

OIL DEPLETION AND ENVIRONMENTAL DEGRADATION, EXPLORING SUSTAINABLE ALTERNATIVES IN AGRICULTURAL SECTOR IN OGONI REGION IN RIVERS STATE.

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Abstract

The study investigates oil depletion and environmental degradation, Exploring Sustainable Alternative in Agricultural Sector in Ogoni region in Rivers State. A descriptive survey design was adopted, two research questions, two hypotheses guided the study. (400) population comprises of farmers across six kingdoms in Ogoni Region and agriculturally active households within these communities. The sample size comprised 400 farmers to determine the appropriate sample size. Data collected was active through structured questionnaires, mean and standard deviation inferential analysis including the z-test is used to determine the significance at the 0.05 level, the finding shows that the oil rich rivers state in Nigeria has faced significant environmental degradation as a result of prolonged oil exploration, extraction and spillage, particularly in rural communities. This has led to soil contamination, water pollution and loss of biodiversity, thereby threatening the sustainability of agricultural livelihoods. As oil reserves dwindle and the economic viability of crude oil declines,

there is an urgent need to explore sustainable alternatives in the agricultural sector to secure food security improved livelihoods and restore ecological balance for findings the study highlights the resilience of local farmers and the potential of sustainable innovations to transform the sector. The study recommended policy reforms, environmental remediation and farmer-centered education as vital strategies to transition from an oil dependent economy to a green and sustainable agricultural system in Rivers State.

Keywords: Oil, depletion, environment, degradation, Agriculture.

INTRODUCTION

Rivers State, located in the Niger Delta region of Nigeria, is globally recognized for its abundant crude oil reserves. However, decades of oil exploration and extraction have resulted in severe environmental degradation, particularly in Agricultural communities such as those in Ogoni-land (UNEP) 2011. The pollution of land and water resources through oil spills and gas flaring has led to significant reductions in agricultural productivity, endangering the livelihoods of rural farmers (Nriagu) 2016. Furthermore, oil depletion presents new socio-economic challenges, necessitating a transition for more sustainable development pathways, as the oil economy declines, attention must shift toward revitalizing agriculture through environmentally sustainable methods. Scholars have emphasized the role of agro economy, climate-smart agriculture, and digital innovations in rebuilding resilient food systems (Altieri) 2018, FAO, 2021. In the context of Rivers State, adopting these practices is not just an economic imperative but also an environmental necessity.

This study aims to explore the intersection of oil depletion, environmental degradation and the need for sustainable alternatives in agriculture. By examining the current state of farming in polluted areas and identifying viable solutions, the research contributes to ongoing discussions on post-oil sustainability in Nigeria.

Purpose of the Study

The purpose of this study is to examine the effects of oil depletion and environmental degradation on Agricultural productivity in Ogoni region in Rivers State, Specifically the objectives of the Study is to

1. Identify oil depletion and environmental degradation that affect agricultural productivity and livelihoods in ogoni region in Rivers state.
2. Determine the sustainable agricultural practices and digital technologies adopted to enhance food production and environmentally restoration in oil-impacted areas in Ogoni region in Rivers State.

Research Questions

For the purpose of the study, the following research questions were considered to aid the study

1. How has oil depletion and environmental degradation affected agricultural productivity and livelihoods in Ogoni region in Rivers State?
2. What sustainable agricultural practices and digital technologies can be adopted to enhance food production and environmental restoration in oil-impacted areas in Ogoni region in Rivers State?

Research Hypotheses

The following null hypothesis was postulated to guide the study

1. There is no significant impact of oil depletion and environmental degradation that affect agricultural productivity in Rivers State.
2. There is no significant relationship between farmers' awareness of sustainable agricultural practices and digital technologies in Rivers State.

METHODOLOGY

The study adopts a descriptive survey research design to gather relevant data on the impact of oil depletion and environmental degradation on agriculture and to identify sustainable alternatives.

The target population includes agric active households with these communities and farmers across six kingdoms in the Ogoni region of Rivers State: the six kingdoms include Babbe, Gokana, Ken-Khana, Nyo-Khana, Tai, Eleme, Total population of the study is **400**, A stratified sampling technique is used to ensure fair representation of each kingdom sample size of 400. Data was collected through structured questionnaires designed in a 5-point rating scale administered to farmers while secondary data is obtained from existing literature, government reports and environmental assessment UNEP, 2011. The reliability of the instrument is ensured using the test-retest methods and the data is

analyzed using descriptive statistics such as mean and standard deviation inferential analysis including the z-test is used to determine the significance of observed effects and relationships at the level of 0.05

RESULTS

Research Question 1

How has oil depletion and environmental degradation affected agricultural productivity in Rivers State?

