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Environmental Planning and Management as a Strategry for Solving Environmental Problems in Niger Delta Region: A Study of Bonny Island, Rivers State, Nigeria

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Abstract
Environmental issues are meant to be operationalized through the formulation of actor-specific environmental actions plans, which define priority action that will convert strategy into practice. The Environmental Planning and Management (EPM) process which is an increasingly popularized cans of solving the myriads of problems afflicting the environmental in contemporary world. The study examines the use of Environmental Planning and Management (EPM) process as a strategy of solving environmental problems in Bonny Island, Rivers State, Nigeria by investigating the perception of the general public on the state of the environment in the area, level of participation of people in compliance to existing environmental strategies, causes of ineffective environmental management in the area and assessing community satisfaction with existing environmental management approach using well structured questionnaires administered to sampled households. Questions were related to socio-economic characteristics of households, willingness to participate by the community in the EPM process, perceived level of environmental degradation in the area, level of compliance of oil and gas companies to environmental laws and the role of Government environment protection agencies in protecting the environment of the study area.
The results confirm that the level of damage from oil exploration, gas activities, pollution and pipeline vandalizations is chronic and cumulative, which has resulted to the degradation of the environment, routine of facilities and compliancy to environmental management approaches are not regular, facilities and equipment were found be grossly inadequate therefore proper inspection can not be well carried out, the community expressed dissatisfaction with the existing environment approach which they attributed to the inability of fully implementing the environmental approach, the community indicated that given the opportunity they are willing to participate in evolving an effective environmental management approach. Recommendations were made for the effective and efficient application of the EPM process in the study area.
Keywords: Environmental Planning and Management, Degradation, Environment, Bonny Island

INTRODUCTION

The Niger-Delta region is located in the southern part of Nigeria, it is known for rich natural resources such as oil, abundant flora and fauna, hydrocarbon deposits in its oil, clay for burnt brick silica sand for glass manufacturing industries, its rich mangrove forest was considered the third largest in the world. Oil fields in Niger-Delta are not large but are plentiful in the region and cuts across farms, waterways and fishing grounds.
For nearly four decades, the Nigeria economy is completely dependent on petroleum extraction, generating 25% of its GDP (which has risen to 40% as of 2000) NDDC 2005. Even though oil has become the centre of current industrial development and economic activities, the links between oil exploration and exploitation process and the increasing environmental, health and social problems in oil process and the increasing environmental, health and social problems in oil producing communities which has led to environmental pollution, oil spillage, land degradation, pipeline vandalization and biodiversity depletion.
The rate at which immediate environment of this rich region, that defines wealth and poverty simultaneously is being affected is quite alarming. The environment is bad that the inhabitants are used to witnessing first degree environmental degradation. As in the case of most oil producing regions of less developed countries, the economic and political benefits are given more weight than the resulting damage of the environment which is important.
The environmental challenges in Bonny results from the continual exploration and exploitation of natural resources which has gradually degraded the ecosystem primarily from economic motives. This has become an important issue of growing concern, considering that serious environmental degradation, increased activities in the oil industries leading to discharge of toxin of increased volume of effluents which have exacerbated the incidences of pollution and contamination both surface and ground water by harmful gas, contamination of soil by oil spills and leaks, increased deforestation as well as environmental degradation stemming from gas flaring. Considering the effects of land degradation will not reel out inadequate waste management, bush burning, urban

industrial pollution, erosion and inappropriate agricultural activities resulting to acid rain, biodiversity depletion, air pollutant deforestation, population pressure and over exploration.
The Niger Delta has celebrated and Nigerian's lack of coherent pollution control policy. Until recently, three was little incentive for power plants to implement pollution abatement strategies or for oil companies to undertaken environment remediation efforts, only recently no longer willing to tolerate oil company's absolving themselves of their responsibility to reducing pollution.
However, this could be attributed to lack of community involvement in environmental management approach in the study area.
Therefore ,this study is set out to address the problem of environmental degradation in Bonny Island.

