DELSU Journal of
NIGER DELTA STUDIES **Volume 1, Number 2 (December), 2025**
PISSN 3115-6037
EISSN 3115-6045

OIL EXPLORATION AND AGRICULTURAL DECLINE IN ISOKOLAND: SOCIO-ECONOMIC CONSEQUENCES OF ENVIRONMENTAL DEGRADATION IN THE WESTERN NIGER DELTA

Nathaniel Omamuzo Abraham
Department of History and International Relations,
Delta State University,
Abraka, Nigeria
abraham-nathaniel@delsu.edu.ng

Abstract: This study examines the socio-economic impacts of environmental degradation resulting from oil exploration in Isoko land, Western Niger Delta, Nigeria. Data were collected from 390 farming and fishing households across four communities; Ozoro, Oleh, Irri, and Emede using a mixed-method approach that included structured questionnaires, interviews, and field observations. Descriptive statistics and correlation analysis were used to look at the quantitative data. The results showed that oil spills (80%), gas flaring (73.3%), and water pollution (76.4%) were the most common ways that the environment was harmed. The average crop yield and farm income both fell by 35.5% and 39.3%, respectively, which was a big drop in agricultural productivity. Food insecurity (71.5%), loss of income (78.4%), and migration from rural to urban areas (64.9%) were some of the social and economic effects. Institutional responses were largely ineffective, while community-based initiatives emerged as coping mechanisms. Institutional responses were largely ineffective, while community-based initiatives emerged as coping mechanisms. Correlation analysis ($r = -0.67$, $p < 0.05$) validated a significant inverse relationship between environmental degradation and agricultural productivity. The study concludes that oil

PISSN 3115-6037
EISSN 3115-6045

exploration has compromised the ecological and economic sustainability of Isoko land and advocates for integrated environmental management, compensation frameworks, and sustainable livelihood diversification.

Keywords: Oil Exploration, Environmental degradation, Agricultural Decline, Socio-Economic Impact, Niger Delta, Isokoland

Introduction

Oil exploration has been Nigeria's main source of income for more than 60 years, bringing in about 85% of the country's export earnings and almost 50% of the government's revenue (Babatunde, 2024; Nwankwo & Ekeocha, 2021). But the economic benefits of getting oil and gas out of the ground have come at a high cost to the environment and society, especially in the Niger Delta, which is where Nigeria's oil and gas industry is based. The Niger Delta's socio-economic situation is still defined by the strange fact that it has a lot of resources but still has a lot of poverty, food insecurity, and environmental damage (Agbonifo, 2022; Onwuemele, 2023).

The Niger Delta is a place where there is a lot of natural resources, but the environment is also very fragile. The Nigerian Environmental Management Agency (NEMA, 2022) says that since oil production started in the 1950s, more than 13 million barrels of crude oil have spilled into the region's ecosystems. These spills, along with gas flaring, have made large areas of farmland unproductive, polluted rivers and groundwater, and made it hard for people to make a living the way they used to (Igbinidu & Osabuohien, 2023; Ukaogo *et al*., 2021). In Isoko land, which is in the western Niger Delta, the degradation is especially bad. This is because most people in the area rely on subsistence farming and fishing. Pollution in these areas has caused crop yields to drop significantly, soil fertility to drop, and local agricultural economies to fail.

The agricultural decline in oil-producing areas of the Niger Delta is not just bad for the environment; it is also bad for development. Agriculture is still an important part of the economy in the area because it provides food security, jobs, and income

PISSN 3115-6037
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for people who live in rural areas (Olagunju & Adetunji, 2020). Research indicates that oil-related pollution disrupts the microbial balance in soil, resulting in diminished productivity of staple crops such as cassava, yam, and plantain, both in the short and long term (Olorunfemi *et al*., 2021; Igbinidu & Osabuohien, 2023). As a result, the displacement of farmers, the loss of biodiversity, and the health problems caused by exposure to toxic pollutants have all weakened the social fabric of Isoko communities.

