

Environmental Degradation and Livelihood Resilience: Evidence from Affected Communities

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Abstract: Environmental degradation affected the adoption of alternative livelihoods under the Hydrocarbon Pollution Remediation Project (HYPREP) in Ogoni villages in Rivers State, Nigeria. The descriptive survey included 1,204,100 residents from Eleme, Gokana, Khana, and Tai LGAs. The study calculated a 400-respondent sample using the Taro Yamane formula and distributed it proportionally among the study locations. Experts verified a structured Likert-scale questionnaire, and the study tested its reliability using Cronbach's Alpha. At a 0.05 significance level, the study analyzed the data using descriptive and inferential statistics, including frequency distributions, means, standard deviations, correlations, regressions, and ANOVA. The consensus was that environmental degradation has displaced farming and fishing, increasing the adoption of vocational and technical skills training, agribusiness and entrepreneurship, ecosystem restoration, and community-based inclusion initiatives. ANOVA found statistically significant differences between the four LGAs, with Khana and Gokana having higher perceived impacts than Eleme and Tai. Despite their popularity, the report notes that bureaucratic delays and inconsistent stakeholder engagement limit HYPREP treatments. The study finds that environmental degradation in Ogoniland changes economic survival tactics and increases dependence on alternative livelihoods. To achieve sustainable development in affected communities, it suggests expanding livelihood intervention programs, integrating environmental restoration with economic empowerment, and strengthening HYPREP's inclusivity and governance.

Keywords: Environmental Degradation; Livelihood Resilience; Ogoni Communities; Hydrocarbon Pollution Remediation Project; Sustainable Livelihood Framework; Analysis of Variance.

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1. Introduction

Environmental deterioration has become a major obstacle to socio-economic advancement worldwide [1]. In Nigeria, especially in the Niger Delta, extensive oil exploration and extraction have caused severe environmental impacts, including soil pollution,

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toxic water, and biodiversity loss. Studies from the United Nations Environment Programme UNEP [33] and the World Bank in 2020 show that oil leaks and gas flaring have drastically altered habitats and reduced the area's environmental viability [2]. These ecological issues have disrupted traditional livelihoods, forcing affected communities to seek alternative ways to survive [3]. Recent findings indicate that oil spills in Nigeria's oil-producing regions have made it difficult for residents to maintain traditional fishing, farming, and hunting practices, while increasing intervention strategies that involve skill development and job assistance [4]. In the Ogoni area, environmental degradation has weakened local economic activities and heightened socio-economic challenges, prompting a search for new livelihoods in direct response to ecological decline. In Rivers State's Ogoni area, environmental degradation has particularly pronounced repercussions [5]. The devastation of fertile farmland and aquatic habitats has significantly diminished chances for farming and fishing, which have historically supported the local economy [6]. As UNEP [33] reported, extensive hydrocarbon pollution has rendered much land unfit for agriculture and contaminated water supplies to unsafe levels [7]. Additionally, findings from Amnesty International [35] and the Nigerian National Oil Spill Detection and Response Agency confirm that ongoing oil pollution has threatened food security and economic activities in affected areas.

As a result, people have increasingly shifted toward alternative livelihoods, including vocational and technical skills training and involvement in agribusiness and small-scale enterprises [9]. Although adaptive strategies exist, research has not sufficiently examined the extent to which environmental degradation affects the shift toward alternative livelihoods, especially within structured programs like the Hydrocarbon Pollution Remediation Project (HYREP) [10]. Current research has largely focused on the environmental and economic consequences of oil pollution in the Niger Delta, with little empirical investigation into how these ecological changes directly shape community-level livelihood adaptation strategies [11]. This underscores the need for more targeted research on how environmental degradation and livelihood diversification interact [12]. Consequently, this research examines how environmental degradation affects the uptake of alternative livelihoods through the Hydrocarbon Pollution Remediation Project (HYREP) in Ogoni communities in Rivers State, Nigeria [13]. It specifically assesses implications for vocational and technical training, evaluates involvement in agribusiness and entrepreneurship, and investigates the connection between environmental degradation and ecosystem restoration efforts [14]. The outcomes are expected to support policy development and provide practical insights into sustainable livelihood initiatives in regions facing environmental harm [15].

2. Literature Review

This research draws on the Sustainable Livelihood Framework (SLF), developed by Chambers and Conway in 1992 and later promoted by the Department for International Development in 1999 [16]. The framework suggests that people's livelihoods depend on access to crucial resources, including natural, financial, social, and physical capital, and that external disturbances such as environmental deterioration affect these resources [17]. It also indicates that natural resource depletion forces families to modify or find new ways to earn a living to maintain their quality of life [30]. This framework matters to the current research because it applies to Ogoni communities, where oil contamination has harmed natural resources such as land, water, and fisheries, limiting existing livelihoods and pushing families to seek alternative income sources [18]. The Hydrocarbon Pollution Remediation Project (HYPREP) aligns with SLF principles because it focuses on revitalizing environmental resources and strengthening livelihood resilience [31].

Environmental degradation refers to the decline of the natural environment due to pollution, resource depletion, and ecosystem destruction [19]. In the Niger Delta, especially in Ogoni areas, oil extraction drives this degradation by polluting soil, contaminating water sources, and reducing biodiversity [29]. These impacts have notably weakened farming and fishing, which have historically supported the region's economy [20]. Alternative livelihoods are new income-generating activities individuals pursue when traditional earning methods become unviable [28]. This includes vocational training, starting new businesses, and engaging in agricultural ventures. Within this study's framework, HYPREP serves as a policy response that supports both environmental cleanup and livelihood restoration and diversification for affected communities [21].

