Environmental Pollution and Economic Growth in Riverine Areas of Rivers State (2000 – 2020)

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Abstract

Over the years, there has been wanton destruction of the environment of the riverine areas of Rivers state, Nigeria including their water ways, air ways and farms. This is occasioned as a result of oil spillage and pollution. This study investigated therefore the effect of these pollutions on their environment. The broad objective of the study was to find out the impact of the environmental pollution on the economic growth and livelihood of the farmers in the riverine areas of Rivers State. The population of the study was 2358 (Two thousand, three hundred and fifty-eight) farmers whose main occupation is fishing and crop production. A sample size of 342 was obtained using the Taro Yamane formulae for determination. A total of 342 structured questionnaires were distributed and 279 were returned representing 82% of the sample size. Three (3) research questions were formulated and analyzed using statistical mean. Z-test statistics was also used to test the hypotheses at 0.05 level of significance. Findings were made to show that environmental pollution impact on the livelihood activities of people living in the communities located in the riverine areas of Rivers State. The study strongly recommends that a Pre-Mineral Exploration Strategic Plan (PMESP) be put in place to strengthen the government Environmental Impact Assessment (EIA) programmes to provide awareness, compensations and mitigating actions to cushion the effects of environmental pollution on the agricultural, fishing, health and other socio-economic activities of farmers in the riverine areas of Rivers State.

Keywords	*Environmental Pollution; Economic Growth; Riverine Areas; Rivers State*
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Introduction

Riverine areas also known as flood plains or low-lying areas are underlined by shallow aquifers and are found along Nigeria's river system. Accordingly, floodplain or fadama lands are regarded as very rich agricultural areas; they encompass land and water resources natural or artificial, permanent or temporary that could easily be developed for irrigation agriculture (Ingawa,2004). Okonkwo (2015) noted that riverine are referred to as swamps or marshes, and are among the most important ecosystems in the world. They are essential for providing many ecosystem services, such as food control, maintenance of biodiversity, fish production, carbon storage, aquifer discharge and flood control as well as providing habitat for many endangered species. The Nigerian Niger Delta is the largest riverine area in Africa and the third largest mangrove forest in the world, and is known for its richness in biodiversity as well as its oil and gas resources (Kafada, 2012). The livelihoods of the majority of the riverine area dwellers depend on the dynamics of the system and its biodiversity (Emerton, et al, 1999). The economic importance of the riverine cannot be overemphasized.

The surroundings or conditions in which one inhabits or plants grow or animals lives or operates in defined as environment. The activities carried out within such an environment to facilitate better growth of crops, animals, and other occupations determines the economic potentials and development in all aspects of life. A friendly environment would create an atmosphere of peace, good health, serenity, promote creativity and innovations reaping the best gifts of nature and freshness of air and vegetation. Health-wise, the environment includes the surroundings, conditions or influences that affect organizations. The activities of man in his efforts to better life conditions has through difficult methods affect his surroundings that instead of yielding the required comfort and desirable peace has created hardship and denials to good aquatic life and production. Environmental pollution is defined as the contamination of physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected (Iyyanki, et al, 2017). Any form of alteration of our natural surroundings wholly or largely by product of human actions through direct or indirect effect is pollution to the environment. It is of high importance to access the activities of human operations and also assess their impacts on the environment noting their impediments to the social, health and economic growth of the dwellers in a particular geographical area especially in Rivers State where according to indigenes of the state refer their zone as "the goose that lay the golden eggs" because of the multiplicity of oil companies activities in the area. Vital among other activities of the operators in the oil and gas industry in Rivers state is the impact of these environmental changes occasioned by their operations that affect the economy of the people, their way of life and survival in their various locations especially those communities located along the frontline riverine areas in the state.

Statement of the Problem

Abundant oil and gas in the Niger delta region of Nigeria has brought and is still bringing enormous rent to the government of the country. If financial resources realized from the sale of these natural resources were adequately put in use, Niger delta region and Nigeria as a country would have been the envy of other countries. Human and material resources would have been developed enough to make the country an advanced place.