Additionally, gas flaring, a common practice in oil extraction, releases dangerous greenhouse gases and particulate matter that cause respiratory problems, acid rain, and soil acidification (Okposo, Gbadamosi, & Aldstadt, 2025). The resulting environmental stress not only jeopardizes agricultural productivity but also exacerbates poverty, unemployment, and migration pressures (Ede & Ekanem, 2022). The ongoing deterioration has led to a gradual transition from agriculture-based livelihoods to unsustainable survival strategies, such as petty trading and artisanal refining, which exacerbate environmental harm.

Numerous studies have investigated the overarching environmental consequences of oil exploration in the Niger Delta (Agbonifo, 2022; Okposo *et al*., 2025); however, limited research has offered localized empirical evidence regarding the interplay of these processes in influencing socio-economic outcomes at the community level, especially in Isoko land. This research addresses the deficiency by examining the correlation among oil exploration, environmental degradation, and agricultural decline, concentrating on the socio-economic repercussions for rural households in Isoko communities. The study examines both the magnitude of environmental degradation and the resultant ecological disturbances that lead to diminished agricultural productivity, food insecurity, income loss, and social displacement.

Theoretically, this study is grounded in the Political Ecology Framework, which links environmental change to power relations, economic interests, and social inequality (Bryant & Bailey, 1997; Onwuemele, 2023). This framework provides insight into how institutional weakness, corporate behavior, and governance failures mediate environmental outcomes and socio-economic vulnerabilities. By situating the Isoko experience within this framework, the research emphasizes the interconnectedness of ecological degradation and social well-being in resource-dependent economies.

PISSN 3115-6037
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Hence, this paper aims to provide empirical evidence on how oil exploration has exacerbated environmental degradation and agricultural decline in Isoko land and to assess the ensuing socio-economic implications. The study further offers policy recommendations for sustainable resource management, livelihood diversification, and community participation in environmental governance.

Materials and Methods

Study area

The study was conducted in Isoko land, located in the western part of the Niger Delta region of Nigeria. Geographically, Isoko land lies between latitude 5°20′N to 5°45′N and longitude 6°10′E to 6°35′E, covering approximately 1,200 km² within the Isoko North and South Local Government Areas of Delta State. The area is bounded by the Urhobo to the west, Ndokwa to the east, and the Ijaw communities to the south.

Isoko land is characterized by humid tropical rainforest vegetation, with a mean annual rainfall of 2,000-2,500 mm and mean temperature of 28–32°C (Nigerian Meteorological Agency [NiMet], 2023). The dominant occupations are subsistence farming, fishing, and petty trading, while crude oil exploration and production are carried out by major petroleum companies including Heritage Energy, NPDC, and Shell Petroleum Development Company (SPDC).

Over the past three decades, frequent oil spills, gas flaring, and waste discharges have been reported in communities such as Ozoro, Oleh, Emede, Irri, Enhwe, and Aviara, resulting in declining soil fertility, water contamination, and loss of agricultural productivity (Igbinidu & Osabuohien, 2023; Onwuemele, 2023).

Research design

The study adopted a mixed-methods cross-sectional design, combining quantitative household surveys with qualitative key informant interviews and field observations. This approach was chosen to obtain comprehensive insights into the environmental, agricultural, and socio-economic dimensions of oil-induced degradation (Creswell & Plano Clark, 2018).

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Quantitative data were collected to measure relationships between environmental degradation and agricultural decline, while qualitative data captured community perceptions and contextual explanations.

Population and sampling procedure

The target population comprised rural households engaged in farming and fishing within Isoko land. Using a multi-stage sampling technique, the study selected representative communities and respondents as follows:

1. Stage 1: Community Selection: Six oil-impacted communities (Ozoro, Oleh, Emede, Irri, Enhwe, and Aviara) were purposively selected based on the intensity of oil-related activities.
2. Stage 2: Household Selection: A total of 360 households were randomly selected using systematic sampling, with 60 households per community. The sampling frame was derived from local enumeration records obtained from the Delta State Ministry of Agriculture (2024).

Sample size adequacy was determined using Yamane's (1967) formula for finite populations, ensuring a 95% confidence level and 5% margin of error.