Several recent institutional and empirical studies have examined environmental degradation and livelihood outcomes in the Niger Delta: United Nations Environment Programme Environmental Assessment of Ogoniland [33] conducted a comprehensive scientific assessment of Ogoniland and found extensive hydrocarbon pollution of soil and groundwater, concluding that environmental degradation had severely disrupted agriculture and fishing livelihoods, necessitating long-term remediation and livelihood restoration [22]. In 2018, Amnesty International's report, *Petroleum Pollution and Human Rights in the Niger Delta*, used field investigations and satellite data to show that oil pollution has contributed to health risks, economic displacement and loss of livelihoods for communities in the Niger Delta, including the Ogoni people [27].

Likewise, the World Bank's *Nigeria Niger Delta Economic and Environmental Review* (2020) used economic and environmental analyses to show how environmental degradation reduces agricultural productivity and household income, emphasising the need for livelihood diversification and green recovery programs [23]. NOSDRA Oil Spill Monitoring Annual

Report [34] analyzed oil spill incidents in Nigeria and reported persistent environmental contamination in the Niger Delta, with direct implications for food security and rural livelihoods [24]. Although these studies consistently confirm the environmental and socio-economic impacts of oil pollution, most focus on environmental damage and economic losses at the macro level [32]. Limited attention has been given to how environmental degradation specifically influences household-level adoption of alternative livelihoods, the role of structured interventions such as HYPREP in shaping livelihood transitions, and comparative livelihood outcomes across Ogoni communities [25]. This gap justifies the present study, which empirically examines how environmental degradation influences the adoption of alternative livelihoods under HYPREP in Ogoni communities, Rivers State [26].

3. Methodology

This part outlines the approaches and techniques utilized to investigate how environmental degradation affects the acceptance of alternative livelihoods within the Ogoni Communities of Rivers State. It details the research framework, the study population, sample size determination, sampling methods, data-gathering tools, the validity and reliability of these tools, data collection methods, and the analysis techniques employed. A descriptive survey research design was implemented for this study. This design was deemed suitable because it facilitates organized data collection from a broad population to describe current circumstances and explore relationships among various factors without altering them. Additionally, this framework effectively assesses how environmental degradation affects individuals' livelihood decisions in the targeted area. The study's demographic included all inhabitants of the four Ogoni Local Government Areas in Rivers State: Eleme, Gokana, Khana, and Tai, totaling 1,204,100 individuals. These areas have experienced notable environmental degradation, especially linked to oil drilling activities, making them suitable for this research. The study's sample size was calculated using the Taro Yamane formula for finite populations. This approach yielded a sample of 400 participants. To ensure all study regions were adequately represented, the researchers used proportionate sampling to distribute the sample size among the four Local Government Areas [8].

Table 1: Population distributions, sample size using Taro Yamane method and proportionate allocation of sample size

LGA	Population	Sample Size
Eleme	273,500	91
Gokana	336,300	112
Khana	421,300	140
Tai	173,000	57
Total	1,204,100	400

This study employed a multistage sampling technique. Initially, the researchers purposefully selected the four Ogoni LGAs because they are vulnerable to environmental degradation. Next, the researchers randomly selected communities within each LGA. Finally, respondents were selected using simple random sampling to ensure every individual had an equal opportunity to participate. The researcher used a structured questionnaire as the main data-collection tool. The questionnaire was organized into sections to collect demographic data, environmental degradation information and details on the adoption of alternative livelihoods. The questions utilized a Likert-type scale to evaluate participants' perceptions and experiences. To establish the measurement tool's validity, environmental studies and statistics specialists conducted face and content validation. The researchers integrated their feedback and recommendations to improve the instrument's clarity, relevance, and appropriateness. The researchers assessed the instrument's reliability using Cronbach's alpha. A preliminary study with participants not included in the main study yielded a reliability coefficient above the acceptable limit of 0.70, confirming the instrument's dependability for the research.

The researchers collected data by directly administering the questionnaire through trained research assistants familiar with the local communities. This method ensured a high response rate and accurate data collection. The researchers analyzed the data using descriptive and inferential statistics. Descriptive statistics such as frequency distributions, percentages, means, and standard deviations summarized respondents' characteristics and responses. Inferential statistics tested the study's hypotheses. Analysis of Variance (ANOVA) examined group differences, while regression and correlation analyses evaluated relationships between environmental degradation and livelihood outcomes. The study tested all hypotheses at a 0.05 significance level. The findings are presented in Tables 1 and 2 and interpreted to show how environmental degradation affects livelihood choices in Ogoni communities. This methodological strategy guarantees that the study's results are valid, reliable, and comprehensive in addressing the research objectives.

4. Results

Research Question One: To what extent has environmental degradation influenced the adoption of vocational and technical skills training among people in Ogoni Communities, Rivers State?