AIM AND OBJECTIVES

This research is aimed at investigating the environmental characteristics and problems of the study area and plan proposals for environmental planning and management. The
specific objectives are to:

a. review the concepts, principles, relevancy of EPM strategy
b. examine the spatial environmental characteristics of Bonny
c. identify the environmental problems in Bonny
d. make proposals for environmental management using the EPM strategy.

CONCEPTUAL FRAMEWORK

Concept of EPM Process

The EPM concept entered the planning dictionary or can be said to have originated in the 1960's with the social movement and revolution, which changed the concept and discipline of physical planning. The movement originated in U.S. with the integration of social planning with physical planning. Alschuler, Brooks, Peter Marris, Howard Odum and others are among the earlier planners who propagated the concept of EPM.
UNCHS defines environmental planning and management approach as the process in which it allows for interactive, participation of stakeholders in reaching a consensus an environmental issues which needs to be planned and managed.
Wahab (1998:17) defines EPM as a bottom-up participatory interactive and collaborative approach to physical planning and management in which public technocrats work in concert with the organized to jointly address environmental and socio-economic issues affecting people and their environment.
The UNCH/UNEP (1987) defines EPM as a continuing and dynamically evolving process whose purpose is to make development policy formulation and implementation progressively more responsive to environmental consideration.
Bloxom (1996) sees the EPM as a tool to understand environmental issues in the context of development interaction. It is according to UNCHS (1995), " a new way of looking of and understanding development a new way of organizing our thoughts about how to mobilize resources and take action in respect of developmental issues". The EPM process is a holistic, dynamic flexible and interactive approach to sustainable physical planning and management capable of addressing all environmental problems confronting physical planning while strengthening the local capability for better planning and management.
The EPM process is adopted as a means of solve specific environmental problems it becomes imperative to integrate the procedure into the normal or routing activities of all stakeholders involved. The EPM process is also a fall not of the Agenda 21 of the united Nation to mobilize support form local actors or stakeholders in the public organized private and the popular sectors concluding the indigenous people in their guest for solving environmental issues.

THE STUDY AREA

Bonny is a town in River state in South east Nigeria, on the sight of Biafra. A small island located just offshore. It is located between longitude 4^0N5^0N and between latitude 6^0E8^0E. Bonny Island constitute of several settlements, squatter settlements and migrant communities of interest are Agalanga, Jacob-Ama (Mango village) Akusu I and II including Nembekiri (Monkey villages), while the settlements include Bonny town which is the largest settlement which is located on the South-West edge f the island, the labour camp (a.k.a workers camp), and the oil and construction complexes and their residential areas.
According to the 1991 census, the population of Bonny was about 156, 760. Bonny now has about 215,358, this increase is as a result of the source: National Population Commission.

Table1: **Population Distribution in the Study Area**

Settlements	**Population distribution**
Abalamabie	9,325
Agalanga	22,535
Akiama	10,769
Akusu	20,506
Bonny	64,607
Finna	53,071
Jacob Ama	7,019
Nemekiri (Monkey Village)	21,501
Workers camp	6,023
Total	**215,358**

Source: NPC (2006)

Bonny Island experiences a seasonal climate (dry season and (net season) with high humidity all year and high annual average rainfall of about 4000mm, with mean annual maximum temperature of about 31.3 ^{0}C and mean minimum temperature of about 22.5^{0}C.

Air quality on Bonny Island is generally good, although industrial activity and different forms of road and river traffic have increased in recent years. Air quality monitoring data from Nigeria Liquidified and Natural Gas Corporation (NLNG, 2001), indicated that all potential pollutants, cabonmonoxide, nitrogenoxide, sulphur oxide, hydrogen sulphide, methane and non methane, volatile hydro carbons at present is average compared to Nigeria and internationally accepted standards.

Bonny Island is relatively flat and consists of series of shallow sand ridges that indicates past regular seaward accretion. Hydro geological study has revealed that rain water percolation through sand has created a bulb of fresh water resource that supplies borehole water for the Bonny populace.

Bonny Island's river system has the highest volume of all the river systems in the Delta an the proportion of fresh water flow down the river is low. Therefore is generally a net flux of tidal water up the river, which disperse into various creeks and channels.