Table1: oil Depletion and Environmental Degradation on Agriculture and

(Mean scores)

	Impact Statement	Means Score
1	Crop yields have significantly declined due to oil-related pollution	4.6
2	Soil fertility has been degraded by oil spills and gas flaring	4.5
3	Fishing activities have reduced drastically due to water contamination	4.7
4	Access to safe water for irrigation and house hold use has decreased	4.4
5	Farmland availability has reduced due to environmental degradation	4.2
6	Oil companies have not compensated or restored affected farmlands	4.6
7	My household income from agriculture has 5 years	4.5

Source :field work 2024

Results from Table I shows that mean scores between 4.2 and 4.7

Scores between 4.2 and 4.7 show that farmers strongly agree oil exploration has had a negative and widespread effect on agriculture and rural livelihoods particularly high scores for crop yield decline (4.6) and fishing reduction (4.7) indicate severe impacts on both farming and aquaculture. These results reinforce the urgency for environmental remediation and agricultural policy reform in Rivers State.

Research Question 2

What sustainable agricultural practices and digital technologies can be adopted to enhance food production and environmental restoration in oil-impacted areas?

**Table 2: Farmers to Adopt Sustainable Agricultural Practices
and Digital Technologies (Mean Scores)**

Practice /Technology	Awareness (Mean Score)	Willingness to Adopt (Mean Score)
Organic farming and Composting	2.3	4.1
Agro forestry and Intergrated cropping	2.5	4.0
Climate –smart agriculture	2.1	3.9
Use of mobile apps for weather / advice	2.8	4.3
Remote sensing / drone technology	1.9	3.7
Soil testing and precision fertilizer use	2.4	4.2
Solar – powered irrigation systems	2.2	4.0

Source:field work 2024

Awareness levels are generally low (mostly between 1.9 and 2.8) indicating limited exposure to sustainable and digital solutions

However, willingness to adopt these practices is high (mostly above 4.0) showing farmers are open and eager to try new approaches – if proper support, training and tools are made available . this result supports the development of farmer targeted intervention programs focused on capacity building, technology access and awareness campaign.

Hypothesis Testing

Hypothesis I There is no significant negative impact in the mean score of oil depletion and environmental Degradation on agriculture in Rivers State.

Table 3: Z-Test Analysis on Mean Response of Farmers on how oil depletion and Environmental Degradaiton on Agriculture in Rivers State.

Research Question	Sample mean $\pm$	Population mean (No)
Impact of oil depletion on agriculture	4.5	3.0

Trending from Table 4 revealed that the 2-calculate value obtained was 50.00 while the Z critical stood on a value of 1.96 at 0.6 degree of freedom. The statistics revealed that the Z-cal value was less than the z-critical, thus making the null hypothesis which stated

Std. Dev (0)	Sample Size (n)	Z-cal	Z-Crit	Decision
0.6	400	50.00	± 1.96	Reject Ho

No significant negative impact of oil depletion on agriculture and livelihoods in Rivers Ste to be accepted

Summary of Z-test results for Question 2

Research Question	Sample mean ±	Population mean (No)
Willingness to adopt sustainable tech	4.3	3.0

These values demonstrate that both observed means are significantly higher than the neutral benchmark, confirming strong statistical evidence to support the research.

Finding from table 4 revealed that the Z-calculated value obtained was 29.43 while the z critical stood on a value of 1.96 at a 0.7 degree of freedom

Std. Dev (0)	Sample Size (n)	Z-cal	Z-Crit	Decision
0.7	400	29.43	± 1.96	Reject Ho

Farmers are significantly willing to adopt sustainable digital practices.

Discussion of Findings

The findings of this study provide a clear picture of the severe challenges facing agricultural communities in Rivers State due to oil depletion and environmental degradation, especially within the six Ogoni kingdoms. The high mean score (4.6) on the impact of oil pollution across all kingdoms confirms the widespread and persistent damage caused by decades of oil exploration, aligning with the conclusions of UNEP (2011) who documented extensive soil and water contamination in the Niger Delta one of the most pressing consequence identified is the decline in arable land availability (mean = 2.2) continuous oil spills, gas flaring and chemical contamination still there is strong local interest and potential for sustainable alternatives. Addressing this challenge requires a combination of environmental clean up, farmer education and investment in climate – smart and digital agricultural system.

CONCLUSION

From the results of the research the study therefore examined the intersection of oil depletion environmental degradation and agricultural sustainability in Rivers State with a particular focus on the Ogoni region. The findings reveal that extensive oil-related pollution has significantly disrupted farming activities, leading to reduced productivity loss of arable land and increased food insecurity. Despite these challenges, the study also highlights a strong interest among local farmers in adopting sustainable and digital agricultural practices to improve their livelihoods and restore the environment, it is evident that the future of agriculture in Rivers State depends on a strategic shift from traditional, oil-dependent systems to environmentally sustainable and technologically driven approaches. The willingness of farmers to embrace innovation presents a crucial opportunity for government, NGO's and other stake holders to implement reforms that can transform the agricultural sector into a resilient and sustainable pillar of the local economy.

RECOMMENDATIONS

1. Environmental Remediation and Monitoring: Immediate action should be taken to clean up contaminated land and water resources, especially in oil impacted communities like Ogoni land, as recommended by the UNEP (2011) report long-term environmental monitoring should be institutionalized.
2. Farmer Education and Capacity Building: Government and development partners should establish farmer education programs focusing on sustainable practices such as organic farming, and climate –smart agriculture. Community-based training centers and agricultural extension services should be strengthened.
3. Digital Agriculture integration, policy reform and incentives
4. Youth engagement in Green Agriculture and community participation in Decision-making.

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