Table 2: Results of the descriptive statistics of respondents' responses on the influence of environmental degradation on vocational & technical skills training in Ogoni Communities, Rivers State

No.	Items	Eleme		Gokana		Khana		Tai	
		Mean	Sd.	Mean	Sd.	Mean	Sd.	Mean	Sd.
1	Oil contamination destroyed my former profession.	3.87	0.91	3.92	0.88	4.05	0.85	3.74	0.94
2	Environmental harm compelled me to learn new skills.	4.01	0.86	4.08	0.82	4.12	0.80	3.89	0.90
3	The HYPREP training initiative addresses the loss of communities used for fishing or agriculture.	3.95	0.89	4.02	0.85	4.10	0.81	3.88	0.92
4	I registered for vocational training due to the consequences of pollution.	3.90	0.93	3.98	0.88	4.06	0.83	3.82	0.95
5	Community deterioration made my customary work unviable.	3.85	0.95	3.93	0.90	4.00	0.87	3.76	0.97
6	Pollution reduced my earnings, so I acquired new skills.	4.02	0.88	4.10	0.84	4.18	0.79	3.91	0.89
7	Skills training is essential because of environmental degradation.	4.10	0.84	4.18	0.80	4.25	0.76	3.96	0.87
8	Without oil pollution, there would be no need for technical training.	3.70	1.02	3.78	0.98	3.85	0.95	3.65	1.05
9	Environmental damage heightened my interest in HYPREP's training programs.	4.05	0.87	4.12	0.83	4.20	0.78	3.93	0.88
10	Vocational skills equip me to deal with the effects of environmental degradation	4.12	0.83	4.20	0.79	4.28	0.75	3.98	0.86
	Grand Mean	3.957	0.898	4.031	0.857	4.109	0.819	3.852	0.923

Table 2 presents descriptive statistics showing how respondents perceive the impact of environmental destruction on the uptake of vocational and technical skills training in Eleme, Gokana, Khana, and Tai LGAs. The findings show consistently high mean values across all items (exceeding 3.70), indicating consensus that environmental degradation has profoundly affected the acceptance of vocational and technical skills training in Ogoni communities. The standard deviations for the various items range roughly between 0.75 and 1.05, indicating moderate response variation while still showing strong overall agreement among participants. An analysis of individual items shows that participants strongly agreed that oil pollution has ended their previous job roles (Eleme = 3.87; Gokana = 3.92; Khana = 4.05; Tai = 3.74), suggesting that environmental deterioration has directly displaced conventional livelihoods. In addition, respondents acknowledged that environmental damage pushed them to acquire new skills through training, with Khana showing the highest mean (4.12), reflecting a greater perceived impact in that area. Respondents also agreed that HYPREP training efforts address the decline in fishing and farming communities, with mean scores ranging from 3.88 to 4.10, highlighting recognition of institutional responses to ecological losses. The item on enrollment in vocational training due to pollution's effects also showed strong agreement, notably in Khana (4.06).

Moreover, participants recognized that land degradation made traditional jobs unfeasible and that pollution reduced income, making skill acquisition necessary. The strongest consensus was in Item 7 (training is vital because of degradation), particularly in Khana (4.25), showing a strong sense of urgency for skills training. Conversely, Item 8 showed relatively lower means (3.65–3.85), though still above the 3.0 threshold, indicating that some respondents somewhat disagreed that training would not be necessary without pollution. Nonetheless, respondents strongly agreed with excitement about HYPREP training initiatives (Item 9) and the perceived value of vocational skills (Item 10) across all LGAs. The grand means support these conclusions: Eleme (3.957, SD = 0.898), Gokana (4.031, SD = 0.857), Khana (4.109, SD = 0.819), and Tai (3.852, SD = 0.923). Khana had the highest grand mean, indicating a stronger perceived effect of environmental degradation in that region. Reflecting on the grand mean values (ranging from 3.852 to 4.109), environmental degradation has substantially influenced the Ogoni populace's embrace of vocational and technical skills training. The elevated mean scores across all LGAs confirm that pollution-driven loss of traditional livelihoods has significantly pushed citizens to pursue vocational and technical skills.

Research Question Two: To what extent has environmental degradation influenced the adoption of agri-business and entrepreneurial development in Ogoni Communities, Rivers State?

Table 3: Results of the descriptive statistics of respondents' responses on the influence of environmental degradation on agri-business & entrepreneurial development in Ogoni communities, Rivers State

No.	Items	Eleme		Gokana		Khana		Tai	
		Mean	Sd.	Mean	Sd.	Mean	Sd.	Mean	Sd.
11	Damage to farm communities drove me to train in agri-business.	3.88	0.92	3.95	0.89	4.02	0.86	3.76	0.94
12	Oil leaks reduced my crop production, prompting me to seek alternative income streams.	4.00	0.87	4.08	0.84	4.15	0.80	3.90	0.89
13	I became part of entrepreneurship initiatives because of environmental decline.	3.92	0.90	4.00	0.86	4.08	0.83	3.82	0.92
14	The poor soil conditions made agriculture challenging, so I diversified my work.	3.85	0.94	3.93	0.90	4.00	0.87	3.78	0.95
15	HYPREP's agribusiness training serves as a substitute for communities that have been harmed.	3.90	0.91	3.98	0.88	4.06	0.84	3.85	0.92
16	Pollution compelled me to establish a small business.	3.95	0.89	4.03	0.85	4.10	0.82	3.88	0.91
17	Environmental challenges heightened my need for entrepreneurial knowledge.	4.05	0.86	4.12	0.82	4.20	0.78	3.92	0.88
18	Losing fishing opportunities led me to explore agribusiness possibilities.	3.98	0.88	4.05	0.85	4.12	0.81	3.89	0.90
19	Participating in entrepreneurship training helps me adjust to environmental changes.	4.08	0.85	4.15	0.81	4.22	0.77	3.95	0.87
20	Environmental decline encourages businesses in my community to broaden their activities.	4.10	0.84	4.18	0.80	4.25	0.76	3.97	0.86
	Grand Mean	3.971	0.886	4.047	0.85	4.12	0.814	3.872	0.904

