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Indigenous Technologies Fishing Settlement Response to Climate Change Variability's in Southern Nigeria

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Abstract

The study focused on indigenous technologies used by fishermen in southern Nigeria as adaptation measures to climate change variability's. Interview schedule was used to elicit information from sixty respondents in three (3) communities using simple random sampling technique. Percentage and mean scores were utilized for data analysis. The study established that the climate change experiences were: rise in sea level, rise in temperature, high wind, change in tidal pattern and frequent storms. The effects of climate change experiences on fishing include low fish catch, increase in boat mishap, reduced fish production and low growth rate of fishes. Indigenous technologies used as mitigating steps include building of bigger boats, the use of diverse fishing gears and observation of weather. These technologies had been very effective as mitigating steps. The study recommended mainly that modern weather forecasting facilities should be provided for the fishermen.

Keywords: Indigenous technologies, fishing settlement, climate change

Introduction

In Nigeria, fish production is not only important as a source of rich protein, but can also be used to bring about institutional changes. These changes can offer access to production assets and resources which can help to empower the poor and directly promote their livelihood (Obikezie, 1999). However, in recent times, fish production has been affected by climate change.

Climate change represents several factors associated with increasing atmospheric concentration of green house gases. It include increasing acidification of the

oceans, increasing sea level and related factors such as change in winds, strength of storms, precipitation patterns among others (Secretan *et al.*, 2007). Impact of climate change on aquaculture could occur directly and indirectly and not all facets of climate change will impact equally on fisheries and aquaculture (IPCC, 2007). The bid to reduce the effect of climate change on fisheries, made man to seek for ways on how to adapt to climate change experiences as an increased frequency is at an extreme.

Adaptation to climate change is an active set of strategies and actions taken by people in reaction to or in anticipation of change in climate in order to enhance or maintain their well-being. Adaptation can therefore involve either building adaptive capacities to increase the ability of individuals, groups or

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organizations to predict and adapt to changes, as well as implementing indigenous knowledge adaptation decisions, in transforming that capacity into action (Desilva & Soto, 2009). Indigenous knowledge or technology is defined as a knowledge or technology characterizing particular region or country. Silitoe (1998) opined that indigenous knowledge are not primitive left over from the past but in a country, as system that have been time-tuned and adopted both biologically and socially, to counter the process of what are often harsh and inimical environment. The fish farmers in fish farming settlements also have adapted indigenous technologies in fish farming (Sicat, 2003).

Problem statement

Climate change therefore, is a major challenge to agricultural development in Nigeria and Rivers State in particular. It is not only a challenge to agricultural development but to food security and general livelihood of many populations. Agriculture including fish farming being the most weather dependent of all human activities is highly vulnerable to climate change. Rivers State is experiencing an increase risk from climate change that is evident in rising temperatures, increasing flood, sea level rise, among others. These have increasingly affected livelihood of the rural populace which have resulted to poor output in agricultural produce including fish farming, in the way of poor growth and reproduction of fishes. It is therefore necessary to find answers to the following questions. What are the climate change experiences of the fish farming settlement? What are the effects of these climate change experiences? What indigenous technologies have been applied to adapt to the climate change variability's? and how effective are these indigenous technologies to the fish farmers for climate change adaptation?

Purpose of the study

Specifically, the study sought to:

- i. identify the climate change experiences in the study area;

- ii. Examine the effects of these climate change experiences on fish farming;
- iii. Determine the indigenous technologies that have been applied to adapt to the climate change effects; and
- iv. Ascertain the effectiveness of these indigenous technologies used for climate change adaptation.

Methodology

The study was carried out in Andoni Local Government Area (LGA) of Rivers State, Nigeria. The LGA is bounded by the Atlantic Ocean, which made the people to be predominantly fish farmers and serves as the major supplier of fish and other sea food in the State. The LGA has many fishing settlements namely: Ebukuma-Ija, Okwunibi, Asaramatoro, Asarama-otro, Akaja, Light House, Down-billow, Oyorokoto, Agbama and Chekmoluk. Simple random sampling was employed to select three fishing settlements namely: Oyorokoto, Agbama and Ebukuma-Ija and twenty (20) fish farmers from each of the selected fish settlements. This gave a total of sixty (60) fish farmers that were selected for the study. Interview schedule was used for data collection. The data collected were subjected to percentage and mean scores. A four point Likert type scale with options Very Effective (4), Effective (3), Less Effective (2) and Not Effective (1) was used. The values were added to get 10 which were further divided by 4 to get 2.50. The 2.50 was the mean score used for judgment. Any value equal to or greater than 2.50 was considered effective, while values less than 2.50 were considered not effective.