However, that has not been the case. Exploration of oil has turned to exploitation of the region. It has become a resource curse. The antiquated method of exploration of oil has led to environmental degradation that has continued to affect the livelihood of the inhabitants of host communities.

Government has been urged by both local and international agitators to make oil companies participating in oil exploration in the delta to enthrone modern and best industry standard that will help eliminate the devastating effects of pollution. That however has not been achieved and environmental pollution in the region is still going on unabated. This study intends therefore to find out the impacts of this environmental pollution on the economic growth and livelihood of farmers in the host communities, using riverine communities in Rivers state as case study.

Objectives of the Study

The general objective of this study is to examine impact of environmental pollution on the economy of the people resident in the riverine areas of Rivers State. The specific objectives of the study include:

1. To ascertain how environmental pollution impact on crop production in the riverine areas of Rivers State.

2. To ascertain how environmental pollution impact on health of the inhabitants of the riverine areas of Rivers State.
3. To ascertain how environmental pollution impact on the fishing activities of farmers in the riverine areas of Rivers State.

Research Questions

The following research questions were postulated to guide the study

1. How does environmental pollution impact on crop production in the riverine areas of Rivers State?
2. How does environmental pollution impact on the health of the inhabitants of the riverine areas of Rivers State?
3. How does environmental pollution impact on the fishing activities of farmers in the riverine areas of Rivers State?

Statement of Hypotheses

The following alternate hypotheses have been formulated to guide the study and were tested at the 0.5 level of significance.

1. There is a significant relationship between environmental pollution and crop production in the riverine areas of Rivers State.
2. There is a significant relationship between environmental pollution and health of the inhabitants of the riverine areas of Rivers State.
3. There is a significant relationship between environmental pollution and fishing activities of farmers in the riverine areas of Rivers State.

Scope of the Study

This study is limited to those farmers that are located in the riverine areas of Rivers State which includes Okrika, Ogubolo, Asai-toru, Degema, Opobo, Akukutoru and Bonny Island. The content scope of the study is to find out how environmental pollution impacts on the riverine people's crop and fish production and their health. The study covers between years 2000 to 2020.

Significance of the Study

The study is important and of significance because it would examine how the activities of oil companies in Rivers State especially the riverine communities impede on the fishing, agricultural and health of the inhabitants of the area. It would also examine how our once friendly, fertile environment, rich in agricultural and aqua-culture has been bastardized and subjected the people living within these areas to perpetual poverty in both health and economic inability by environmental pollution. This study would also provide adequate suggestions on ways through which environmental pollution and degradation would be reduced to improve the livelihood of persons living along the coastal lines in Rivers State. The study would add to literature in public administration that will benefit future researchers in the subject matter.

Limitations of the Study

Environmental cases are so sensitive that government and community leadership take it so seriously and as such, information regarding pollution is guarded jealously in order not to generate bad blood amongst communities, companies and government at any given time. In that regard, getting people and stakeholders to give answers to our questionnaire was difficult. But the researcher explained that it was only an academic exercise aimed at acquiring a degree. That made them to cooperate. Security challenges are also a big hindrance in accessing some of these areas because of kidnapping, bunkering, activities of illegal refinery operators within these places. However, the researcher engaged the services of security operatives on any visit to the area.

Review of Related Literature

Conceptual Review

Environmental Pollution

Environment has been defined by various scholars according to their understanding and interpretations since it is difficult to hold on to one specific definition. It is important we have some of the definitions and draw conclusion from their various views as cited in Kumar (2018).

