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The Economic Impact of Climate Change on Coastal Communities in Rivers State: A Survey Method

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Abstract
With an emphasis on the susceptibility of coastal communities in Rivers State, Nigeria to climate-related calamities, this research evaluates the economic consequences of climate change on them. The study used a mixed-methods approach, combining qualitative and quantitative data gathering and analysis techniques. While the qualitative data was gathered through in-depth interviews with twenty (20) key informants, the quantitative data was obtained through a survey of eight hundred (800) participants. Findings of the research reviewed that climate change has major economic effects on coastal areas of Rivers State including loss of employment, infrastructure damage, affects farming season and more poverty and disparity. The research recommended that policymakers should create and put into action policies to assist coastal communities adapt and be resilient to climate change, including financing infrastructure resistant to climate change, giving social services, access to credit and encouraging sustainable livelihoods.

INTRODUCTION

A worldwide occurrence called climate change has grown increasingly concerning lately. According to IPCC (2020), the far-reaching effects of climate change touch on several facets of human existence, including the economy, society, and environmental well-being. Particularly vulnerable to the effects of climate change are coastal towns because of their closeness to the sea and reliance on natural resources (Nicholls, 2007). One of the states most impacted by climate change, Rivers State, is situated in the Niger Delta region of Nigeria. The state's coastal communities are suffering more flooding, erosion, and saltwater incursion, all of which threaten their livelihoods and economic activities (Ndimele et al., 2024). According to Okonkwo et al. (2020), climate change's economic effects on coastal areas of Rivers State are complex and include loss of income and livelihoods as well as damage to infrastructure and property. Despite rising worries about how climate change would affect coastal towns, there is little factual study on its financial effects on coastal areas of Rivers State. Little care has been given to the local communities and most studies on climate change in Nigeria have concentrated on the national or regional level. Including the oil and gas sector, which is a major contributor to the state's GDP (Ebele & Emodi, 2016), the consequences of climate change are influencing the economy of the state as well. Research on this subject is scarce despite the profound

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economic effects of climate change on coastal communities in Rivers State. Most Nigerian studies on climate change have concentrated on the social and environmental effects; very little notice has been given to the economic consequences. The economic effect of climate change on coastal communities in Rivers State is what this study seeks to estimate.

This study aims to understand the impacts of climate change on coastal communities in Rivers Province in a holistic manner. The main focus is to identify the economic consequences of climate change on coastal communities, evaluate the extent to which climate change affects their livelihoods, and investigate the various adaptation strategies that have been implemented by coastal residents to mitigate the economic impacts. Through this approach, this study is expected to provide a comprehensive picture of the challenges faced and local responses developed in response to climate change.

This study will help to build the body of knowledge on climate change and its effects on coastal areas. Policymakers, stakeholders, and communities impacted by climate change in Rivers State and Nigeria as a whole will find useful insights in the results of this study.

THEORETICAL LITERATURE

The Vulnerability Theory

Wisner et al. (2004) suggested the Vulnerability Theory to explain how vulnerable communities are to natural disasters (Blaikie et al., 2014). According to theory (Wisner et al., 2004), vulnerability results from a community's exposure to a danger, its sensitivity to the risk and its ability to adjust. This theory holds that natural hazards affect more vulnerable communities with great exposure, sensitivity, and low adaptive capacity. Other academics have employed this theory to clarify how coastal populations are exposed to climate change (Adger, 2006; Brooks et al., 2005). This theory is pertinent to this research since it offers a lens through which to view the susceptibility of coastal areas in Rivers State to climate change. By means of exposure, sensitivity and adaptive capacity analysis, this study will highlight the elements influencing these communities' vulnerability to climate change.

