

The Intuitional Perspective of Environment Pollutants Impact Severity on Artisanal Fisheries Resources in Niger Delta, Nigeria

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Abstract: The intuitional perspective of environment Pollutants Impact Severity on Artisanal Fisheries Resources in Niger Delta area of Nigeria was conducted for a period of one year (January 2008 – December 2008) to determine severity of environmental pollutants impacting on fisheries resources conservation and management in the Niger Delta region based on the opinion of relevant institutional personnel perspective, The study area covered include three core fishing states of Bayelsa, Delta and Rivers States. Questionnaires were used to obtain desired information which was divided into 2 categories: middle level/technical and management officers. A total sample size of 105 respondents in the study area was taken using exhaustive sampling technique for the institutions and random sampling technique to choose respondents within institutions where the sample population was found to be high ($n > 30$). The data collected was subjected to analysis using binomial regression analysis, Kendall Rank coefficient of concordance, Likert mean and Likert mean of mean analysis. From the results, the severities of environmental parameters on fisheries resources were considered to significantly impact on fisheries resources by the respondents. The ranking and Likert mean of mean analysis result showed that all studied pollutants were significantly implicated to impact on fisheries resources in the Niger Delta region with LMM = 3.13. The Kendall ranking also showed that crude oil related pollutants such as oil spills, gas flaring and thermal pollution were ranked as the most severe pollutants impacting on fisheries resources of the region. This result is expected considering that the three states and the region is predominantly crude oil producing.

Key words: Artisanal fisheries, environment pollutants severity, intuitional perspective, Niger Delta, Nigeria

INTRODUCTION

The Niger Delta is one of the world's largest wetlands and by far the largest mangrove forest in Africa. Within this extremely valuable ecosystem, oil activities are widespread – Rivers State and Delta State produce 75 percent of Nigeria's petroleum, which represents over 50 percent of national government revenues. However, despite its vast oil reserves, the region remains poor. Optimal resource and land use in the area is constrained by a lack of development, stagnant agricultural productivity, very limited opportunities in urban areas, rapid population growth, the generally poor health facilities and tenuous property rights. Conflicts have developed between local communities, private and public developers over resource ownership and use, particularly tied to oil activities.

Despite the immense fisheries resources and development potential with which the Niger Delta is

endowed with, it has been plagued in recent times with environmental problems which crude oil production in the region has brought in its trail. For example, Awosika (1991), painted the picture of environmental problems of oil pollution on fisheries resources and fishers settlements as follows:

“Apart from the fact that the Niger Delta area is Nigeria's main source of oil and gas, it has always been the provider of protein in the form of fisheries products. A harvest of fisheries resources, fishing settlements and infrastructure dot the entire coastal areas. Sources of environmental degradation, which have been implicated in the reduction of fish yield in the Niger Delta, include coastal erosion, water pollution (mainly from oil spill), land reclamation, uncontrolled urbanization and lack of knowledge of the general hydrodynamics of the water body. Beach erosion has been a major problem to many fishing

settlements in the Niger Delta. Many fishing settlements have had to retreat inland in face of the surging waters of the ocean of the fluvial. Knowledge processes show that settlements are more stable on the accreting side of meandering rivers. Since fishery resources depend heavily upon estuaries and coastal waters, as well as their hydrography, degradation of these environments can often be linked to subsequent reduction in capture fishery yield”.

Awosika (1991), reported that the Niger Delta is the second largest delta in the world, with an average area of about 16,340 km², out of which about 2,370 km² (15%) is permanently underwater by upstream rivers, creeks and tidal waters. The pits, which grow in the direction of long shore movements, are common features in the Niger Delta area. These pits generally enclose narrow creeks as they grow. The Niger Delta shelf is very wide, reaching almost 75 km offshore, enlarging to 84 km off Cross Rivers State. This very large, relatively shallow continental shelf provides excellent near shore fishing ground. This is an indication that the near off and on shore areas of the Niger Delta is richly endowed with enormous fisheries resources.

