For example, if there is evidence of implementation of some of the requirement but there is not enough evidence to support that care has been taken of all the issues in the EMP of the project.
Inadequate 1–49%	Implementation does not meet the minimum requirements of the approval, for example, if the implementation can be described as poorly handled or not complete.

(Source: After World Bank, 1996; African Development Bank Group, 2000)

**Table 3.** *Selected case studies*

1	<b>Case 1: Diebu Creek Exploratory Drilling Project – SPDC in Bayelsa State.</b> The project was planned to improve hydrocarbon production with an expectation of over 250 million barrels of oil equivalent (MMBOE). The project scope included the drilling of one vertical or slightly deviated well within the Diebu Creek.
2	<b>Case 2: Nimbe Field Development Project by NAOC in Bayelsa State.</b> The Nimbe Field Development project involved drilling development wells with its associated activities. The development drilling comprised the drilling of two wells on an existing well location. In addition, three wells were drilled at three other locations at Obiama, another at Etima and the third one at Amapogu.
3	<b>Case 3: Exploratory Drilling in Ekedei Field in Oil Mining Lease (OML) 63 Project by NAOC in Bayelsa State.</b> The project was the drilling of exploratory wells at the Ekedei oil field in Oil Mining Lease (OML) 63 in Bayelsa State. The project involved the drilling of a vertical well to a total vertical depth (TVD) of 5113m with an impact target of all area of interest.
4	<b>CASE 4: Nembe Creek Trunk Line (NCTL) Replacement Project by SPDC Bayelsa State.</b> The lines were built in 1981 and had reached end of their design life. The project involved additional land acquisition along existing right-of-way (ROW) to accommodate a new line.
5	<b>CASE 5: Ekeremor Field Development Project by Excel Exploration and Production in Bayelsa State.</b> The project involved the work over of existing wells, drilling of new wells and hook up of these wells to other facilities at Ogbotobo through flow lines and pipelines. The field is located within OML 46.
6	<b>Case 6: Tebidaba East – An Exploratory Well Drilling Project by NAOC in Bayelsa State.</b> It is situated in the Oil Mining Lease (OML) 63. The project was designed as a field development project to increase the productivity of wells. It involved drilling activities for the re-entry and development of Tebidaba 11ST from the existing Tabidaba 11.
7	<b>CASE 7: 20" x 37 Km Kolo Creek Trunk Line Replacement Project by SDPC in Rivers State.</b> Kolo Creek and Rumuekpe are located about 42–68 km north west of Port-Harcourt, the project transverses five local government areas: Ogbia in Bayelsa, Abua/Odual, Ahoada west, Ahoadaeast and Emohua in Rivers state. A 20" x 37 Km Kolo Creek – Rumueke TL, which was commissioned in 1994, was to be replaced with a carbon steel pipeline due to corrosion. The pipeline itself is a replacement of an earlier one which was commissioned in 1974.
8	<b>Case 8: Agbada Non-Associated Gas (Nag) Project by SPDC in Rivers State.</b> The project involved the drilling of 2 non-associated gas (NAG) wells and laying of a bulk line. The project is located at the Dodo-North Field which is about 12km northwest of Port Harcourt. The Non-Associated Gas project involved side tracking from existing appraisal wells for the two new (DN 001 and DN 002) NAG wells.
9	<b>CASE 9: Asaramatoru Oil and Gas Field Project by SPDC in Rivers State.</b> The project involved the re-entry of two suspended wells (ASRA 01 and 02), the construction of flow lines and pipelines for the evacuation of the produced oil and gas from the field to Bonny Flow Station for processing and transmission to Bonny Terminal for export. It also involved establishment of a 25m by 10km long pipeline right-of-way (ROW) from the field to the SPDC Bonny flow station and Bathymetric survey of the Opobo Channel from Bonny River to Andoni River for transport of equipment in and out of field.
10	<b>CASE 10: Bonny Terminal Integrated Project by SPDC in Rivers State.</b> The expansion was planned to improve on the quality and capacity of the existing facilities which comprised 23 storage tanks arranged into six tanks groups. Smaller tanks were removed and replaced with larger tanks. New tank internals were installed on the remaining old tanks. Among other upgrades, the works included modification to the pipe works. Also, new earthen tank bunds and impermeable floors were provided.
11	<b>CASE 11: Produced Water Re-Injection in Ebocha Field in OML 61 by NAOC in Rivers State.</b> Produced water re-injection in the petroleum industry is generally recognized as an environmentally responsible method of disposing produced water. The re-injection project was designed to dispose the produced water from the Ebocha oil centre in an environmentally safe way by treating and re-injecting the water from Akri, Kwale, Irri, Mbede, Ebocha and Obiafu and Obrikom fields that are collected at Ebocha Oil Centre through dedicated wells within underground formations.
12	<b>Case 12: Swamp Area Gas Gathering Project by NAOC in Rivers State.</b> The project was conceived with a goal to increase and supply additional gas of 312MMscfd to the NLNG's 4th and 5th train. The project involved the installation of compressors, pumps, generators and separators at Ogbainbiri and Tebidaba flow stations and OB/OB Gas Plant. Pipeline networks were laid as follows: 12"x 35 km pipeline from Tebidaba to Ogbainbiri flow station on existing right-of-way (ROW) and 24"x 121 km pipeline from Ogbainbiri to OB/OB Gas Plant on partly existing and partly new right-of-way (ROW).