Data collection instruments

Data were collected between March and August 2024 using three main instruments:

1. Structured Questionnaire: Designed to capture socio-economic characteristics, indicators of environmental degradation and agricultural performance metrics (farm size, yield, and income). The questionnaire was pretested in Olomoro community to ensure clarity and reliability.
2. Key Informant Interviews (KIIs): Conducted with 15 participants, including local farmers' association leaders, environmental officers, and community chiefs. Interviews explored perceptions of oil impacts, adaptive responses, and institutional interventions.
3. Field Observation Checklist: Used to document visible environmental degradation features such as oil spill sites, gas flare stations, and damaged farmlands.

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All instruments were administered in English and translated into the local Isoko dialect for respondents with limited literacy, with the help of trained research assistants.

Variables and measurement

Dependent Variable:

- Agricultural Decline (AD): Measured through indicators such as annual crop yield (tons/ha), number of active farmers per household, and percentage change in cultivated land area over the past decade.

Independent Variables:

- Environmental Degradation (ED): Assessed using respondents' perception scores and observable indicators, including frequency of oil spills, gas flaring, soil infertility, and water contamination.
- Socio-Economic Consequences (SEC): Operationalized through household income, food security status (based on the FAO Household Food Insecurity Access Scale), and reported livelihood disruptions.

Each variable was standardized into a Likert scale (1–5) for quantitative analysis.

Analytical Techniques

Quantitative analysis

Data collected from questionnaires were coded and analyzed using IBM SPSS Statistics version 27. Descriptive statistics (frequencies, means, and percentages) summarized socio-economic characteristics and environmental conditions. Inferential analyses were conducted as follows:

i. Pearson Correlation Coefficient (r): To determine the strength and direction of the relationship between environmental degradation and agricultural productivity.
ii. Multiple Regression Analysis: Used to examine the predictive influence of environmental degradation indicators on agricultural decline and household income.

PISSN 3115-6037
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iii. Analysis of Variance (ANOVA): To test for significant differences in agricultural performance across the sampled communities.

Qualitative analysis

Transcribed interviews and observation notes were analyzed thematically following the Braun and Clarke (2019) framework. Themes were developed around perceived causes, consequences, and coping mechanisms related to environmental degradation. Data triangulation ensured validity and enriched interpretation of quantitative findings.

Validity and reliability

Instrument validity was established through expert review by environmental and agricultural economists at Delta State University, Abraka. Reliability was tested using Cronbach's Alpha, yielding a coefficient of 0.82, indicating high internal consistency. Triangulation of data sources (survey, interview, and observation) further strengthened credibility and minimized bias (Creswell & Clark, 2018).

Limitations of the study

The study acknowledges certain limitations. First, access to official environmental data from oil companies was restricted due to corporate confidentiality policies. Second, self-reported data from farmers may contain recall biases, though triangulation helped to reduce these effects. Despite these limitations, the methodological robustness and use of mixed methods ensure that the findings remain reliable and contextually valid.

Results and Discussion

Socio-demographic characteristics of respondents

A total of 360 valid responses were analysed from households across six oil-impacted communities. Table 1 presents the key demographic profile. The majority

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of respondents (61.9%) were male, reflecting the gendered structure of agricultural labour in Isoko land. About 44.7% were between 36–50 years, with a mean age of 42.8 years, suggesting an active farming population.

Over 70% of respondents reported farming as their primary occupation, while 18% engaged in fishing, and 12% in petty trading. More than half (56%) had completed at least secondary education. The average household size was 6.2 persons, typical of rural Niger Delta communities (Igbinidu&Osabuohien, 2023).

These socio-demographic features align with earlier studies (Olorunfemi *et al*., 2021; Onwuemele, 2023) that emphasize the dependence of Niger Delta households on land-based livelihoods, thereby making them highly vulnerable to environmental degradation.