Scott (1966) reported that ‘the Niger Delta is characterized by extensive networks of rivers and creeks, which discharge their waters into the Atlantic Ocean’. Owing to the superfluity of the area, fishing is a major occupation for its residents. Incidentally, due to the very poor rural nature and low technological attainment of the country as a whole, the Niger Delta fishing practices have remained largely artisanal, with very little technological modernization of the age long fishing practices.

Scott (1966) gave a list of the fishes of the Niger Delta. The list of fishes includes 147 marine species, 75 brackish water species and 63 fresh water species. This list of fishes was by no means exhaustive for the Niger Delta, as it is recommended by Scott (1966), that there is need for an organized collection and identification of the local fishes of the Niger Delta.

The above findings critically implicate environmental factors as a serious challenge to the sustainable growth and development of the Niger Delta fisheries. Unless the fisheries resources of the region are properly conserved and managed in the face of the serious threat that the implicated environmental factors pose to it, there may continue to be a downward trend in the fisheries yield of the Niger Delta fishing ground.

The above description of the geophysical characteristics of the Niger Delta, her people, fisheries and fishers in particular, partly justifies the need for an assessment of the conservation perspectives of the relevant institutions that are major stakeholders of the sub-sector. This would be with the major objective of optimizing resource use on a sustainable basis. It is

therefore imperative that the resources of the Niger Delta area (fisheries prominently inclusive) are properly managed and conserved for sustainability, in order to reduce conflict of interest in the region.

Literatures that specifically discuss the importance of institutions in conservation and management of fisheries resource are few. The relevance of institutions involved with conservation and management of fisheries resources is better understood when they are reviewed in conjunction with the concept of fisheries resource conservation/management. The justification of this assertion is readily founded in the numerous institutions, local, national and international that are involved in fisheries resources conservation, management and development generally. These institutions serve as policy formulation, development and regulatory agencies for the conservation and management of fisheries resources based on the mandate establishing them.

For example, Okachi (1991), enumerated some of the various institutions that are involved in fisheries resources development in Nigeria as follows:

The International Fund for Agricultural Development was established on 30th November 1977. The objectives and functions of the fund is to mobilize additional resources to be made available at concession terms for agricultural development in developing member states, of which Nigeria is a part. IFAD’s focus is mainly on projects designed to expand or improve food production systems and to strengthen official policies and institutions within the framework of natural priorities and strategies. Fisheries resources development in the Niger Delta area is a major focus of IFAD in Nigeria as a basis for increasing its objectives of food production. Hence, it has been involved in various fisheries programmes. An example is the IFAD/UNDP assisted artisanal fisheries development project.

This is an arm of the United Nations Organization, which has contributed a grant of \$0.5m to the fisheries development extension training programme course of 1991 at Uyo, Cross Rivers State. This organization with headquarters in New York assists in the management of fisheries project on behalf of IFAD. NACB was established in 1972 under the Companies Act, to fill the gap of a material project account. Funds are distributed as needed to the states or area branches to be disbursed by the Fisheries Development Units (FDU’s). This ministry negotiated the loan for IFAD projects and together with the Federal Department of Fisheries (FDF) manages the main IFAD loan account with the Central Bank of Nigeria (CBN). It is a department in the Federal ministry of Agriculture. It is responsible for coordinating national fisheries development programmes. Its role is to guide, supervise, monitor and evaluate the operations and impact of fisheries development projects. In the states, the SDF’s within the ministry of Agriculture is responsible for

fisheries development with extension duties taken over by the World Bank – Assisted Agricultural Development Project (ADP). Agricultural Development is cited as a priority in the Nigerian Constitution and is therefore the responsibility of the three tiers of government to fully support it. The supervisors for Agriculture in each LGA council are expected to mobilize the local people for community development and for execution of project beneficial to the people, including fisheries.