The Island supports three main types of natural vegetation; Mangrove, Fresh water swamps and dry land rain forest. The fresh water swamp forest includes area of "Galloping swamp", which has dry land rain forest on the drier ridges and swamp forest in between. In addition there are areas of open coast sand beaches, inter tidal flats and creeks.

Agriculture on Bonny Island is very limited and only takes place on the relatively poor sandy soil of the dry land ridges of the galloping swamp forest, therefore fishing which is traditionally a very important economic activity on Bonny Island. About 55% of the population are engaged in fishing or fish farming. While about 45% of the population are oil workers, construction workers, unskilled low income workers, artisans etc.

At Bonny, the road network consists of single two-long, two wary carriage way road that inter connects Bonny town with the other settlements. The primary roads are essentially single two lane carriage ways that act as major distributors for all categories of traffic movement between Bonny and the rest of the Island. Usage of the major roads by cars, motor bikes and pedestrians heavy.

ENVIRONMENTAL PROBLEMS FACING THE STUDY AREA

Bonny is now experiencing series of environmental damage, this is because the area is known for productive wetlands and oil deposits. The terrestrial and marine environment has being badly damaged and one of the primary cause is the oil industry and other associated industries.

Oil Exploration

Oil exploration began in 1958, little did one know that the environment would be adversely affected by its activities. Oil exploration has being a major uncontrollable source of environmental and social degradation, because of the massive oil exploration in the area which has led to a range of environmental issues such as contamination of both surface and ground water by harmful gases like Benzene, Ethyl benzene, Toluene (O'Rourke and Connolly 2003).

Gas Flaring

Gas and oil activities have caused damage to the environment, thousands of tons of waste all disposed untreated directly into the ecosystem. There has being considerable amount of gas flared which is as a result of oil and natural gas that is mixed in every oil deposit, the natural gas called "associated gas" must be removed from oil before refining (Ashton et al 1999). Gas flaring is simply the burning of this associated gas. Gas flaring is simply the burning of most countries of the world where gas may only occur in certain circumstances such as emergency shut downs. Due to the lack of utilized infrastructure, approximately 76% of associated gas is flared (Africa News Service 2003). Not only is the flaring damaging the environment and human health, it is also

wasting huge amounts of the country's second most valuable natural resource.

Table 2: Gas flaring (billion cubic metres) in sub sahara Africa

Countries/Year	1995	2000	2005	2010
Angola	4.51	5.94	4.72	4.08
Cameroun	1.15	1.19	0.97	0.92
Chad	0.00	0.00	0.09	0.05
Congo	1.08	2.02	1.79	1.88
Cote d'Ivoire	0.06	0.09	0.04	0.09
DRC	0.53	0.43	0.44	0.39
Eq. Guinea	0.61	1.21	1.36	0.39
Ghana	0.00	0.00	0.01	0.20
Gabon	2.15	2.54	2.36	1.68
Nigeria	**27.09**	**27.19**	**21.25**	**15.18**
South Africa	0.06	0.13	0.14	0.10
Global	154.97	164.90	171.65	133.90

Source: Baumuller, H. et. Al (2011), The Effects of Oil Companies Activities o the Environmnent, Health and Development in Sub-Saraha Africa. Directorate-General for External Policies of the Union. Directorate B, Policy Department Study. European Parliament. 2011. Retrieved from *http://www.europarl.europa.eu/activities/communities/studies.do?language=EN* 27/08/2011

Pollution

Pollution has gradually eaten into the environment because of series of oil exploration and exploitation, other related gas activities etc, which has corroded the air quality, water and land. There is a considerable amount of dredging and filling of the water ways, siltation, erosion, spills which has led to acidification of water bodies, discharge of huge amounts of production water containing significant quantities of hydrocarbons, leaks from old corroded and poorly maintained pipelines, oil in gas flares, abandoned offshore rigs, refinery effluent and toxic sludge which has in turn damaged forests and agricultural land.

The reason why the inhabitants which depends on the biodiversity for their means for survival have become nuisance to the environment.