1. **Sir E.J. Ross:** Defined environment as an aggregate of all those external conditions and effects which regulate life and development of organizations.
2. **Alan Gilpin:** From a scientific point of view, environment is taken to mean everything that is physically external to the organism, organism includes human beings.
3. **K. R. Dikshit:** A holistic view of the world as it functions at any point of time with a multitude of a special elemental and socio-economic systems distinguished by quality and attributes of space and mode of behaviours of abiotic and biotic forms.
4. **Black's Dictionary:** Environment in its widest sense includes an aggregation of all those economic, social culture and natural conditions and facts which influence human life and living organism. Having viewed some of the definitions above, they seem to be consistent about nature, conditions, organism including man. In that sense therefore, Godson-Ibeji, (2016), stated that "Traditionally, the word environment is defined as the total surroundings that includes natural and biological resources. The World Bank, (2001) holds that "Environment is a natural and social conditions surrounding all mankind, including future generations. Therefore, the environment includes the biophysical components and processes of the natural environment such as the land, water and air as held by Bayole, et al (2011). Environment could further be summarily defined as "a habitation of man, plant, animals, organisms". The natural surroundings which plants, organisms, animals inhabit for life which includes water, air and land. No living organism live in isolation, existence by any form is complementary with the surroundings.

The word "pollution" is derived from a Latin word "Polluere/Polutus"which means to contaminate any feature of the environment or defiled or to make dirty or to pollute. The expression 'pollute' mean to get spoil or to make unclean or impure or unhealthy". Environmental pollution may be defined as "an undesirable change in the physical, chemical or biological characteristics of air, water and land that may or will harmfully affect human life (Kumar, 2008). Accordingly, every substance existing in the environment has definite composition when a foreign body is introduced into it or the proportion of its constituents is modified, then that substance loses its original character and qualities. As a consequence of the changed constitution, the original substance does not serve its definite purpose. The modified version is termed as "polluted" or adulterated substance "and the process is called "pollution" this pollution is the contamination of the environment by man-made substances or energy that have adverse effect on living or non-living matter (Kumar, 2018).

Godavarman (2002), posited that "environmental pollution is the release of substance and energy as waste product of human action which result in changes usually harmful, within the natural environment. It is in the common understanding of various contributors concerning environment and its pollution that man's activities directly or indirectly affect the natural surroundings as a result of the negative impact of the by- products as waste generated by his activities. Once the original nature of an environment is altered that it can no longer maintain its natural potentials to yield the normal results and purposes of its existence, it is classified as having been polluted. When an environment loses potency as a result of introduction of unfriendly substances, it becomes polluted. According to Godson-Ibeji, (2016) Environmental pollution is the introduction of different harmful pollutants in a certain environment that make the environment unhealthy for survival of man.

Environmental Pollution in the Niger Delta

The Niger Delta region in Nigeria occupies the major parts where exploration activities take place. Akpan and Ajayi, (2016), as cited in Omoogun et al (2021) emphasizes that 'Niger Delta region of Nigeria faces several environmental issues among which water contamination is predominant and even available water is usually polluted because of environmental pollution and degradation. According to Omoogun, (2021), "Hydrocarbons can cause both physical and chemical effects in water; even very small quantities of hydrocarbons can prevent oxygen transfer in water column, thus affecting aquatic life support systems.

It is not a surprise that the consistent cry by inhabitants especially the communities in the riverine areas has generated concerns by the government and sometimes organizations come out to condemn its frequency as a result of environmental pollution both air, water, soil and even noise.

Ipingbemi, (2009), as cited in Omoogun et al (2021), examined the effects of oil spillage on the socio-economic activities of the people and the environment in some communities in the Niger Delta region and the objectives of that study were to determine the quantity of oil spills from pipelines, the area of the coverage and to assess the effects of oil spillage on the people, soil, and water. Soil samples were collected from different communities and locations. The soil and water samples were analyzed using the atomic absorption spectrophotometric and gravimetric methods for soil and water respectively. It was discovered that there was high presence and concentration of heavy metals in the soil and water – Chromium, Lead, Arsenic, etc. While the economic significance of hydrocarbons as the primary source of fuel and that versatile application in downstream industries are obvious, the product may also have major environmental consequences. There are other possible sources of pollutants such as vehicles and generators emissions, burning of vegetation and trash (including domestic waste), food processing and use of fuel for cooking. The exploration activities of major drilling, refining and producing companies in the Niger Delta regions flare gas, emit thick smoke and hydrocarbons into the atmosphere that form 'black soot' which have been identified to be injurious to health of the inhabitants.