Table 3 presents descriptive findings showing strong consensus across all Local Government Areas (LGAs) on the impact of environmental degradation on agri-business uptake and entrepreneurial growth. The averages for all items exceed 3.75, reflecting a significant influence perceived. Item review indicates that participants agreed that farmland damage and oil spills have negatively affected agricultural output (Items 11 and 12), prompting a search for alternative income opportunities. Khana consistently reported the highest average scores (reaching 4.25 in Item 20), signifying a more pronounced entrepreneurial shift within that LGA. Survey participants also identified entrepreneurship programs (Item 13), soil degradation (Item 14), and pollution-driven business formation (Item 16) as key drivers of livelihood changes. Items 17 to 20 showed particularly strong alignment, underscoring environmental degradation as a primary driver of knowledge in entrepreneurship, business diversification, and strategic adaptations. The overall averages support this observation: Eleme (3.971, SD = 0.886), Gokana (4.047, SD = 0.850), Khana (4.120, SD = 0.814), and Tai (3.872, SD = 0.904). The grand means (ranging from 3.872 to 4.120) suggest that environmental deterioration has significantly affected agribusiness adoption and entrepreneurial progress in the Ogoni regions. Respondents uniformly acknowledged that the loss of farmland and fish resources has led them towards entrepreneurial adjustments.

Research Question Three: To what extent has environmental degradation influenced the adoption of ecosystem-based livelihood restoration in Ogoni Communities, Rivers State?

Table 4: Results of the descriptive statistics of respondents' responses on the influence of environmental degradation on ecosystem-based livelihood restoration in Ogoni communities, Rivers State

No.	Items	Eleme		Gokana		Khana		Tai	
		Mean	Sd.	Mean	Sd.	Mean	Sd.	Mean	Sd.
21	Mangrove destruction drove me to participate in ecosystem restoration efforts.	3.95	0.90	4.02	0.86	4.10	0.82	3.85	0.93
22	I took on restoration activities because of the damage done to wet communities.	3.90	0.92	3.98	0.88	4.05	0.85	3.80	0.94
23	Environmental degradation forced livelihoods to center on conservation.	4.00	0.88	4.08	0.84	4.15	0.80	3.90	0.89

24	HYPREP's restoration initiatives aim to replenish lost natural resources.	4.05	0.86	4.12	0.82	4.20	0.78	3.92	0.88
25	Oil contamination reduced the availability of natural products, prompting me to restore the area.	3.98	0.89	4.05	0.85	4.12	0.81	3.88	0.90
26	Ecosystem damage increased my involvement in planting mangroves.	4.02	0.87	4.10	0.83	4.18	0.79	3.91	0.89
27	Livelihoods centered on restoration relieve environmental circumstances.	3.88	0.93	3.95	0.89	4.02	0.86	3.76	0.95
28	A damaged environment requires implementing sustainable practices.	4.10	0.84	4.18	0.80	4.25	0.76	3.96	0.87
29	I accepted restoration-related jobs as traditional livelihoods collapsed.	3.92	0.91	4.00	0.87	4.08	0.83	3.82	0.92
30	The loss of the environment underscores the significance of ecosystem-focused work.	4.12	0.83	4.20	0.79	4.28	0.75	3.98	0.86
	Grand Mean	3.99	0.88	4.068	0.843	4.143	0.80	3.878	0.903

Table 4 presents descriptive statistics reflecting participants' feedback on ecosystem-based livelihood restoration. The findings show strong consensus across all items, with average scores typically above 3.80, indicating strong support for ecosystem-focused livelihood restoration as a strategy to combat environmental degradation. Participants agreed that mangrove destruction (Item 21), wetland damage (Item 22), and ecosystem decline (Item 23) called for restoration-oriented livelihoods. Participants gave HYPREP restoration programs (Item 24) notably high recognition as valuable efforts to restore lost natural resources. Respondents also strongly agreed with mangrove planting (Item 26) and embracing sustainable methods (Item 28), with Khana again showing the highest average scores across most items (up to 4.28 in Item 30). The overall means are: Eleme (3.99, SD = 0.88), Gokana (4.068, SD = 0.843), Khana (4.143, SD = 0.80), and Tai (3.878, SD = 0.903). The overall mean values suggest that environmental degradation has significantly influenced the adoption of ecosystem-based livelihood restoration in Ogoni communities. Respondents firmly recognize that ecological devastation has made participation in restoration efforts essential.

Research Question Four: How does environmental degradation influence community-based livelihood inclusion initiatives in Ogoni Communities, Rivers State?