and African Development Bank group (2000), in order to determine the effectiveness of implementation. Trochim (2000) recommends this method of analysis in order to deliver a scientifically valid outcome. The overall performance of a particular project’s EMP was determined as the sum of the performance of its components.

Both random and purposive selection methods were used to select the specific cases among various cases that fall within the area of study. First, the purposive sampling approach was applied to collate and list all oil and gas approved projects subject to EMP implementation from the ministry earlier mentioned. The stratified method was then applied to group the projects according to states. This enabled the identification of projects that fall in each state of the region. Then, the projects that fell under the study area, which are the two states covered in this study, Rivers and Bayelsa states, were collated for further sampling processes.

Furthermore, the probability sampling method was applied to select the cases for study. The simple random sampling technique (Easton& McColl, 1997) was applied to select 6 case studies from each of the states that form the study area. Thus, in total, 12 case studies were chosen, all of which were projects approved by

the regulating agencies and subjected to the EMP (Table 3). The choice of the 12 cases was purposive to achieve a deeper level of analysis and in line with the recommendation by Cresswell (2008) to use between 5 and 25 cases for a case study research. Similarly, Yin (1994) and Novek (1995) suggest that researchers can achieve representative results with only two cases. In similar studies, Nieslony (2004) used only 3 cases in Germany, Isah (2012) used 2 cases in Nigeria and Georgeades (2012) used 4 case studies in South Africa. Therefore, the use of 12 cases is appropriate to increase the level of representation.

## Results and Discussion

The cases studied scored very low on the 18 indicator assessment (Table 4). The indicators are developed from the best practice principles of follow-up as discussed in the preceding sections.

The study found that the implementation of the EMPs across projects in the Niger Delta is inadequate as shown by the average performance. None of the projects performed excellent. Only 2 projects (Bonny

**Table 4.** Checklist assessment of cases (Assessment number codes are as in Table 1 while project number codes are as in Table 3)

Basis of analysis and judgement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Score	%
Project number																				
1	√	x	√	√	x	√	x	√	√	x	x	x	√	√	√	√	x	x	10/18x100	55.5%
2	√	x	√	√	x	√	x	√	√	x	√	x	√	√	√	√	x	√	12/18x100	66.6%
3	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	05/18x100	27.7%
4	√	x	√	√	x	√	x	√	√	x	x	√	√	√	√	√	x	√	12/18x100	66.6%
5	√	√	√	√	x	x	x	x	√	x	√	x	√	√	√	√	x	x	10/18x100	55.5%
6	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	5/18x100	27.7%
7	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	5/18x100	27.7%
8	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	5/18x100	27.7%
9	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	5/18x100	27.7%
10	√	x	√	√	x	√	x	√	√	√	√	√	√	√	√	√	√	x	14/18x100	77.7%
11	x	x	√	x	x	x	x	x	x	x	x	x	√	√	√	√	x	x	5/18x100	27.7%
12	√	x	√	√	x	√	x	√	√	√	√	√	√	√	√	√	√	x	14/18x100	77.7%

(Source: Fieldwork)



Terminal Integrated Project and Swamp Area Gas Gathering Project) out of the 12 case studies, representing 16.7% of all projects scored 77.7% and were classified as good performance, which is described as implementation that fully meets the requirements of the Approval. Another 4 projects (Diebu Creek Exploratory Drilling Project, Nimbe Field Development Project and Eremor Field Development Project and Nembe Creek Trunk Line (NCTL) Replacement Project), representing 33.3% of the scored projects in the category, were indicated as adequate, which means that the implementation barely meets the requirements of the approval. The performance of each indicator is presented in Table 5.