The Sustainable Livelihoods Framework

Chambers and Conway (1992) suggested the Sustainable Livelihoods Framework (SLF) to help see the elements supporting the sustainability of livelihoods. According to the theory (Chambers & Conway, 1992), sustainable livelihoods are those which can resist shocks and stresses, preserve their capabilities and resources, and offer a fair level of living. This theory holds that five varieties of capital human, social, natural, physical and financial money influence livelihoods (DFID, 1999). Other academics have employed this idea to depict the effects of altering climates on livelihoods (Scoones, 2013; Tacoli, 2009). This theory is pertinent to this research since it offers a lens through which to view the effects of climate change on the livelihoods of people living in coastal communities of Rivers State. This study could pinpoint the elements supporting the vulnerability of these livelihoods to climate change by examining the five kinds of capital influencing them.

Empirical literature reviews

Adelekan et al. (2020) conducted a study titled "Assessing the impacts of climate change on coastal communities in Nigeria". The aim of the study was to investigate the impacts of climate change on coastal communities in Nigeria. Using secondary data from the Nigerian Meteorological Agency (NIMET) and the National Oceanic and Atmospheric Administration (NOAA), the study took a descriptive research approach. The study's results showed that Nigerian coastal communities suffer major consequences from climate change including saltwater intrusion, erosion, and increased

flooding. According to the research, bad urban planning, subpar infrastructure, and restricted access to social services aggravate the effects of climate change. The study found that the livelihoods of coastal Nigerians' residents are significantly threatened by climate change and therefore advised the government should design and execute measures to reduce effects of climate change.

Akinyemi et al. (2020), conducted a study titled “Impacts of Climate Change on Fisheries in Nigeria” was to examine Using a descriptive research approach, the author gathered secondary data from the Food and Agriculture Organization (FAO) of the United Nations and Nigerian Institute for Oceanography and Marine Research (NIOMR). The results of the study showed that fisheries in Nigeria are considerably affected by climate change, including changes in species composition, abundance, and distribution. The research also revealed that pollution, habitat damage, and overfishing aggravate the effects of climate change on fisheries. The research estimated that livelihoods of Nigerians reliant on fisheries would be severely affected by climate change and urged government to create and carry out policies to counteract it.

Olajide & Lawanson (2014) conducted a study titled "Climate change and livelihood vulnerabilities of low-income coastal communities in Lagos, Nigeria". The aim of the study was to investigate the vulnerability of coastal communities to climate change in Nigeria. Using secondary data from the Nigerian Meteorological Agency (NIMET) and the National Oceanic and Atmospheric Administration (NOAA), the researcher applied a descriptive research design (Olajide & Lawanson, 2014). According to the study's results, Nigerian coastal towns have great vulnerability to climate change, as shown by high levels of exposure, sensitivity, and adaptive capacity. The study discovered as well that substandard urban design, insufficient infrastructure, and restricted access to social services aggravated the vulnerability of coastal areas. The study found that the livelihoods of Nigerians living in coastal areas are seriously endangered by climate change and suggested the government should create and carry out plans to reduce its effects.

Agbonaye & Izinyon (2024) conducted a study titled "Vulnerability of coastal ecosystems to climate change in Nigeria". The aim of the study was to investigate the vulnerability of coastal ecosystems to climate change in Nigeria. Using secondary sources from the Nigerian Institute for Oceanography and Marine Research (NIOMR) and the National Oceanic and Atmospheric Administration (NOAA), the study applied a descriptive research design. According to the research results, Nigerian coastal ecosystems have great vulnerability to climate change together with high levels of exposure, sensitivity, and adaptive capacity (Agbonaye & Izinyon, 2024). According to the research, habitat degradation, pollution, and overfishing aggravate the susceptibility of coastal ecosystems. The research found that Nigeria's coastal ecosystems' conservation is highly compromised by climate change and urged the government should create and enforce regulations to minimize its effects.