Table 3: SOME SEVERELY POLLUTED SITES IN THE STUDY AREA

LOCATION	**ENVIRONMENT**	**IMPACTED AREA (ha)**	**NATURE OF INCIDENCE**
Bonny	Mangrove forest	20	Gas flare and oil spill
New finima	Mangrove forest	10	Gas flare and oil spill
Abalamabie	Mangrove forest		Oil spill
Akiama	Mangrove forest	5	Discharge of refinery wastes

Source: A workshop on pollution and environmental studies. Port Harcourt (May 2006).

PIPELINE VADALISATION

Nigeria has lost over N150.5 billion to pipeline vandalization in the last eight years just as no fewer than 2,550 people have lost their lives due to fire incidents resulting from pipeline vandalism within the same period under review but the petroleum products' pipelines vandalism took the center stage from early nineties in the Niger Delta region but the crescendo has taken an unbearable dimension as the spate Total Network of pipelines running across the length and breadth of the country carry refined and crude products to designated points. There are about 5,001 Kilometers stretch of pipelines, consisting of about 4,315 multi products pipelines to 23 depots (20 inland and 3 Refineries' depots) and 666 Kilometers of crude oil pipelines to the four refineries. The crude pipelines originate from the off-shore terminals to supply the refineries in Warri, Kaduna and Port Harcourt.

The pipes are buried under the ground with about 25 meters wide Nigerian National Petroleum Corporation's (NNPC) right of way (ROW). The maintenance and security of the ROW are carried out by NNPC through the Communities. Environmental degradation was fashionably canvassed as a reason for communities to disrupt activities of the multinationals in order to call attention to the negative effects of their operations on ecology of the area.

Other causes of line breaks and spills are:

- Rupture due to diminished integrity and aging process of the pipes
- Sabotage

Pipelines vandalism is on the upward swing and seems to be continuing unabated. In 2000, the number of vandalized pipelines stood at 137 and 2,237 in 2005. The increase observed in the half year of 2006 was 144.88% higher than what was observed in the same period of 2005. Pipelines vandalism has continued to be

more prominent in areas like port-Harcourt, Warri and Mosimi axis. In 1996, there were 33 cases of vandalized pipelines and 16 ruptures as against 1,170 within the first half of 2006. Product losses incurred through vandalism in 2000 was 397,600 Metric Tonnes or 10.121 billion Naira and 647,632 or 42.102 billion naira in 2005. In the first half of 2006, there were 2059 cases of vandalism

Degradation of the environment is one of the worst disasters that have befallen the areas where pipelines have been vandalized. Raging fires have destroyed farmlands and forests thereby reducing arable land for farming. Spills into waterways destroy marine and aquatic life, flora, fauna, resort centers, pollution of drinkable water (Badejo and Nwilo). Pipeline vandalism compounds the spate of spillages from other sources and exacerbates the problems of environmental degradation and pollution of waterways

METHODOLOGY

The method of data collection was through the use of applicable sampling techniques. Since the study population is made up of residents in the study area. The authors carried out a stratified sampling to delimit the area of study into settlements. There are nine settlements. The settlements were then delimited using simple random sampling technique to select respondents for the research work. From these settlements, the study sample was taken.

Information on the population in the nine settlements of the study area was obtained from the National Population Commission (NPC) Rivers State Office Port-Harcourt.

Samples were taken in the nine settlements that makes up Bonny Island. The sampled 200 household heads, the 200 households sampled was chosen for convenience due to the limited time available to carry out the research. Well structured questionnaires was administered to the selected respondents, Three sets of questionnaires were administered: The first were directed at the oil companies for the purpose of determining the existing environmental management, policies, measures as well as the general problems encountered. The second were administered on the residents of the area in which the environmental problems were identified, with a view to determining the general problems encountered. The third were administered on staff of Rivers State Environmental Protection Agency, who are saddle with the responsibility of environmental protection and management, to get the views of respondents on environmental planning and management problems in the study area.

Oral interviews was also adopted along side with questionnaire administration for the three categories of respondents to source vital information that was not captured by the questionnaire.

Similarly, published and un-published literatures were also reviewed which forms the theoretical foundation of the study. The data collected was analyzed using basic statistical tools, such as tables and charts where necessary.