As indicated in Table 5, the remaining 6 projects representing 50% of the case studies scored in the category

of inadequate, which means that the implementation is unable to achieve the lowest requirement of the conditions of approval. These include Exploratory Drilling in Ekedei Field in Oil Mining Lease (OML) 63, Tebidaba East – An Exploratory Well Drilling Project, 20" x 37 km Kolo Creek Trunk Line Replacement Project, Agbada Non-Associated Gas (NAG Project, Asaramatoru Oil and Gas Field Project and Produced Water Re-injection in Ebocha field. The average score of the 12 case studies is 46.3%, which falls in the inadequate category. It is, therefore, reasonable to conclude that the implementation of the EMP in the Niger Delta is inadequately applied. These findings are significant to both the environmental and corporate concerns of the proponent during project execution as it helps

**Table 5.** Percentage scores of case study projects

S/N	Project title	State	Year of Approval	Performance (%)	Category *
1	Diebu Creek Exploratory Drilling Project	Bayelsa	2005	55.5	Adequate
2	Nimbe Field Development Project	Bayelsa	2006	50	Adequate
3	Exploratory Drilling in Ekedei Field in Oil Mining Lease (OML) 63	Bayelsa	2006	33.3	Inadequate
4	Nembe Creek Trunk Line (NCTL) Replacement Project	Bayelsa	2006	66.6	Adequate
5	Eremor Field Development Project	Bayelsa	2007	55.5	Adequate
6	Tebidaba East – An Exploratory Well Drilling Project	Bayelsa	2006	27.7	Inadequate
7	20" x 37 km Kolo Creek Trunk Line Replacement Project <b>(Rivers state stretch)</b>	Rivers		27.7	Inadequate
8	Agbada Non-Associated Gas (Nag) Project In Obio Akpor LGA, Rivers State	Rivers	2015	27.7	Inadequate
9	Asaramatoru Oil and Gas Field Project Rivers State	Rivers	2011	27.7	Inadequate
10	Bonny Terminal Integrated Project	Rivers	2000	77.7	Good
11	Produced Water Re-Injection Project in Ebocha Field in NAOC OML 61 in Ogba Egbema	Rivers	2015	27.7	Inadequate
12	Swamp Area Gas Gathering Project	Rivers	2006	77.7	Good
	Average score			46.3	Inadequate

(Source: Fieldwork)

organisations evaluate how their action impacts the environment, their adherence to guidelines, documentation of environmental management practices and achievement of environmental vision (EPA, 2005). This finding is in line with the findings of Nwokwo (2013) that EMP implementation is weak in Nigeria. It also conforms to other findings about EMP implementation across EIA jurisdiction in Africa including Ecaat (2004) in Uganda, Sampong (2004) in Ghana, Tekeu (2004) in Cameroun, and McCartney (2010) in Ethiopia. It also supports the findings of Dada and Akpandara (2004) who report poor implementation EMP during an internal review by Shell Petroleum Development Company in the Niger Delta. The implication of these findings on the sustainability of the Niger Delta region is important because without adequate implementation the environment is vulnerable to adverse environmental impact of oil and gas production activities. Researchers have reported environmental problems in the region and have attributed them to the activities of oil and gas production (Ojarokutu & Gilbert, 2010; Unabia, 2010; UNEP, 2011; Fasina, 2016; Yakubu, 2017). Eregha and Irughe (2009) and Yakubu (2017) have directly blamed oil exploration and production activities in the Niger Delta by accusing of irresponsibility in handling the physical, social and economic environment of people of the Niger Delta. Inadequate implementation of the EMP may exacerbate these occurrences. Also, this may have a significant impact on the achievement of sustainable development goals (SDG), particularly goals 6–7 and 12–16, which deal with development priorities relating to enhanced environmental management.

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## Conclusions

Based on the findings, the study concludes that the implementation of the EMP of oil and gas projects in the Niger Delta region of Nigeria requires improvement. The implementation falls below the standard practice principles of EIA follow-up. This poor implementation of the EMP is capable of increasing the vulnerability of the Niger Region to the adverse impacts of activities of oil and gas production. It, therefore, agrees with the findings of other researchers that oil and gas production activities may be directly responsible for some of the social and physical environmental problems in the region. The study also concludes that this may have a negative impact on the achievement of sustainable development goals and may accelerate the issues of climate change and affect Nigeria's effort to achieving sustainable development goals (SDGs).

The study, therefore, recommends that the implementation of the EMP of oil and gas projects be improved upon by all stakeholders according their respective responsibilities. The proponents as well as the regulator of oil and gas production projects should adopt and adhere to the best practice principle with improved reporting and record keeping of the implementation process. Since the finding of this study is consistent with other findings on the implementation of the EMP, this method is recommended as a quick assessment procedure for supervisors and other senior officials who reserve the responsibility to drive EMP implementation in the region. Such quick assessment will enable early determination of the health of EMP implementation towards an early intervention. It would aid improved implementation practice and environmental integrity. Finally, similar studies should be carried out in other sectors and jurisdictions where the implementation of the EMP is poorly understood.

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