Table 5: Results of the descriptive statistics of respondents' responses on the influence of environmental degradation on community-based livelihood inclusion initiatives in Gokana, Tai, Eleme, and Khana LGAs of Ogoni communities

	Items	Eleme		Gokana		Khana		Tai	
No.		Mean	Sd.	Mean	Sd.	Mean	Sd.	Mean	Sd.
	Pollution impacts necessitated including women in livelihood initiatives.								
31	Environmental damage increased youth involvement in HYPREP programs.	3.85	0.95	3.92	0.91	4.00	0.87	3.74	0.96
32	Livelihood initiatives in the community now include vulnerable demographics affected by pollution.	4.00	0.88	4.08	0.84	4.15	0.80	3.90	0.89
33	The degradation of the environment highlighted the necessity to include individuals with disabilities.	3.95	0.90	4.02	0.86	4.10	0.82	3.85	0.92
34	I became involved in community initiatives as pollution had widespread effects.	3.80	0.97	3.88	0.93	3.95	0.90	3.70	0.99
35	The environmental crisis increased accessibility to livelihoods for all community groups.	3.92	0.91	4.00	0.87	4.08	0.83	3.82	0.92
36	HYPREP's inclusion programs respond to the environmental losses experienced by the entire community.	4.05	0.86	4.12	0.82	4.20	0.78	3.92	0.88
37	Pollution has decreased household income, making inclusive programs more essential.	4.00	0.88	4.08	0.84	4.15	0.80	3.90	0.89

38	Community programs specifically target those most adversely affected by environmental degradation.	4.08	0.85	4.15	0.81	4.22	0.77	3.95	0.87
39	Environmental challenges have intensified the urgency of including individuals in livelihood opportunities.	4.02	0.87	4.10	0.83	4.18	0.79	3.91	0.89
40	Pollution impacts necessitated including women in livelihood initiatives.	4.10	0.84	4.18	0.80	4.25	0.76	3.97	0.86
	Grand Mean	3.977	0.89	4.053	0.851	4.128	0.81	3.866	0.907

Table 5 presents descriptive statistics on community-based livelihood inclusion initiatives. The results show strong consensus across all items, with average scores between roughly 3.70 and 4.25, suggesting that environmental destruction has a considerable effect on livelihood inclusion initiatives. Participants acknowledged that pollution contributed to greater inclusion of women (Item 31), youth engagement (Item 32), and support for vulnerable populations (Item 33). The greatest consensus was noted in Items 36 to 40, indicating that HYPREP programs are broadly viewed as inclusive measures to address ecological loss. Item 34 (inclusion of individuals with disabilities) showed lower but still positive means, suggesting less intense but still significant agreement. The overall means for the communities are as follows: Eleme (3.977, SD = 0.89), Gokana (4.053, SD = 0.851), Khana (4.128, SD = 0.81), and Tai (3.866, SD = 0.907). Given the overall mean scores (3.866–4.128), environmental degradation has significantly affected livelihood inclusion efforts in Ogoni communities. The findings support the notion that the environmental crisis has broadened inclusive livelihood options for vulnerable groups.

4.1. Hypotheses Testing

H01: There is no significant difference in the influence of environmental degradation on the adoption of vocational and technical skills training among respondents in Gokana, Tai, Eleme, and Khana LGAs in Ogoni Communities.

Table 6: ANOVA for vocational & technical skills training adoption

Source of Variation	SS	Df.	MS	Means				F-cal	F-crit	Decision
				Eleme	Gokana	Khana	Tai			
Between Groups	2.84	3	0.95	3.32	3.34	3.33		4.21	0.006	Reject H01
Within Groups	89.52	396	0.23							
Total	92.36	399								

Table 6 presents the findings from a one-way analysis of variance (ANOVA) examining how respondents perceive the effect of environmental decline on the uptake of vocational and technical skills training in the Gokana, Tai, Eleme, and Khana LGAs within Ogoni Communities. The means indicate minor differences among the LGAs, with Eleme (3.32), Gokana (3.34), Khana (3.33), and Tai showing consistent average values, reflecting an overall high and similar level of agreement across the areas examined. The ANOVA results indicate statistically significant differences among the groups, with an F-calculated value of 4.21 and a significance level of 0.006, below the 0.05 threshold. Because the p-value is under this critical limit, the null hypothesis (H01) is rejected. This indicates a meaningful difference in how environmental degradation affects uptake of vocational and technical skills training among respondents across the four LGAs. The results imply that while perceptions are generally elevated across all communities, the degree of influence notably differs by location, likely due to disparities in the severity of environmental impacts and access to HYPREP initiatives.

H02: There is no significant difference in the influence of environmental degradation on the adoption of agri-business and entrepreneurial development among respondents in Gokana, Tai, Eleme, and Khana LGAs in Ogoni Communities.

Table 7: ANOVA for agri-business & entrepreneurial development

Source of Variation	SS	Df.	MS	Means				F-cal	F-crit	Decision
				Eleme	Gokana	Khana	Tai			
Between Groups	2.36	3	0.79	3.97	4.05	4.12	3.89	3.88	0.009	Reject H02
Within Groups	80.60	396	0.20							
Total	82.96	399								

The ANOVA results in Table 7 show variations in respondents' perceptions of how environmental degradation affects agribusiness and entrepreneurial growth in the four LGAs. The average scores show that respondents from Khana (4.12) and

Gokana (4.05) reported greater influence than those from Eleme (3.97) and Tai (3.89), indicating a stronger perceived effect of environmental degradation on livelihood diversification in these regions. Further analysis of variance shows an F-calculated value of 3.88 and a significance level of 0.009. Because the p-value is below 0.05, this result is statistically significant. Therefore, researchers reject the null hypothesis (H02). This finding highlights significant differences among the LGAs in how environmental degradation affects agribusiness and entrepreneurial development. The results suggest that the effect of environmental degradation is not uniform across the communities, with certain LGAs experiencing more pronounced economic displacement that motivates entrepreneurial adaptation than others.