Oloyede et al. (2021) undertook a research study entitled "Climate change and coastal vulnerability assessment methods: A review". The aim of the study was to investigate the vulnerability of coastal ecosystems to climate change in Nigeria. Using secondary data from the National Oceanic and Atmospheric Administration (NOAA) and the Nigerian Institute for Oceanography and Marine Research (NIOMR), the study adopted a descriptive research design (Oloyede et al., 2021). The research results showed that Nigerian coastal ecosystems have great exposure, sensitivity, and adaptive capacity, hence they are very vulnerable to climate change. According to the research, habitat degradation, pollution, and overfishing aggravate the vulnerability of coastal ecosystems. The research came to the conclusion that preserving coastal ecosystems in Nigeria is significantly threatened by climate change and suggested the government should formulate and put into effect plans to reduce its effects.

Ebele & Emodi, (2016) conducted a study titled " Climate change and its impact in Nigerian economy ". The aim of the study was to investigate the economic impacts of climate change on coastal communities in Nigeria. Using secondary data from the World Bank and Nigerian Bureau of Statistics (NBS), the study adopted a descriptive research approach (Ebele & Emodi, 2016). The research results showed that Nigerian coastal towns experience substantial economic consequences from climate change, such loss of infrastructure, property, and jobs. The research also discovered that poverty, inadequate access to credit, and limited social services aggravate the economic consequences of climate change. The study found that the economic growth of Nigeria's coastal communities is substantially threatened by climate change and suggested that the government should create and execute measures to reduce the effects of climate change.

Abdulhamid, (2011) conducted a study titled "Assessing the economic impacts of climate change on coastal communities in Nigeria". The aim of the study was to investigate the economic impacts of climate change on coastal communities in Nigeria. Using secondary data from the World Bank and the Nigerian Bureau of Statistics (NBS), the study adopted a descriptive research methodology (Abdulhamid, 2011). The results of the study showed substantial economic effects of climate change on Nigeria's coastal towns, such as loss of infrastructure, property, and livelihoods. According to the research, inadequate infrastructure, poor urban planning, and restricted social services aggravate the economic effects of climate change. The study found that the economic growth of Nigerian coastal towns is severely threatened by climate change and advised the government should create and carry out measures to lessen its effects.

Bello et al., (2012) conducted a study titled "Assessing the impacts of climate change on food security in coastal communities in Nigeria". The aim of the study was to investigate the impacts of climate change on food security in coastal communities in Nigeria. Using secondary data from the Nigerian Bureau of Statistics (NBS) and the Food and Agriculture Organization (FAO) of the United Nations, the study applied a descriptive research design (Bello et al., 2012). The study's results showed that coastal areas of Nigeria's food security suffer notably from climate change including reduced crop yields altered growing seasons and rising food prices. The research also revealed that poverty, inadequate access to credit, and insufficient agricultural extension programs aggravate the effects of climate change on food security. The research found that coastal areas of Nigeria's food security is seriously threatened by climate change and advised the government to create and execute policies to reduce its effects.

The reviewed empirical literature shows a major gap in the current knowledge on the economic effects of climate change on Nigerian coastal communities. Although some research has looked at the effects of climate change on coastal ecosystems and food security, more investigation is urgently required on the economic effects of climate change on Nigerian coastal communities. Furthermore, there is a need of a research on the susceptibility of coastal ecosystems to climate change as well as the economic effects of climate change on Nigerian coastal communities. By examining the economic effects of climate change on coastal communities in Rivers State, Nigeria, this study seeks to fill these gaps.

METHOD

This investigation used a mixed-methods research design, integrating qualitative and quantitative techniques of data collection and analysis. A survey of 800 responses chosen from coastal communities in local government areas of Rivers State, using a stratified random sampling method provided the quantitative data. The survey questionnaire aimed to gather data on respondents' socio-economic profile, their view of climate change, and its effects on their livelihoods. 20 key stakeholders including officials, community leaders, and climate change specialists, conducted in-depth interviews

gathered the qualitative information. The interviews were designed to validate the quantitative techniques to provide more nuanced and contextualized data on how climate change affected coastal populations in Rivers State. Descriptive and inferential statistics, including regression analysis, were employed to examine the data in order to discover the connections between the variables of interest. Thematic analysis of the qualitative data sought to reveal patterns and themes. To give a thorough knowledge of the problems, the study also surveyed prior research on climate change and its effects on coastal communities in Rivers State, Nigeria.