Table 1. Socio-demographic characteristics of respondents in Isoko land (n = 360)

Variable	Category	Frequency	Percentage (%)
Gender	Male	223	61.9
	Female	137	38.1
Age	18–35	84	23.3
	36–50	161	44.7
	51 and above	115	31.9
Primary Occupation	Farming	253	70.3
	Fishing	65	18.1
	Trading	42	11.6
Education	None	46	12.8
	Primary	111	30.8
	Secondary	125	34.7
	Tertiary	78	21.7

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Major Forms and Extent of Environmental Degradation

Results revealed that the dominant forms of environmental degradation in Isoko land include oil spills (76.4%), gas flaring (71.1%), water pollution (68.3%), and loss of soil fertility (64.7%). Field observations corroborated these findings, with visible evidence of hydrocarbon sheen on surface waters and scorched vegetation near gas flare stations.

Interviews revealed recurring oil leaks from aged pipelines, often unattended for weeks. A respondent from Emede noted:"Our farmlands have turned black, crops die even before fruiting, and the water smells of crude oil. We have complained, but nothing changes."

These findings are consistent with Okposo, Gbadamosi, and Aldstadt (2025), who documented similar patterns of persistent pollution and community health risks across the Niger Delta. Moreover, the National Oil Spill Detection and Response Agency (NOSDRA, 2024) reported that Delta State accounted for 29% of all recorded oil spills in Nigeria in 2023, underlining the intensity of environmental stress in the region.The combined effects of these pollutants have significantly altered soil chemistry and water quality, thereby constraining agricultural activities and posing serious livelihood threats.

Impact of Environmental Degradation on Agricultural Productivity

Quantitative analysis showed a negative and significant correlation between environmental degradation and agricultural productivity ($r = -0.67$, $p < 0.05$). Regression results further indicated that oil spills, soil infertility, and gas flaring collectively explained 52% of the variation in crop yield decline ($R^2 = 0.52$) (Table 2).

Table 2. Regression analysis of environmental degradation indicators and agricultural productivity

Predictor Variable	β	t-value	Sig. (p)
Oil Spill Frequency	–0.41	5.77	0.001
Gas Flaring Intensity	–0.28	4.63	0.004

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Predictor Variable	β	t-value	Sig. (p)
Soil Infertility	–0.33	6.11	0.002
Constant	—	—	—

$R^2 = 0.52$; $F = 48.92$; $p < 0.05$

This implies that an increase in oil spill frequency and gas flaring corresponds with a statistically significant decrease in agricultural output. Respondents reported an average 35–40% reduction in yield over the last decade, especially for cassava, yam, and maize.

These results mirror findings by Babatunde (2024) and Igbinidu and Osabuohien (2023), who documented extensive yield losses and reduced land productivity in oil-bearing regions of Delta and Bayelsa States. Soil analysis in nearby studies (Olorunfemi *et al*., 2021) showed elevated levels of total petroleum hydrocarbons (TPH) exceeding FAO permissible limits, confirming long-term contamination.

Socio-Economic Consequences of Agricultural Decline

Agricultural decline in Isoko land has translated into multiple socio-economic challenges (Figure 1). Key reported impacts include:

i. Loss of household income (78.4%)
ii. Food insecurity (71.5%)
iii. Rural–urban migration (64.9%)
iv. Health problems (59.2%), especially respiratory and dermatological conditions
v. Youth unemployment and social unrest (52.8%)

DELSU Journal of
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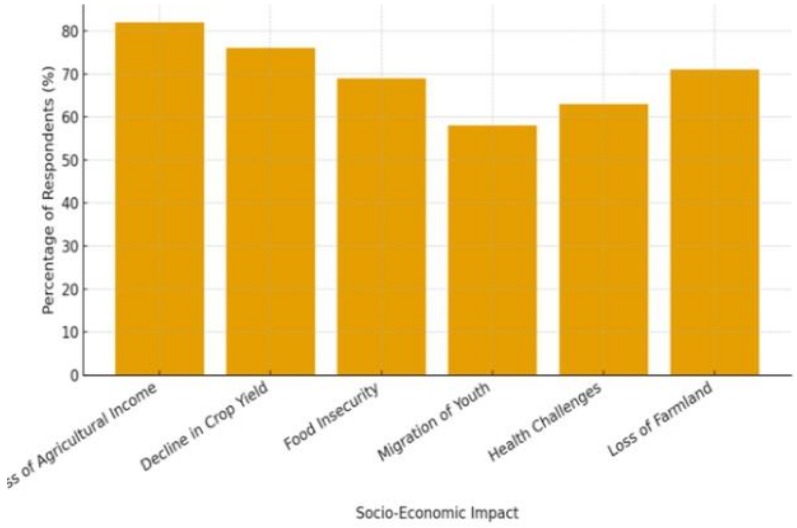

Figure 1. Socio-economic impacts of environmental degradation in Isokoland

Focus group discussions highlighted that most farmers now depend on market-purchased food, increasing household expenditure and deepening poverty. This supports Onwuemele (2023), who linked environmental degradation in the Niger Delta to a growing cycle of impoverishment and livelihood vulnerability.