H03: There is no significant difference in the influence of environmental degradation on the adoption of ecosystem-based livelihood restoration among respondents in Gokana, Tai, Eleme, and Khana LGAs in Ogoni Communities.

Table 8: ANOVA for ecosystem-based livelihood restoration

Source of Variation	SS	Df.	MS	Means						
				Eleme	Gokana	Khana	Tai	F-cal	F-crit	Decision
Between Groups	2.75	3	0.92	3.99	4.07	4.14	3.88	4.05	0.008	Reject H03
Within Groups	89.95	396	0.23							
Total	92.70	399								

Table 8 presents the ANOVA results for ecosystem-based livelihood restoration across the four LGAs. The average scores indicate that Khana (4.14) and Gokana (4.07) show slightly higher perceptions than Eleme (3.99) and Tai (3.88), suggesting differences in involvement in ecosystem restoration activities. The ANOVA results show an F-calculated value of 4.05, with a significance level of 0.008, which is below the 0.05 threshold. Thus, researchers reject the null hypothesis (H03). This outcome suggests that environmental degradation affects ecosystem-based livelihood restoration differently among respondents in Gokana, Tai, Eleme, and Khana LGAs. This implies that engagement in restoration-based livelihoods varies significantly across communities, likely due to differing intensities of environmental damage and the presence of restoration efforts such as HYPREP projects.

H04: There is no significant difference in the influence of environmental degradation on community-based livelihood inclusion initiatives among respondents in Gokana, Tai, Eleme, and Khana LGAs in Ogoni Communities.

Table 9: ANOVA for community-based livelihood inclusion

Source of Variation	SS	Df.	MS	Means						
				Eleme	Gokana	Khana	Tai	F-cal	F-crit	Decision
Between Groups	2.61	3	0.87	3.98	4.05	4.13	3.87	3.92	0.009	Reject H04
Within Groups	89.95	396	0.23							
Total	92.70	399								

The ANOVA findings in Table 9 show how respondents view the impact of environmental decline on community-based livelihood inclusion initiatives. The average scores show that Khana (4.13) and Gokana (4.05) received slightly higher ratings than Eleme (3.98) and Tai (3.87), suggesting differences in perceived inclusion across the local government areas. The calculated F-value of 3.92, accompanied by a significance level of 0.009, indicates that the results are statistically significant at the 0.05 threshold. Therefore, the study rejects the null hypothesis (H04). This suggests a noteworthy difference in how environmental degradation affects community-based livelihood inclusion initiatives across the four local government areas. The results imply that environmental degradation affects inclusion strategies differently across communities, potentially reflecting differences in policy implementation, community vulnerability, and the availability of HYPREP livelihood programs.

5. Discussions

Table 2 presents respondents' findings on how environmental degradation affects acceptance of vocational and technical skills training as alternative livelihood options. The elevated average scores from Eleme, Gokana, Khana, and Tai reflect a significant consensus that oil spills have displaced conventional livelihoods, prompting individuals to pursue vocational and technical training. This observation supports research indicating that oil pollution in Ogoniland has significantly changed livelihoods, reduced agricultural and fishing productivity, and compelled many families to seek alternative means of survival. The conclusion that oil contamination has eliminated former occupations aligns with findings that agricultural and fishing activities have become less feasible because oil pollution harms soil, water, and aquatic ecosystems. Additional evidence from rural communities in the Niger Delta indicates that those engaged in traditional livelihoods earn lower incomes, and the number of

farmers and fishers is decreasing as pollution continues to undermine these environmentally reliant jobs. Respondents' acknowledgment of HYPREP training programs aligns with HYPREP's official mission, which focuses on restoring livelihoods and strengthening local capabilities in Ogoniland. Nonetheless, prior research highlights a critical limitation: HYPREP's implementation has been sluggish, burdened by bureaucracy, and hindered by insufficient stakeholder engagement, meaning recognition of training initiatives does not automatically indicate full realization of their benefits. The notably high scores in Khana suggest deeper local awareness of livelihood disruption, which is reasonable given broader evidence that responses to oil pollution vary by community and are shaped by local economic strengths and exposure levels.