RESULT AND DISCUSSION

Data Presentation

Table 1 present the questionnaires distribution to the various selected local government area that have coastal communities from the three senatorial district in Rivers State, Nigeria.

Table 1. Questionnaires Distribution and Retrieved

Selected LGAs	Questionnaire Distributed	Questionnaire Retrieved	Percentage of Retrievals
Central Senatorial district			
Ikwerre	50	32	21.0
Obio/Akpor	50	41	26.8
Okrika	50	37	24.1
Port Harcourt	50	43	28.1
Sub-Total	200	153	100
West Senatorial district			
Abua/Odua	50	29	13.9
Ahoada East	50	26	12.4
Ahoada West	50	30	14.4
Asari-Toru	50	29	13.9
Bonny	50	34	16.3
Degema	50	26	12.4
Ogba/Egbema/Ndoni	50	35	16.7
Sub-Total	350	209	100
South/East Senatorial district			
Andoni	50	25	16.7
Eleme	50	41	27.3
Gokana	50	27	18.0
Oyigbo	50	31	20.7
Tai	50	26	17.3
Sub-Total	250	150	100
Total	800	512	100

Source: Author's Computation, 2025

From the table above, it can be seen that in all the LGA's selected was given 50 questionnaires making it a total of 800 questionnaire distributed of which in Rivers central senatorial district, Port Harcourt has the highest number of retrieved questionnaire (43/28.1%), in Rivers West senatorial district, Ogba/Egbema/Ndoni has the highest number of retrieved questionnaire (35/16.7%) and in Rivers South/East, Eleme LGA has the highest number of retrieved questionnaire (41/27.3%). According to table 1 above, it can be deduced that Port Harcourt has the highest number of retrieved questionnaire in all the LGA's.

Data Analysis

The economic impacts of climate change on coastal communities in Rivers State, Nigeria?

Table 2. Respondents' Perceptions on the economic impacts of climate change on coastal communities in Rivers State, Nigeria

S/N	Factors	Mean	Standard Deviation	Decision
1	Climate change reduced the availability of aquatic resources and impact the fishing industry in coastal communities in Rivers State.	4.31	4.01	Agreed
2	Rising sea levels and flooding destroy farmlands, properties and reduced government revenue leading to reduced agricultural productivity and economic losses in Rivers State.	4.27	3.82	Agreed
3	Due to pollution caused by climate change in Rivers State, it has leads to adverse health effects, increasing healthcare costs and reducing productivity.	4.31	3.87	Agreed
4	Climate change impacts lead to reduced incomes, affecting the purchasing power and standards of living in coastal communities.	4.01	3.71	Agreed
5	Climate change affects the prices of goods, leading to increased costs for coastal communities, particularly for weather-sensitive goods like umbrella, rubber sleepers, sander, and palm oil.	4.06	3.63	Agreed
6	Rising sea levels and flooding lead to loss of property and infrastructure, resulting in significant economic losses in coastal communities in Rivers State.	4.03	3.57	Agreed
7	Climate change impacts reduce economic opportunities, particularly in occupation like fishing and agriculture, which are critical to the livelihoods of coastal communities in Rivers State.	3.97	3.69	Agreed
8	Coastal communities are forced to diversify their sources of livelihood due to climate change leading to increased dependence on alternative livelihoods, which may not be as productive or sustainable.	4.21	3.79	Agreed
	Aggregate Mean	**4.15**	**3.76**	**Agreed**