Gas flaring, oil spillage from corroded pipeline, spills as a result of pipeline vandalism and illegal refining of petroleum products known as "Kpo Fire" has become the order of the day in the Niger Delta area. Mismanagement of procedures and other acts of mischief has caused several explosion incidents that claimed many lives in the area. The recent was the fire outbreak that occurred at an illegal bunkering site and it affected over 100 people within the boundary of Imo and Rivers State on April 23, 2022.

Impact of Environmental Pollution on the Economy

Livelihood is defined as a set of activities essential to everyday life that are conducted over one's life span. Such activities could include securing water, food, fodder medicine, shelter, clothing etc. An individual livelihood involves the capacity to acquire aforementioned necessities in order to satisfy the basic needs of themselves and their household (Wikipedia), the Oxford Dictionary of English further described livelihood as activities usually carried out repeatedly and in a manner that is sustainable and providing of dignity, for instance, a fisherman's livelihood depends on the availability and accessibility of fish. The farmer in that same vein depends on the availability of fertile land to plant and harvest his crops, sell part of them to get cash to solve other problems and demands for living. According to Krantz (2001) the concept of sustainable livelihood is an attempt to go beyond the conventional definitions and approaches to poverty eradication. As cited in Godson-Ibeji (2016), Ugwuanyi et al (2012) opined that the exploration activities in Nigeria as a whole has polluted the water bodies and land territorial ecosystem. One of the biggest concerns associated with this pollution in the environment is the risk of contamination to farmland, fisheries and portable water since most of the people's livelihood depends on farming, fishing and usage of water for other domestic purposes. The above explanations, descriptions and definitions as provided by different authorities elucidated the controversies of pollution in all aspects of it to be a principal factor that disrupt man's livelihood because of its catastrophic nature. Once an environment is polluted, it takes much funds, caution and time for its remedial and subsequent recovery. It is therefore obvious that environmental pollution is both social and economic cost to the society.

Theoretical Framework

The theoretical base of this study is the Environmental Externalities theory. The theory is also known as the theory of "Positive and Negative Externalities" which is very useful in the analysis of environmental economics. Externality is said to be positive when the actions of an individual or group of individuals bestows on others positive rewards and becomes negative when the actions of an individual instead of conferring a positive benefit, interfere with his wellbeing or livelihood. In this circumstance therefore, a technological spill over is a positive externality which occurs when a company's invention not only benefit them but also is shared in the society and forms a pool of knowledge to the people. In the contrary, when a factory discharges its untreated effluents into the river, the river is polluted and consumers of the river bear costs in the form of health costs and or water purification. The two theories of "Positive and Negative externalities were propounded by Alfred Marshal (1842-1924) and Arthur Cecil Piogu (1920). While Alfred Marshall was concerned with the positive externality in economics, his theory only concerned the positive externalities accruing to the third parties outside the transaction. Piogu in his negative externality was focused not only on the benefits of externalities but also the costs. Accordingly, Piogu (1920) externality theory deals with the problem of smoke emission by a factory damaging nearby business or residents. However, his solution for correcting the negative externality is to impose a per unit tax on output to the firm generating the negative externality. So, when the welfare of one party is adversely affected by the action of another party and the loss in welfare is not compensated for due to lack of liability to the third parties who suffered the damages. This paper in the light of the above theories argues that government should mandatorily implement the legislation required for oil industries to practice and take all necessary precautions that will prevent or minimize environmental damages ensuring that host communities who bear the brunt of environmental damage are adequately compensated.

Empirical Review

Related empirical studies were reviewed in this section

Yakubu (2018) did a work on particle (Soot) pollution in Port Harcourt Rivers State, Nigeria-Double air pollution burden? Understanding and tackling potential environmental public health impacts. The author wanted to know the effects of air pollution in the city of Port Harcourt and what the government is doing to avert it. Using Ex-Post Facto research methodology, the author discovered that particle pollution in that city increases the risk of mortality among exposed populations. The author therefore underscores the need for rigorous implementation of existing environmental legislations established to protect the environment and public health.