Thus, the overall trend aligns with previous research asserting that support for alternative livelihoods, including skill development and retraining, is essential in places where pollution has rendered traditional occupations impractical. Similarly, the hypothesis test in Table 3 presents the ANOVA findings on notable differences in responses from Eleme, Gokana, Khana, and Tai regarding the effect of environmental degradation on the uptake of vocational and technical skills training. The outcomes indicate that average perceptions were largely comparable among Eleme, Gokana, Khana, and Tai; however, the overall differences remained statistically notable, suggesting that the impact of environmental degradation on the adoption of vocational and technical skills varied across the LGAs. This analysis aligns with observations that oil pollution in Ogoniland has transformed traditional livelihoods and modified land utilization over time, leading to community-specific adaptation strategies rather than uniform ones. The results also align with research showing that oil spills have displaced agricultural and fishing occupations, forcing affected families to seek alternative ways to sustain themselves. Further investigations into remediation in Ogoniland suggest that cleanup initiatives can create both skilled and unskilled jobs through recovery value chains, reinforcing the finding that environmental degradation can stimulate interest in vocational training. At the same time, HYPREP's ability to deliver these benefits appears inconsistent, as its implementation has been described as bureaucratic, under-resourced, and lacking stakeholder engagement. Table 4 presents descriptive statistics highlighting average discrepancies in responses from Eleme, Gokana, Khana, and Tai on the impact of environmental degradation on adopting agribusiness and entrepreneurial development as alternative livelihood strategies.

The strong consensus across all Local Government Areas indicates that damage to agricultural land, oil leakage, and dwindling fish populations have driven individuals to pursue agribusiness and other entrepreneurial adjustments. This aligns with findings that oil contamination reduces agricultural productivity, lowers crop yields, harms fisheries, and undermines household quality of life in Ogoniland and the broader Niger Delta. Information suggesting that individuals sought different sources of income after experiencing losses in agriculture and fisheries aligns with household survey results from Ogoniland, which show that 42% of individuals reliant on fishing and farming pursued alternative means of subsistence. In comparison, 91% reported declining fish catches. This finding is further supported by research showing that environmental decline substantially harms small and medium enterprises and entrepreneurial success in the Niger Delta, making adaptive entrepreneurship a sensible response to ecological and economic disturbances. This strong support for entrepreneurial initiatives, business diversification, and adaptation approaches underscores findings that communities seek to broaden livelihood options when conventional environmental assets fail. Nevertheless, the literature introduces complexity: while some adaptation routes yield positive outcomes, others are counterproductive. Ethnographic research indicates that environmental pressures can drive households toward artisanal refining, which generates income but worsens pollution and traps communities in cycles of economic instability. The higher mean in Khana suggests a more pronounced entrepreneurial transition there.

Yet, the overall trend across all four Local Government Areas aligns with recommendations to strengthen human capacity, improve policy contexts, expand access to funding, and foster public-private collaboration to sustain agribusiness entrepreneurship in Nigeria. In summary, Table 5 supports earlier research indicating that environmental degradation not only disrupts livelihoods but also transforms them into diversified and entrepreneurial survival strategies. Similarly, the hypothesis test results in Table 7 present the ANOVA findings on notable differences in responses from Eleme, Gokana, Khana, and Tai regarding how environmental degradation affects the acceptance of agribusiness and the growth of entrepreneurship as alternative livelihood strategies.

The ANOVA findings show that the impact of environmental degradation on agribusiness and entrepreneurial adaptation varies across the four local government areas, with Khana and Gokana showing a greater perceived effect than Eleme and Tai. This aligns with extensive evidence that oil pollution harms agricultural land, reduces fish populations, and undermines household incomes, compelling residents to diversify income and pursue alternative economic approaches. This outcome also supports studies showing that families in the Niger Delta often turn to diverse income sources when conventional farming and fishing become less effective. National research on agribusiness shows that while Nigeria has considerable agribusiness potential, limited technology adoption, inadequate infrastructure, and a lack of skill development hinder sustainable entrepreneurial progress. Importantly, not all entrepreneurial adaptations yield positive outcomes: some findings show that environmental pressures can push households to engage in artisanal refining, a maladaptive response that, while generating revenue, worsens pollution.

Table 8 presents descriptive statistics on disparities in responses from Eleme, Gokana, Khana, and Tai regarding how environmental degradation affects ecosystem-based livelihood restoration as an alternative income source. The elevated average scores indicate that participants see ecosystem degradation as a primary driver of the shift to restoration-focused livelihoods. This aligns with existing literature on the Niger Delta, which shows that mangrove loss, wetland declines, and overall ecosystem deterioration threaten both biodiversity and the economic activities of communities that rely on these ecosystems. The strong consensus on the need for mangrove planting and sustainable methods is supported by restoration studies that argue mangrove conservation and rehabilitation can create meaningful employment, restore ecosystem services, and enhance sustainable development in the Niger Delta. Related research on remediating contaminated areas and wetlands in Nigeria also highlights job-creation opportunities through bioremediation and restoration processes, including both skilled and unskilled positions. Respondents' awareness of HYPREP restoration projects aligns with findings that indicate the Ogoni cleanup was established to oversee environmental restoration and livelihood recovery. However, prior studies show that restoration effectiveness hinges on continuous community engagement, ongoing monitoring, and preventing re-contamination from illicit refining activities and pipeline leaks. The significantly higher figures in Khana indicate stronger local recognition of ecological loss and the need for restoration. This trend aligns with broader studies that find participation in restoration efforts increases where environmental degradation is evident and directly relates to economic decline.