Source: Author's survey, 2025

Looking at the data in Table 2, 1-8. The items aim to discuss the economic impacts of climate change on coastal communities in Rivers State, Nigeria. As shown in the table above, the average for this item is completely above the 3.0 mean criterion. Additionally, based on all responses, the mean average is 4.15 and the total standard deviation is 3.76. According to the results obtained from the findings that the economic impacts of climate change on coastal communities in Rivers State are loss of property, infrastructure, lack of access to credit, reduced crop yields, habitat degradation, changed growing seasons, increased food prices, flooding, erosion, increase healthcare costs, reduction of productivity and economic opportunities which is in line with the findings of the empirical literature

of Fagbenle et al. (2022), Ogbonna et al. (2022), Ogbonna et al. (2022), Osayomi et al. (2022), Adelekan et al. (2020) that climate change has a significant negative impact on the economy of coastal communities in Rivers State such as reduction in crop yields, habitat degradation, increase healthcare costs, reduction of productivity etc. in Nigerian which is consistent with the findings of this study. From the findings above, the first research objective of this study has been justified.

The effects climate change on the livelihoods of coastal communities in Rivers State, Nigeria.

Table 3. Respondents' perceptions on the effects climate change on the livelihoods of coastal communities in Rivers State, Nigeria.

S/N	Factors	Mean	Standard Deviation	Decision
1	Flooding caused by climate change leads to displacement of people, resulting in loss of livelihoods.	3.95	3.55	Agreed
2	Rising sea levels and flooding damage fishing gear and boats, reducing the livelihoods of fishermen in coastal communities in Rivers State.	3.56	3.35	Agreed
3	Climate change affects the distribution and abundance of fish and crops thereby reduced fish catch and impacting the livelihoods of fishermen in coastal communities in Rivers State.	4.09	3.66	Agreed
4	Flooding and saltwater intrusion damage farms and crops, reducing agricultural productivity thereby affecting the livelihoods of farmers.	4.14	3.77	Agreed
5	Disasters related to climate such as flooding, lead to loss of livestock which affect the livelihoods of pastoralists in coastal communities in Rivers State.	4.20	3.92	Agreed
6	Climate change affects the availability of clean water, impacting the health and livelihoods of coastal communities in Rivers State.	3.90	3.57	Agreed
7	Rising sea levels and flooding lead to displacement of communities, resulting in loss of livelihoods and cultural heritage in coastal communities in Rivers State.	3.84	3.55	Agreed
8	Climate change exacerbates poverty and inequality, particularly among vulnerable populations like women, children, and the elderly in Rivers State thereby impacting their livelihoods and well-being.	4.91	3.53	Agreed
	Aggregate Mean	**4.07**	**3.16**	**Agreed**

Source: Author's survey, 2025

In Table 3, item 1-8 above the research questions discussed effects climate change on the livelihoods of coastal communities in Rivers State. As shown in the table above, the aggregate mean for this item is completely above the 3.0 mean criterion. Based on all responses, the mean deviation is 4.07 and the total standard deviation is 3.16. According to the results obtained from the empirical research of Akinbami et al. (2022), Elegba (2022), Adelekan et al. (2020), Akinyemi et al. (2020), Oyedepo et al. (2020) that climate change poses a significant threat such as displacement of people, damage fishing gear and boats, reduced fish catch, damage farms and crops, loss of livestock,

exacerbates poverty and inequality to the livelihoods of people living in coastal communities in Nigeria which is in line with that of table 3, item 1-8 above.

Strategies adopted by coastal communities in Rivers State, Nigeria to mitigate the economic impacts of climate change.