RESULTS AND DISCUSSION

ASSESSMENT OF COMPLIANCE TO EXISTING ENVIRONMENTAL PROTECTION LAWS

In general, the level of compliancy with effluent standards and administration is low, compliance monitoring by FEPA in 1954 revealed that some industries have installed pollution control devices of which the facilities are slightly below full compliancy. There are still polluted sties which are not cleared, abandoned oil facilities which has led to fire accidents and toxic spills, oil companies do not regularly report compliance. The government have also contributed in somewhat in her oversight to the management of the oil industries.

Source: FEPA 2008

ESTIMATION OF THE DEGRADED ENVIRONMENT

For the purpose of this study, it is very important to know the estimate of the level of degraded environment which is gotten from the level of compliance to the environmental management strategies in existence.

- Assessment of community satisfaction with existing environmental management approach.
- Level of participation by the community in compliancy to existing environmental management strategies.
- Opinion of the residents on the cause of ineffective environmental management in the study area.
- Willingness to participation of industries in the area
- Willingness to participate by the residents of the community
- Educational background of respondents and their willingness to participate in the EPM approach in reducing environmental degradation.
- Income of respondents with the study area
- Willingness to contribute resources

Table 4: ESTIMATION OF THE LEVEL OF DEGRADING OF THE ENVIRONMENT

Type of degradation	Ratio	Percentage
Pollution	6.5	65
Gas flaring activities	3.5	35
Total	10	100

Source: Field Survey 2013

Table 5: OIL SPILLS

Quantity average per millions of barrels	Year
2 – 5 million barrels	2005
5 – 9 million barrels	2006
9 – 13 million barrels equivalent to 36 – 50 Exxon valdez spills.	2007

However volume estimates of oil spills are usually low as 50% of Nigerian oil is assumed to evaporate within 48 hours and spills are not usually detected in that period. These do not include any marine spills which are some of the worst.

Source (World Bank 2006)

Level of participation of people in compliance to existing environmental strategies

Inference

This show that there is little or no participation by members of the community. This is as a result of non-challancy and neglect. This therefore calls for the need of public participation.

Table 6: Opinio of the residents on the causes of ineffective environmental management in the area

Causes	Frequency	Percentage
Effectiveness of environmental laws	50	33
Blames oil industries	46	31
Inadequate equipment	30	20
Lack of cooperation	24	16
Total	150	100

Source: : Field Survey 2013

Table 7: Assessment of community satisfaction with existing environmental management approach

Responses	No. of respondents	Percentage
Satisfied	20	10
Dissatisfied	180	90
Total	200	100

Source: Field Survey 2013

In trying to apply the EPM approach in curtailing environmental degradation of the study area a test for willingness of the residents of the community on the study area to participate in the programme was carried out as shown below.

Willingness to participation of industries in the area

Inference

This shows that the oil industries involved are ready to comply and participate in the reduction of environmental degradation in the area.

From the survey, it was deduced that 33% of the respondents agreed to the fact that it is due to the ineffectiveness of environmental laws, 31% blames the oil industry for polluting the environment, 20% says there are no adequate equipments to carry out inspection 16% agree to the fact that no cooperation between the oil industries, government and the community.

Table 8: Willingness to participate by the community

Responses	No. of respondents	Percentage
Respondents willing to participate	150	75
Not willing to participate	50	25
Total	200	100

Educational background of respondents and their environmental willingness to participate in the EPM approach reducing environmental degradation

Table 9: Education Level of Respondents

Background of respondents	Agreed	Percentage	Disagreed	Percentage	Total No. of respondents
Primary	30	20	10	20	40
Secondary	45	30	10	20	55
Post secondary	60	40	5	10	65
Others	15	10	25	50	40
Total	150	100	50	100	200

Table 10: Income of respondents within the study area

Average monthly income	No. of respondents	Percentage
Less than N5,000	40	20
6,000 – 10,000	30	15
11,000 – 16,000	50	25
18,000 – 23,000	30	15
25,000 – 29,000	30	15
30,000 and above	20	10
Total	200	100

Source: Field survey, 2013

From the data collected it is observed that 20% earn from N5,000 and less monthly. There are petty traders and mostly fishermen while 15% are artisans and casual labourers earn between 6,000 – 10,000 while about 30% of the residents earn between 18,000 – 23,000. The remaining 10% earn N30,000 and above this hereby shows that a very good percentage of the population have the ability to contribute to the EPM approach.