Other agencies relevant to fisheries development in Nigeria is the defunct Directorate of Foods Roads and Rural Infrastructure (DFRRI), Niger Delta Basin and Rural Development Authority (NDBRDA), Conservation Department of Federal Ministry of Environment (it is a recently created department following the creation of the federal ministry of environment in 1999) and the various states World Bank Assisted Agricultural Development projects. The latest being the Niger Delta Development Commission (NDDC) established in 2000. It is an agency that is partly charged with the responsibility of managing the biodiversity resource of the area, of which fisheries is prominently inclusive.

The institutions described above can be classified as mainly international, national and regional statutory agencies. In addition to these are other agencies like the Agriculture/fisheries extension departments of multinational companies within the Niger Delta area and the conservation department of the Federal Ministry of Environment. Some of these companies include Shell Petroleum Development Company, AGIP, ELF, CHEVRON and MOBIL. This category of institutions plays very vital roles in the development, protection, conservation and management of fisheries resources of the Niger Delta. Although, it is the activities of these same organizations that brings about a pollution trail that constitutes sources of major environmental problems adversely affecting artisanal fisheries resources conservation and management in the region.

The numerous institutions indicated to be involved in fisheries development in the region shows that institutions are important stakeholders in the conservation and management of fisheries resources of the Niger Delta region. Thus, assessing their perspectives on environmental pollutants adversely impacting fisheries resources conservation and management in the Niger Delta region is very vital to sustainable fisheries development in the region. A study of the intuitional perspective of environment Pollutants Impact Severity on Artisanal Fisheries Resources in Niger Delta area of Nigeria to determine severity of environmental pollutants impacting on fisheries resources conservation and management in the Niger Delta region based on the opinion of relevant institutional personnel perspective will add more information to the scanty available literature to facilitate the effective management of the fisheries

resources in the Niger Delta region og Nigeria and other similar regions.

MATERIALS AND METHODS

Study area: This study was carried out for a period of one year (January-December 2007) in predominantly fishing Local Government Areas of Rivers, Bayelsa and Delta States, which by ecology are coastal states. They are located within the South-South geopolitical zone of Nigeria and in terms of Geographic and Geomorphologic zones, the states can be said to constitute the core states of the Niger Delta region where adverse environmental effects, especially from crude oil production activities have been known to negatively impact on fisheries resources over the years. Figure 1 shows the map of the Niger Delta states covered by the study. The reason for choosing these states is that they are largely river-rine and are rich in fish stocks that support artisanal fisheries activities.

According to Awosika (1991), the entire Nigerian coastline is about 800km and the adjacent shelf can be broken into four main geomorphologic zones.

- The barrier Lagos coast between Badagry in the West and Ajumo in the West.
- The marine coast between Ajumo and Benin River estuary.
- The Niger Delta coast between Benin River in the West and Imo River in the East
- The eastern most strand coast between Imo River and Nigerian Cameroun boundary.
- The sampling frame consists of all relevant institutions (Federal Ministry of Environment, State Agricultural Development Projects (ADPs), Federal and States Departments of Fisheries) that are involved in artisanal fisheries resources conservation and management within the study area.

Sampling technique: A frame survey of all the relevant institutions was carried out employing the complete census technique (Bankole, 1990) For the management/officers category respondents selection, the complete census technique was further employed due to their generally small population sizes in each institution ($N < 30$). However, in the case middle level/technical category, where the population sizes of the respondents were found to be comparatively higher ($N > 30$), the random sampling technique was applied to obtain the required sample size.

Primary data was collected from individual officials in selected public institutions using well-structured questionnaires to obtain desired information. The questionnaire was of two categories – Middle Level / Technical and Management / Officers Cadre Institutional