Galadima, et al. (2011) researched on Domestic water pollution among local communities in Nigeria: Causes and consequences. Using descriptive analysis, they found out that lack of education, low budgetary funding, inefficient government policies, corruption, drought and other anthropogenic factors are contributing to the pollution of domestic water in Nigeria. They called for waste management education, adequate funding of water resources and health sectors as part of the solution to the problem.

Hyellai, Duan, Olusola and Narh (2021) reviewed Environmental health situation in Nigeria: Current status and future needs. Using Content analysis, they discovered that lower respiratory infection associated with air pollution has advanced increasing the causes of death. They recommended the sustenance of a healthy environment.

Godson – Ibeji, et al. (2020) researched on coping strategies to mitigate climate change variability among rural farmers in Anambra State, Nigeria. Using Frequency distributions, means and percentages as means of analysis, they found out the main causes of climate change and suggested solutions.

Godson – Ibeji and Chikaire (2016) examined the nature of environmental pollution in Nigeria and its consequences on agricultural productivity. Frequency tables and percentages were used as tools of analysis and they found out that environmental pollution reduces the level of soil nutrients and fertility; and crop growth and yield are also negatively affected. They called for efforts to be made to address the environmental problems of the country immediately.

Nnadi, et al. (2021) investigated the effectiveness of climate change adaptation measures used by women in garden egg production in Enugu State, Nigeria. Using descriptive statistical tools of frequency count, percentage, mean

scores and standard deviation, they found out that climate change like pollution has adverse effect such as scarcity of floral resources on garden egg production by these women.

Godson – Ibeji, Ibe, Chikaire and Aminu (2022) examined the effects of climate change on agro-pastoralists in Southeast, Nigeria. Descriptive statistical analysis was used by them to discover that climate changes have led to loss of animals due to migration, unexpected death of animals, starvation of pastoralists, loss of crops due to drought, etc.

Omorede (2014) assessed the impact of oil and gas resource exploration on the environment in Delta State, Nigeria. The author established through content analysis that oil and gas exploration in the oil communities of Delta State has brought about oil spillage, soil infertility, ill-health to members of the community, displacement of the people of the area, socio-economic deprivation among others. The researcher recommended that Federal government should exert maximum efforts in ensuring that operating oil companies in the area comply strictly with legal instruments to ensure sustainable development in the region.

Oka (2017) analyzed the spate of environmental degradation and its impacts on Niger Delta communities' sustenance. Using descriptive case study approach, the researcher discovered that there are spates and evidences of oil spillage, gas flaring, deforestation, toxic waste dump, etc that have brought about depletion of soil nutrients, increasing global warming with other attendant obvious socio-economic implications like loss of farmland, polluted rivers/streams, loss of domestic livestock, etc. These truly have impacted negatively on Niger Delta communities' sustenance.

Eregha and Irughe (2009) examines the oil related environmental degradation in the Nigeria's Niger Delta and the emerging socio-economic multiplier effects on the people of the region. Applying Content analysis, the study revealed that the emerging social disorder in the delta is as a result of the economic multiplier effects such as unemployment and high level of poverty.

Gap in Empirical Review
There is an existing gap considering the views and contributions of various authors concerning the topic in view. Most authors dwelt on the havoc caused by the outcomes of oil exploration which is inimical to both the environment and the inhabitants but not much was proffered as a solution or preventive measures or compensatory mitigating actions expected to be put in place to protect the environment and the occupants of the environment. This study filled that gap.

Methodology

Research Design

Survey research design was used for this study. Survey research design was used because the study was intended to find out the extent to which environmental pollution impacted on livelihood activities, health of the inhabitants and fishing activities of communities in the riverine areas of Rivers State through identified opinions and perception of farmers.

Area of the Study

This research was carried out in Rivers State in the Niger Delta, Nigeria. It is one of the 36 states of Nigeria with 23 local government areas.

Fig. 1: Map of Rivers State

Sources of Data
The researcher made use of primary and secondary data. Primary data used was from the questionnaire developed for the study while secondary data was from books, journals, internet resources, etc.

Population of the Study

Population of this study comprised resident farmers in the riverine areas of Rivers State
Table 1: Population of Farmers in the Riverine Areas of Rivers State.