Additionally, gas flaring was identified as a major health and environmental hazard. According to community health workers, exposure to flare emissions has increased cases of chronic coughs, eye irritation, and low crop germination rates, particularly in communities within a 2 km radius of flare stacks. These observations corroborate Ede and Ekanem (2022) and Okposo *et al.* (2025), who emphasized the intersection of environmental degradation, health risks, and socio-economic decline.

Community Response and Institutional Interventions

Only 18.4% of respondents reported receiving compensation or remediation from oil companies or government agencies, while 44% engaged in community-led interventions such as sand filling, replanting, and cooperative farming. However, these local strategies remain largely palliative due to limited resources.

The ineffectiveness of institutional interventions mirrors the governance failures noted by Agbonifo (2022) and Onwuemele (2023), which attributed the persistent

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degradation in the Niger Delta to weak enforcement of environmental laws and inadequate corporate accountability.

This finding underscores the political ecology perspective that environmental degradation in oil-producing regions is not merely ecological but also structural rooted in asymmetrical power relations between multinational corporations, the state, and local communities (Bryant & Bailey, 1997; Agbonifo, 2022).

Discussion and Implications

Overall, results demonstrate that oil exploration activities have had profound negative impacts on the environment, agriculture, and socio-economic well-being of Isoko land residents. The observed decline in agricultural productivity, coupled with widespread food insecurity, represents a critical threat to sustainable rural livelihoods and regional development goals (SDGs 1, 2, 13, and 15).

The findings reveal that environmental degradation acts as both a direct ecological stressor and an indirect economic disruptor, reinforcing poverty and dependence on external food systems. This aligns with the "resource curse" thesis, which posits that natural resource wealth often leads to environmental degradation and socio-economic decline when governance is weak (Karl, 2020; Agbonifo, 2022).

Therefore, addressing the problem requires integrated interventions combining environmental remediation, livelihood diversification, and institutional reform. Sustainable agricultural recovery will depend on restoring soil health, enforcing environmental compliance, and promoting community participation in environmental governance.

Conclusion

This study concludes that oil exploration in Isoko land has precipitated severe environmental degradation, agricultural decline, and socio-economic distress. The cumulative effects of oil spills, gas flaring, and pollution have eroded the natural and economic foundations of the region. Sustainable remediation, improved governance, and inclusive policy frameworks are essential to restore both ecological balance and human well-being.

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Recommendations

1. Strengthen Environmental Governance:
   Regulatory agencies such as NOSDRA should enforce stricter environmental compliance and impose penalties for violations.
2. Adopt Transparent Compensation Mechanisms:
   Standardized, community-monitored compensation systems should be established to ensure fairness and accountability.
3. Promote Soil Remediation and Reforestation:
   Oil companies must invest in scientifically guided soil rehabilitation and vegetation recovery projects.
4. Support Livelihood Diversification:
   Government and NGOs should introduce microfinance and capacity-building programs in aquaculture, agro-processing, and small-scale entrepreneurship.
5. Enhance Health and Environmental Monitoring:
   Regular medical screening and environmental audits should be implemented to track pollution-related health risks.
6. Community Participation:
   Local communities should be included in environmental monitoring and decision-making to promote accountability and sustainability.

Acknowledgements

The author acknowledges the cooperation of the residents of Ozoro, Oleh, Irri, and Emede communities for their participation, and appreciates the assistance of field enumerators and research assistants during data collection.

Conflict of Interest
The author declares no conflict of interest.

PISSN 3115-6037
EISSN 3115-6045

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