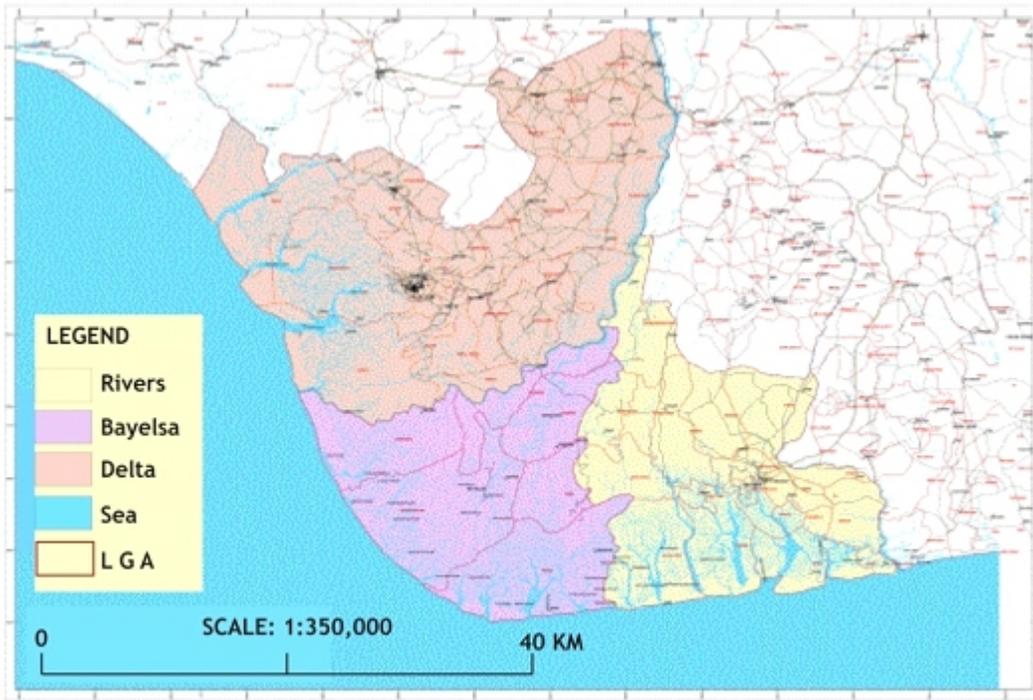


Fig. 1: Map of Niger Delta showing states of the study

Personnel, involved in one or more ways with fisheries resources conservation and management within the Niger Delta states of Bayelsa, Delta and Rivers States.

Data analysis: Kendall’s coefficient of concordance was used to test if there is an agreement among the respondents for the two categories on the identified environmental factors affecting the conservation of fisheries resources.

The test statistics is thus:

$$W = \frac{12 \sum D^2}{M^2(N)(N^2 - 1)}$$

Where

- M = Number of identified environmental factors affecting Conservation of fisheries resources
- N = Number of respondents sampled in the various categories
- D = Difference of the sum of ranking from the mean of the sum of ranks.

The size of W indicates the level of agreement among the respondents about the environmental factors affecting conservation of artisanal fisheries resources i.e. when W = 1, there is perfect accord among the various respondents on their opinion concerning the factors affecting conservation of fisheries resources in the Niger Delta; but where W = 0, there is poor or zero accord.

To determine the severity of factors impacting on fisheries resources, the Kendall coefficient was adopted. It ranks factors based on respondents rating of the presented factors. Scores are the horizontal summation of the product of response and the corresponding rank.

If W = 1, then there is perfect agreement as to which factor is ranked as the most important, if 0, there is non perfect agreement.

$$W = \frac{12D}{K^2(N^3 - N)}$$

where, D = $\sum (R_j - R)^2$

Apart from background characteristics, a five (5)-point summation ranking scale was used to determine the generally accepted pattern of response to each question. The five (5) point summation ranking scale for rating pattern of response and its application based on the “Likert scale” or “Summated rating scale” is as follows:

- SA = Strongly Agree=5
- A = Agree=4
- UD = Undecided=3
- D = Disagree=2
- SD = Strongly Disagree=1
- \sum Ranks =
- Mean of Ranks = 3.0