S/N	RIVERINE LGAs IN RIVERS STATE	FARMERS
1	Akuku-Toru,	191
2	Abual/Odual,	215
3	AsariToru,	230
4	Degema,	201
5	Okrika,	197
6	OguBolo,	210
7	Bonny,	234
8	Andoni	214
9	Opobo	195
10	Ahoada West	216
11	Ahoada East	255
	TOTAL	**2,358**

Source: Rivers State Agricultural Development Programme (ADP) Annual Report, 2009.

Determination of Sample Size

A sample is defined as a subset of a population selected to participate in a study; it is a fraction of the whole, decided to participate in a research project (Nwandu, 2019). In this study therefore, the sample size was drawn using the Taro Yamane formulae as shown below:

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{2358}{1 + 2358(0.05)^2}$$

$$n = \frac{2358}{6.89}$$

$$n = \textbf{342 (Sample Size)}$$

Sampling Technique

The study adopted a multi-stage sampling procedure with the use of purposive and simple random sampling technique for the selection of the respondents.

Method of Data Collection

Method of data collection was face to face method of our structured questionnaire and secondary sources of data comprising of journals, internet resource, agency records, etc.

Validity of the Instrument

The essence of this study is to ascertain whether the purpose for which the questionnaire was designed and used as measuring instrument was achieved. However, the objective is to know if the questions raised in the questionnaire addressed the issues in question and whether the responses were adequate, concise and reliable for an empirical assessment. The validity of the questionnaire is not in doubt as it was objectively and constructively criticized and adopted by experts in the field of measurement and evaluation.

Reliability of the Instrument

The reliability of the measuring instrument was determined through a test-retest method. Copies of the instrument (questionnaire) were administered to a randomly selected sample drawn from the riverine farmers. The data obtained was subjected to test for internal consistency using Cronbach Alpha, which gave a reliability index of 0.75.

Method of Data Analysis

Data collected for the study was analyzed with descriptive statistics using tables, frequencies and percentages. Z-test tool was used to test the hypothesis at 0.05 level of significance.

Data Presentation

The researcher presented and analyzed the data collected from our respondents in this section. 342 copies of questionnaire were distributed to the respondents and 279 returned. That represents of our respondents. The five-point Likert scale of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD) and rated 5,4,3,2 and 1 respectively were adopted. In addition, the mean score from 2.50 and above is accepted as been significant.

Data Analysis

Research Question 1: How does environmental pollution impact on crop production in the riverine areas of River State?

Table 2: Mean scores of how environmental pollution impact on crop production.

S/N	Options	SA	A	UD	D	SD	Total	Mean	Decision
1	Inflammation caused by fire outbreak during dry season affects crop production in riverine areas.	61 22%	174 62%	13 5%	17 6%	14 5%	279	3.89	Accepted
2	Environmental pollution decimated Niger Delta region affecting crop production.	73 26%	182 65%	8 3%	11 4%	5 2%	279	4.1	Accepted
3	Over usage of few arable lands affect crop production.	68 24%	179 64%	12 4%	16 6%	4 1%	279	4.04	Accepted
4	Deforestation adversely affects crop production.	60 22%	187 67%	9 3%	14 5%	9 3%	279	3.98	Accepted
5	Climate change effect such as flooding adversely affects crop production.	53 19%	201 72%	11 4%	10 4%	4 1%	279	4.03	Accepted
	Grand Mean							**4.0**	

Source: Research Data, 2022

The table above shows that the mean scores of the questionnaire items 1-5 is 3.89, 4.1, 4.04, 3.98 and 4.03 respectively. All the 5 mean scores are above the decision level of 2.50. In addition, the grand mean is 4.0 which is also above the decision level of 2.50. Therefore, the result indicates that environmental pollution impact negatively on crop production in the riverine area of Rivers State.

Research Question 2: How does environmental pollution impact on the health of the inhabitants of the riverine areas of Rivers State?

Table 3: Mean scores of how environmental pollution impact on health of inhabitants.