Results and discussion

Climate change experiences in the study area

Table 1 reveals the climate change experienced by fish farmers in the study area. The experiences include frequent storms (58.3%), high wind with water speed (40%), change in tidal pattern (50%), high temperature (45%), rise in sea level (38%)

and flooding (13.3%). This implies that the climate change experiences of the fish farmers in the fishing settlements included frequent storms, change in tide pattern, high wind with speed, and rise in sea level, extreme sun and flooding. Frequent storm and high wind with speed have prevented fishermen from going out to fish because it has led to capsizing of boats that has caused loss of lives in the area. The finding is in line with IPCC (2007) which observed ocean productivity and change in circulation patterns due to climate change.

Table 1: Percentage distribution of climate change experiences

Experience	Frequency	Percentage
Rise in sea level	21	38.0
High temperature	25	45.0
Flooding	20	33.3
Erosion	15	25.0
High wind with speed	20	40.0
Change in tidal pattern	30	50.0
Frequent storm	35	58.3

Source: Field survey, 2012
Multiple Responses

Table 2: Mean distribution of the effects of climate change experiences in fishing and fish production

Effects	Mean Score(M)	Remark
Low fish catch	2.84	Effective
Increase in boat mishap	2.60	Effective
Production of some fish specie	2.83	Effective
Divers fishes far away from the shore	2.81	Effective
Damages fishing settlements	2.54	Effective
Increases fish prices	2.72	Effective
Reduces fish production and growth rate	2.63	Effective

Source: Field survey, 2012

Indigenous technologies applied for adaptation of climate change variability's

Results in Table 3 reveal that majority (67%) of the respondents applied indigenous technology of building bigger boats to withstand the roughness of the sea. Other indigenous technologies applied were observing weather/cloud formation to avoid risk of storm on the sea (50%), use of wind gauge on boats (55%) and use of diversified

Effects of climate change experiences in fish farming

Table 2 reveals that all the listed variables were the effects of climate change experienced in fish farming. They include: low fish catch ($m = 2.84$) increase in boat mishap ($m = 2.60$), drives fishes far away from the shore ($m = 2.81$), damages fishing settlements ($m = 2.54$), increase in prices of fish ($m = 2.72$), reduces fish production and the growth rate of the fishes (2.63) and the production of same fish species ($m = 2.83$). Increase in boat mishap has made some of the fishermen not to go very far from the sea shore to fish. This has led to the catch of same fish species that is, catching the same type of fish at the shore since the others have been driven away from the shore. It also leads to low fish catch those results to increase in the prices of fish. This is in line with De Siloa and Soto (2009) who observed two direct impacts of climate change on aquaculture. They are fluctuations of fish catch and unavailability of fish meal and fish oil.

fishing gears (47%). The use of bigger boats with wind gauge which is an indigenous knowledge has helped to reduce the effect of high wind with speed on their boats. World Bank (1998) sees indigenous technologies or knowledge as local basis decision taking in agriculture, health care, food production, education, natural resource management and host of other activities in a community.

Table 3: Indigenous technology applied to adapt to climate change

Indigenous Technologies	Frequency	Percentage
Fishing far from the shore	6	10.0
Observing weather/cloud formation to avoid risk of storm on the sea	30	50.0
Building bigger boats to withstand the roughness of the sea	40	67.0
Use of wind gauge on boats	33	55.0
Diversification of fishing gears	28	47.0

Source: Field survey, 2012
Multiple Responses

Effectiveness of these indigenous technologies used for climate change adaptation

Table 4 established the effectiveness of these indigenous technologies used by fish farmers to eliminate or reduce the effect of climate change variability's on fishing in the study areas. The study revealed that the knowledge or idea of building bigger boats for fishing (m = 2.82), the use of diversified fishing gears (m = 2.90), change in fishing

pattern (m = 2.63), observation of weather before going out to fish (m = 2.51) and the use of wind gauge on fishing boats (m = 2.70) have actually help to reduce the impact of climate change variability's on fishing thereby helping adapt to the weather which the fish farmers have found themselves. The mean score for observation of weather is 2.51, which indicates that the impact on mitigating climate change variability's is low and could not be wholly depended on.

Table 4: Effectiveness of indigenous technologies of climate change variability's

Indigenous technologies	Very effective	Moderately effective	Less effective	Not effective	Total	Mean score (x)
fishing far from shore	86	27	24	15	152	2.43
observing the weather	80	28	28	18	154	2.54
building bigger boats	108	36	30	11	185	2.82
diversification of fishing gears	100	33	26	16	175	2.90
change in fishing patterns	80	27	34	14	155	2.63
use of wind gauge to prevent wind	96	21	32	27	176	2.70

Source: Field survey, 2012

Conclusion

The study has established that climate change has caused frequent storms, rise in sea level, and change in wind speed and tidal pattern. These have made fishermen in the study area to use indigenous technologies by observing the weather/cloud and also build bigger boats. Whenever they predicted that it was going to rain, they did not go for fishing and even when they went, bigger boats with wind gauge tied to them where used. The wind gauge helps to reduce the impact of the wind on the boat. The study therefore recommends that better and

improved weather monitoring instrument should be introduced to the fishermen as this technology have helped to reduce incident of boat mishap.

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