Table 1: Likert mean and mean of means analysis

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Score | Rank |
|--|----|----|----|----|----|----|----|----|----|-------|------|
| Incidence of oil pollution | 59 | 20 | 6 | 10 | - | - | - | - | - | 187 | 1 |
| Gas flaring | 31 | 40 | 6 | 18 | 10 | - | - | - | - | 241 | 2 |
| Industrial Pollution | 10 | 21 | 20 | 31 | 23 | - | - | - | - | 351 | 3 |
| Thermal pollution | 5 | 9 | 32 | 36 | 20 | 3 | - | - | - | 351 | 4 |
| .Erosion | - | 15 | 20 | 10 | 30 | 30 | - | - | - | 460 | 5 |
| Siltation | - | - | 11 | - | 20 | 40 | 33 | 1 | - | 604 | 6 |
| Physical obstruction of water ways by waste and equipments | - | - | - | - | 2 | 32 | 41 | 20 | 10 | 739 | 7 |
| Sewage pollution | - | - | - | - | - | - | 21 | 50 | 34 | 853 | 8 |
| Flooding | - | - | - | - | - | - | 10 | 34 | 61 | 891 | 9 |

Since, the mean response value for each question is 3.0, where a response mean is up to and above 3.0, we regard that statement as generally accepted or otherwise if less than 3.0. Any item that has a mean response value of 3.0 and above, it will therefore be considered to be the most prevalent or dominant perspective of the respondents on specified variables on conservation and management of fisheries resources of the Niger Delta

Responses to individual items are interpreted based on the Likert mean, which indicates respondent’s level of agreement to each item. The mean is computed by taking the average of the product of responses from the two categories of respondents and the scale point probability (1, 2, 3, 4 and 5). The mean is then interpreted according to the formula below:

| Scale point | Range | Interpretation |
|-------------|-------------|-------------------|
| 1 | 0.1 – 0.99 | Strongly Disagree |
| 2 | 1.0 – 1.99 | Disagree |
| 3 | 2.0. – 2.99 | Undecided |
| 4 | 3.0 – 3.99 | Agree |
| 5 | 4.0 – 5.00 | Strongly agree |

RESULTS

Results from Likert mean and mean of means analysis is presented in Table 1. The individual scores for each factor is a summation of the product of the responses to each item and the respective ranks. According to the ranking order, severity of incidence of oil pollution is considered as the most important factor affecting fishery resources in the area, followed by Gas flaring, industrial pollution and thermal pollution. To emerge as the most severe factor, slightly more than half of the respondents (56.19%) rated oil pollution as the most important environmental factor affecting fisheries resources conservation within the region. Flooding is perceived as the least severe factor by a little more than 50% of the respondents 61 (58%).

The patterns in which respondents perceive the factors severely indicate that pollution related to crude oil exploitation accounted for the top three factors. Also a substantial number of the respondents – 90 (85.71%) rated the first two factors (oil pollution and gas flaring) as the prime factors impacting on fisheries resources.

DISCUSSION

The individual scores for each factor is a summation of the product of the responses to each item and the respective ranks. According to the ranking order, severity of incidence of oil pollution is considered as the most important factor affecting fishery resources in the area, followed by Gas flaring, industrial pollution and thermal pollution. To emerge as the most severe factor, more than half of the respondents (56.19%) rated oil pollution as the most important environmental factor affecting fisheries resources conservation within the region. Flooding is perceived as the least severe factor by a little more than 50% of the respondents 61 (58%). This observation compared favorably the report of Alalibo, (1988) on the fisheries resources of exploitation of the Bonny/ New calabar estuarine fishing ground in the Niger Delta. NEDECO (1961), Ombu (1987) and Ansa (2005) also reported on similar effect of oil pollution on Netherland, Okirika oil terminal on Bonny river estuary, Niger Delta, Nigeria and Benthic microfauna of the Andoni flats in the Niger Delta area of Nigeria, respectively.

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The statistical significance of the ranking was done using the Kendall Rank coefficient concordance (W), which seeks to establish the degree of agreement among the respondents. The computed statistics of 0.82 implies that 82% agreement among officers in management category as well as technical and middle manpower on the severity of each factor.

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