S/N	Options	SA	A	UD	D	SD	Total	Mean	Decision
1	Soot affects the lungs imparting a wide range of serious health outcomes including bronchitis and asthma.	60 22%	182 65%	8 3%	14 5%	15 5%	279	3.92	Accepted
2	Inhaling soot causes cancer	179 64%	68 24%	12 4%	4 1%	16 6%	279	4.04	Accepted
3	Inhaling soot causes also reproductive disorders.	201 72%	55 20%	11 4%	8 3%	4 1%	279	4.5	Accepted
4	There's been increase in untimely death of inhabitants as a result of environmental pollution.	60 21%	175 63%	10 4%	19 7%	15 5%	279	3.88	Accepted
5	Environmental pollution reduces farming activities leading to malnourishment especially in children.	75 27%	180 65%	6 2%	13 5%	5 2%	279		Accepted
	Grand Mean							**4.05**	

Source: Research Data, 2022.

The table above shows that the mean scores of the questionnaire items 1-5 is 3.92, 4.04, 4.5, 3.88 and 3.92 respectively. All the 5 mean scores are above the decision level of 2.50. In addition, the grand mean is 4.05 which is

also above the decision level of 2.50. Therefore, the result indicates that environmental pollution impact on health of inhabitants of the riverine areas of Rivers State.

Research Question 3: How does environmental pollution impact on the fishing activities of farmers in the riverine areas of Rivers State?

Table 4: Mean scores of how environmental pollution impact on the fishing activities of farmers

S/N	Options	SA	A	UD	D	SD	Total	Mean	Decision
1	Decreasing volume of fish catch in the area.	205 73%	57 21%	10 4%	4 1%	3 1%	279	4.6	Accepted
2	Increasing cost of fish rearing.	55 20%	180 65%	8 3%	20 7%	16 8%	279	3.8	Accepted
3	Lack of market for fish products leading to low family incomes.	80 29%	185 66%	5 2%	5 2%	4 1%	279	4.19	Accepted
4	Decreasing fish prices occasioned by migration of inhabitants running away from environmental pollution.	50 18%	192 69%	7 3%	15 5%	15 5%	279	3.88	Accepted
5	Constant pollution of the rivers leading to death of fishes.	70 25%	186 67%	5 2%	5 2%	13 4%	279	4.05	Accepted
	Grand Mean							**4.1**	

Source: Research Data, 2022.

The table above shows that the mean scores of the questionnaire items 1-5 is 4.6, 3.8, 4.19, 3.88 and 4.05 respectively. All the 5 mean scores are above the decision level of 2.50. In addition, the grand mean is 4.1 which is also above the decision level of 2.50. Therefore, the result indicates that environmental pollution impact on the fishing activities of farmers in riverine areas of Rivers State.

Test of Hypotheses

Hypothesis 1

There is a significant relationship between environmental pollution and crop production in the riverine areas of Rivers State.

Table 5: Z-Test on How Environmental Pollution Impact on Crop Production in the Riverine Areas of Rivers State

RESPONDENTS	N	X	SD	Z-CAL	Z- CRIT	P	DF	**DECISION**
Male Farmers	160	3.14	0.78	8.3	1.96	0.05	275	H_0 Rejected
Female Farmers	182	2.57	0.44					

From the table above, since the calculated value of Z-ratio (8.3) is greater than the critical value of Z-ratio. (1.96) the stated alternate hypothesis is rejected. This means that environmental pollution did not impact on crop production in the riverine areas of Rivers State.

Hypothesis 2

There is a significant relationship between environmental pollution and health of the inhabitants in the riverine areas of Rivers State

Table 6: Z-test on How Environmental Pollution Impact on the Health of the Inhabitants of the Riverine Areas of Rivers State

RESPONDENT	N	X	SD	Z-CAL	Z- CRIT	P	DF	**DECISION**
Male Farmers	160	4.01	0.72	1.06	1.96	0.05	275	H_O Accepted
Female Farmers	182	3.69	0.20					

From the table above**,** since the calculated value of Z-ratio (1.06) is less than the critical value of Z-ratio (1.96), the alternate hypothesis is accepted showing that environmental pollution impacted on the health of the inhabitants in the riverine areas of Rivers State.