Table 11: Test for willingness to contribute resource

Resources	Percentage	Frequency
Technical know how/ skill labour	30	60
Unskilled labour	20	40
Time	25	50
Finds	15	30
Equipments (materials)	10	20
Total	100	200

Source: Field Survey 2013

This shows that 75% i.e. 150 respondents are willing to participate in the programme while 50 respondents i.e. 25% disagree. Thereby given the opportunity the residents of the study area are willing to contribute or plug and development of their environment.

SUMMARY OF FINDINGS

- The level of damage from oil exploration, gas activities, pollution and pipeline vandalizations is chronic and cumulative, which has resulted to the degradation of the environment.
- The routine of facilities and compliancy to environmental management approaches are not regular
- Facilities and equipment were found be grossly inadequate therefore proper inspection can not be well carried out.
- 85% of the respondents showed dissatisfaction with the existing environment approach, this can be attributed to the inability of fully implementing the environmental approach.
- 75% of the respondents indicated that given the opportunity they are willing to participate in evolving an effective environmental management approach.

PROPOSALS FOR ENVIRONMENTAL PLANNING AND MANAGEMENT FOR BONNY ISLAND

From the inferences it was observed that existing environmental management approach in practice has no inbuilt mechanism and proper procedure for actors involvement/participation, therefore the following has been recommended.

a. There is a need to raise public awareness on the importance of their participation in the physical planning and development of their environment. This can be enhanced through media campaigns and necessary legislation.
b. The need for the residents to be educated and empowered to detect, report and monitor oil spills, resource degradation and participation in clean up restoration.
c. There is need to foster partnership and collaboration between RSEPA (Rivers State Environmental Authority) and the residents in evolving an environmental management strategy, through this medium the residents will stop looking at oil spills as a commercial asset and make them realize that the spills create long term damage to the environment.
d. Ministries responsible for the environment should be empowered with adequate funds and means to supervise the industries involved.
e. No new oil license should be issued until companies have rectify and clean up current problems.

PROPOSED EPM STRATEGY FOR ENVIRONMENTAL DEGRADATION IN BONNY ISLAND

The application of the EPM strategy will formulate a realistic and implementable strategies for environmental degradation in Bonny.

PHASE I

a. This phase includes the preparation environmental management profile for the study area. This profile will document necessary information or data and preparation of detailed and intimate short, medium or long term environmental action plan report.

b. Sensitizing and mobilizing stakeholders in environmental management. There residents within the study area who have legitimate interest (state, local government and the general public) will be identified and effectively sensitized about their roles and mobilization through brief sessions, formal and informal meetings.

PHASE II

a. This phase involves the establishment of working groups, where the working groups would be seen as platforms for negotiating environmental issues and suggestions and agreements will be translated into actions.

b. Goal formulation process

The working group will be responsible for goal formulation in environmental management approach. The goal denotes what environmental planning is out to achieve in particular. The working group will have a fairly simple and immediate solution and develop demonstration projects, which will spark people's interest in the process.

PHASE III

This is the final phase of the process. Environmental planning and management strategy /action plan formulated and endorsed by the working groups will be implemented. These strategies will be initiated, institutional improvements solidified, procedures for monitoring and evaluating results will be put in place. The key results are

a. Implementation of action plans with goals to be achieved
b. Setting targets and activities to be carried out to achieve these targets
c. Creating awareness and mobilization from determining a benchmark
d. Estimating capital cost of project and maintenance after completion
e. Identifying sources of finance and agreement on cost recovery.

PROPOSED FRAMEWORK FOR ENVIRONMENTAL PLANNING AND MANAGEMENT

The framework which best fits the conditions above is the bottom up multilevel circular approach. This will include decision making, embrace participation, clarity and agreement on environmental planning issue to be tackled, giving emphasis to resources mobilization and building of consensus and participation. It will also allow for endorsement and support of interest groups, which forms the central mechanism of action.

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