Collectively, Table 5 reinforces earlier conclusions that ecosystem-based restoration is increasingly regarded not merely as an environmental solution but also as a pathway for livelihood development in communities affected by oil exploitation. Similarly, the ANOVA results in Table 8 highlight significant differences among responses from Eleme, Gokana, Khana, and Tai on whether ecosystem-based livelihood restoration is a viable alternative for earning a living. The differences across the Local Government Areas indicate that involvement in restoration-oriented livelihoods varies by area, likely because ecosystem damage and access to restoration efforts differ. This observation aligns with findings that Ogoniland has suffered severe pollution and that restoration is closely linked to both ecological recovery and livelihood restoration. This outcome also aligns with research showing that mangrove degradation in the Niger Delta undermines livelihood frameworks and jeopardizes ecosystem services critical to coastal populations. Additional research on restoration emphasizes that conserving mangroves and using bioremediation can create jobs and promote sustainable development when supported by co-management practices and policy frameworks. Nevertheless, long-term benefits seem to depend on ongoing community involvement beyond the HYPREP project's formal cycle. Table 5 presents descriptive statistics showing differences in responses from Eleme, Gokana, Khana, and Tai on how environmental degradation affects community-based initiatives for livelihood inclusion as alternative means of earning a living.

The high level of consensus across items indicates that pollution-related livelihood disruptions are perceived to have expanded inclusion efforts for marginalized groups, such as women and youth. This aligns with findings showing that environmental degradation in Ogoni disproportionately affects vulnerable populations, particularly women, underscoring the need for inclusive livelihood strategies to foster resilience and peace. Research strongly supports increasing women's involvement, showing that women are key contributors to subsistence farming and are disproportionately affected by contaminated soil, food scarcity, and declining household incomes. Additionally, prior studies show that integrating gender-inclusive approaches into remediation and livelihood initiatives improves household income, participation levels, and grassroots conflict resolution. The strong consensus on youth involvement also aligns with research suggesting that generating youth employment and developing alternative livelihoods are crucial to reducing reliance on harmful practices like artisanal refining. This aspect is critical, as unemployment and marginalization sustain illegal refining operations and exacerbate environmental decline. The relatively lower yet still positive assessment of the inclusion of individuals with disabilities suggests that the inclusion process may not be uniform among all marginalized groups. This interpretation aligns with broader findings that participation does not necessarily equate to true inclusion, particularly when trust, capacity, and social barriers remain inadequately addressed.

Furthermore, favorable perceptions of HYPREP-related initiatives align with evidence that community engagement and environmental education are vital for sustaining remediation progress and enhancing local participation. Similarly, Table 7 presents the ANOVA results for testing the hypothesis, showing significant variation in responses from Eleme, Gokana, Khana, and Tai regarding the impact of environmental degradation on alternative livelihood inclusion initiatives within communities. The ANOVA findings indicate that responses on livelihood inclusion also vary across the Local Government Areas, with Khana and Gokana showing a greater impact than Eleme and Tai. This aligns with data showing that environmental degradation in Ogoni creates unequal social and economic challenges, such as impaired livelihoods, inadequate benefit distribution, and limited job opportunities. The finding on inclusion is particularly credible, as previous research shows that women and marginalized populations face greater negative impacts from livelihood disruptions in the Niger Delta. Related studies suggest that stronger stakeholder engagement, active community involvement, and alternative livelihoods can sustain improvements from remediation efforts and reduce exclusionary practices. Consequently, the somewhat inconsistent situation across Local Government Areas aligns with broader scholarly work indicating that factors influencing inclusion hinge on the quality of local governance, active participation, and community trust rather than solely on the extent of environmental damage itself.

6. Conclusion

This research examined how environmental decline influences alternative income strategies in the Eleme, Gokana, Khana, and Tai Local Government Areas within Ogoniland. Results consistently indicate that environmental decline associated with oil activities has severely disrupted conventional livelihoods, especially in agriculture and fishing, pushing those affected to pursue alternative avenues such as vocational and technical skill development, agribusiness ventures, ecosystem restoration efforts, and community-focused inclusion projects. Across topics, participants strongly agreed that ecological pollution has reduced economic productivity and altered livelihood frameworks in the area. The inferential findings also highlighted significant variations among the LGAs, suggesting that while livelihood adaptation generally follows a similar trend, the degree and perceived impact differ geographically. Khana and Gokana typically reported higher perceived impacts, indicating greater livelihood disruption and more substantial adaptive strategies. These discrepancies highlight the uneven distribution of environmental harm and the varied impacts of institutional interventions across Ogoniland. Overall, the study concludes that environmental degradation in Ogoniland is a major driver of livelihood changes, creating both pressure to adjust and opportunities to develop alternative income sources. Nevertheless, the success of these transitions is hindered by challenges in executing intervention programs like HYPREP, which include bureaucratic holdups, insufficient stakeholder involvement, and inconsistent provision of livelihood support.

6.1. Recommendations

Government bodies and agencies like HYPREP should accelerate and expand vocational, technical, and agribusiness skills training programs to ensure wider reach and lasting impact across all affected LGAs. These initiatives should align with local economic conditions to enhance relevance, absorption capabilities, and long-term job prospects for participants. Restoration activities, especially ecosystem restoration efforts such as mangrove rehabilitation and soil cleaning, should be linked to organized livelihood-creation strategies. This combined approach will ensure that ecological recovery contributes directly to sustainable job creation while reducing reliance on environmentally harmful survival strategies. Stakeholder engagement mechanisms must be strengthened to promote inclusive participation by women, youth, and individuals with disabilities in all livelihood and restoration projects. Additionally, intervention initiatives should strengthen governance frameworks to reduce bureaucratic delays, improve transparency, and ensure fair resource distribution across Eleme, Gokana, Khana, and Tai.

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