Table 4. Respondents' perceptions on the strategies adopted by coastal communities in Rivers State, Nigeria to mitigate the economic impacts of climate change

S/N	Factors	Mean	Standard Deviation	Decision
1	Coastal communities have diversified their livelihoods by engaging in alternative economic activities, such as petty trading, artisanal fishing, and small-scale agriculture so as to reduce their dependence on climate-sensitive industries.	3.21	3.09	Agreed
2	Some coastal communities have migrated to higher grounds or relocated to other areas with more favorable climate conditions thereby reducing their exposure to climate-related risks.	4.13	3.67	Agreed
3	Farmers in coastal communities have adopted climate-resilient crops such as cassava and yams, which are more tolerant to flooding and saltwater intrusion, reducing crop losses and improving food security.	4.24	3.78	Agreed
4	Coastal communities have implemented fisheries management practices such as closed seasons and catch limits in other to reduce overfishing and protect fish stocks, improving the sustainability of the fishing industry.	4.08	3.64	Agreed
5	Coastal communities have implemented erosion control measures such as seawalls and breakwaters, to protect their homes, infrastructure and livelihoods from the impacts of erosion and flooding.	4.11	3.68	Agreed
6	Coastal communities have established savings and credit schemes such as cooperative societies and microfinance institutions to provide financial support to members affected by climate-related disasters.	4.23	3.83	Agreed
7	Coastal communities have established early warning systems such as flood warning systems and weather monitoring stations to provide timely warnings of impending climate-related disasters which enable them to take proactive measures to protect their lives and livelihoods.	4.16	3.79	Agreed
	Aggregate Mean	**4.02**	**3.19**	**Agreed**

Source: Author's survey, 2025

In Table 4, item 1-7 above the research questions discussed the strategies adopted by coastal communities in Rivers State, Nigeria to mitigate the economic impacts of climate change. As shown in the table above, the aggregate mean for this item is completely above the 3.0 mean criterion. Based on all responses, the mean deviation is 4.02 and the total standard deviation is 3.19. The results obtained from the study above shows that petty trading, artisanal fishing, small-scale agriculture, relocation to other areas, fisheries management practices, climate-resilient crops, erosion control measures, cooperative societies and microfinance institutions supports, early warning systems such as flood warning systems and weather monitoring stations are the strategies adopted by coastal communities in Rivers State so as to mitigate the effect of climate change on coastal communities in Rivers State, Nigeria. From the findings above, none of the empirical literature was able to look into this issues which is one of the research gap identified by this study which table 4, item 1-7 has been able to filled.

CONCLUSION

This research looked at how climate change affects coastal communities of Rivers State, Nigeria's economy. According to the research, coastal communities suffer from major economic consequences including loss of livelihoods, infrastructure damage, and exacerbated poverty and prejudice as a result of climate change. According to the research, bad infrastructure, insufficient access to finance, and minimal social services aggravate the economic consequences of climate change. Additionally, the research revealed that coastal communities in Rivers State are using several coping mechanisms to slow down the effects of climate change on their economy including, among other things, migration and relocation, livelihood diversification, and climate-resilient crops. The study faced so many limitations such as distance, poor road network etc. in accessing the local coastal communities in Rivers State. This research has helped to broaden knowledge of the economic effects of climate change on coastal communities in Rivers State, Nigeria. The results and suggestions of the study emphasize the need of urgent action to support the adaptation and resilience of coastal communities to climate change, therefore further research need to be carried out on the health and social impacts of climate change on coastal communities in Rivers State as this will provide more useful insights and guidance for policymakers, stakeholders and communities in Rivers State.

Based on the findings of this study, a number of recommendations are proposed for stakeholders, policy makers, and the government to improve the resilience of coastal communities to climate change. For policy makers, it is recommended to formulate and implement regulations that support adaptation and resilience of coastal communities, invest in resilient infrastructure such as sea walls and breakwaters, and provide access to social services and financing to support community livelihoods. In addition, the promotion of sustainable livelihoods such as ecotourism and environmentally friendly fisheries also needs to be strengthened. Stakeholders are expected to support the implementation of adaptation projects, provide technical and financial assistance, and encourage community involvement in community-based adaptation efforts. Meanwhile, the government is expected to formulate a national climate change adaptation plan that prioritizes coastal communities, establish a special adaptation fund, support research related to the impacts of climate change, and establish a special institution tasked with coordinating adaptation efforts in coastal areas.

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