Hypothesis 3

There is a significant relationship between environmental pollution and fishing activities of farmers in the riverine areas of Rivers State.

Table 7: Z-Test on How Environmental Pollution Impact on the Fishing Activities of Farmers in the Riverine Areas of Rivers State

RESPONDENT	N	X	SD	Z-CAL	Z- CRIT	P	DF	**DECISION**
Male Farmers	160	3.88	0.75	1.36	1.96	0.05	340	H_O Accepted
Female Farmers	182	3.72	0.56					

From the table above, since the calculated value of Z-ratio (1.36) is less than the critical value of Z-ratio (1.96) the alternate hypothesis is accepted. This implies that environmental pollution impacted on the fishing activities of communities in the riverine areas of Rivers State.

Discussion of Findings

Environmental Pollution and Crop Production in Riverine Areas of Rivers State

Our respondents in answer to our research questions agree that environmental pollution impact negatively on crop production. However, the result of our hypothesis test contradicts that. The result showed that there is no significant relationship between environmental pollution and crop production in riverine areas of Rivers state. Some empirical evidences and studies disagree with this finding. Godson-Ibeji and Chikaire (2016), Nnadi *et al*(2021) assert that environmental pollution and hazards reduces soil nutrients and crop yields. In that regard, for maximum production of crops in communities in Rivers state, environmental degradation must be reduced.

Environmental Pollution and Health of Inhabitants of the Riverine Areas of Rivers State

There is an agreement by our respondents in answer to our questionnaire and test of our hypothesis that environmental pollution impact negatively on the health of inhabitants of riverine areas. That finding agrees with Yakubu (2018) and Hyellai *et al* (2021) that environmental pollution increases the risk of mortality among exposed inhabitants.

Environmental Pollution and Fishing Activities of Farmers in Riverine Areas of Rivers State

Our respondents agree that environmental pollution has impacted negatively on fishing activities in riverine areas of Rivers state. Our hypothesis result is also in agreement. In a study by Godson-Ibeji *et al* (2022), they note that environmental pollution has led to death of animals. That includes fishes. In that regard, there is a relationship between pollution and fishing and indeed other animal husbandry activities

Summary of Findings

1. Environmental pollution impacted negatively on crop production in riverine areas of Rivers state.
2. Environmental pollution impacted negatively on the health of inhabitants in riverine areas of Rivers state.
3. Environmental pollution impacted negatively on fishing activities of farmers in riverine areas of Rivers state.

Conclusion

Oil and gas resources in the delta region of Nigeria are a blessing to the country because the sustenance of the country depends on these resources. However, the mode of exploration by the engaged oil companies is ancient and is causing harm to the environment. Exploration of these companies has brought about environmental degradation that is affecting both aquatic and farming activities. Our research shows that crop, fishing and indeed health of inhabitants of host communities are adversely affected. In sum, oil and gas and other industrial activities in the riverine areas are damaging and degrading the natural resources of the system.

Recommendations

In the light of the findings of the study the following actions were suggested to bring about improvement in the system:

1. Government should put in place Pre-Mineral Exploration Strategic Plan (PMESP) to strengthen the government's Environmental Impact Assessment (**EIA**) programmes to provide awareness, compensations and mitigating actions to cushion the effects of environmental pollution on the agricultural, fishing and health and other socio-economic activities of farmers in the riverine areas of Rivers state.
2. Routine environmental inspection and monitoring by regulatory agencies is required to forestall future reoccurrences of environmental pollution.
4. Action should be taken against environmental laws violators to put an end to reoccurrence.

Contribution to Knowledge

This study contributed to knowledge by emphasizing that Government should mandatorily implement the legislation required for oil industries to practice and take all necessary precautions that will prevent or minimize environmental damages ensuring that host communities who bear the brunt of environmental damage are adequately compensated.

Recommendation for Further Studies

Future research should focus on the education and sensitization of the dwellers on alternative means of livelihood and income activity that does little harm to the environment. If possible, issues related to environmental protection are included in the curriculum of schools in the riverine areas, so that the people will live with it as a culture.

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