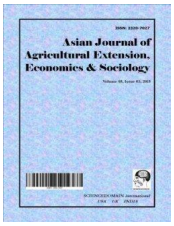

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Perceived Implication of Climate Change on Fish Farming in Ibarapa Region of Oyo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study revealed the impact of climate change on fish farming business in Ibarapa region, Oyo State Nigeria during January to June 2017. Majority of the respondents were male (93.4%) whereas 6.6% were female. Some of the respondents (25%) have been in fish farming business for about 20 years. Major sources of water were deep well and bore-hole. The various constraints encountered in the course of the business were low water availability (25.0%), feeding cost (20.0%), weather problem (13.3%) and funds (11.7%). On awareness/perception of respondents on climate change, 75% of the farmers were aware of change in the climate phenomenon, which was basically through personal experience (33.2%). The perceived climate change factors are; drastic changes in weather condition (50%), increased incidence of drought (18.3%), heavy storms and increased incidence of flooding had 6.7% respectively, poor fish harvest (5%) was considered as the least factor on impacts of climate change.

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Keywords: Climate change; Ibarapa; fish farming; gender; awareness.

1. INTRODUCTION

Climate change and climate variability have occurred throughout history. The impact of climate change and rising ocean temperature and ocean acidification is radically altering aquatic ecosystems thereby modifying fish distribution and the productivity of marine and freshwater species. This has effects on the sustainability of fisheries and aquaculture, as well as the livelihoods of the communities that depend on fisheries [1].

As the planet warms, rainfall patterns shift, and extreme events such as droughts, floods, and forest fires become more frequent [2]. This results in poor and unpredictable yields, thereby making farmers more vulnerable, particularly in Africa [3]. The risk from climate in Africa, and the rest of the world, includes, rising temperatures and heat waves, shortfalls in water supply/increasing floods emanating from shortage/excessive rainfalls, rise in sea level, increasing likelihood of conflict and induced environmental and vector-borne diseases. These conditions arising from climate change are bound to affect agricultural productions (crop, livestock, forest and fishery resources), nutritional and health statuses, trading in agricultural commodities, human settlements (especially of agricultural communities), tourism and recreation among others [4].

Climate change has serious implications for global fisheries and aquaculture. Climate is a major driver that enhances aquaculture sector growth and sustainability. The variations in temperature, relative humidity and rainfall have negative implications on aquaculture production in ponds system. These problems have contributed to serious production loss and increase in socio-economic and income vulnerability among fish farmers. Invariably small-scale or individual farmers are among the highest group vulnerable to climate change [5].

There is increasing concern over the consequences of climate change for fisheries production and food security. Thus, this study aims at determining farmers' perception of climate change, to highlight its impacts on fish farming business in the chosen region and to determine the relationship between perception of climate change effect and other independent variables.

2. METHODOLOGY

2.1 Study Area

Ibarapa region, Oyo state is geographically located on Latitude 8°N, Longitude 4^0E, in the derived savannah zone of southwestern Nigeria. The study was carried out in the three local government areas of the region which housed the seven towns of Ibarapa land. These include Eruwa and Lanlate in Ibarapa East L.G.A., Igboora and Idere in Ibarapa Central L.G.A. and Tapa, Ayete and Igangan in Ibarapa North L.G.A.

2.2 Data Collection and Analysis

A total of sixty questionnaires (fish farmers are few in the region) was administered. The purposive sampling method was used to collect data from the farmers who are into fish farming business in the region.

Data collected were analysed using simple descriptive statistics. Inferential statistics used to determine the relationships between the dependent (perception of climate change) and independent variables was Pearson Correlation Coefficient.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of Fish Farmers in Ibarapa region

Results in Table 1 show that majority (93.4%) of the respondents were males while 06.6% were females. This indicated that more males are engaged in fish farming than females. The finding agrees with that of George [6], Ogunlade [7] and Aphunu and Nwabeze [8], who found out that more males were involved in fish farming than women in their various study areas. The male dominance implies the laborious nature of fish farming operations which are very tedious for females to handle. Result on age; 21-30 (0.0%), 51-60 years (8.3%) 31-40 years (16.7%) and 41-50 (75.0%) years; shows that active productive workforce in fish farming business in this region are within 41-50 years followed by 31-40 years, Ifejika et al. 2007, Adeosun & Bankole, [9] reported the same value of within 41-50 being the most active workforce. Dey et al. [10] reported an average of 43-52 years among Asian farmers, which is consistent with Bolorunduro

2003 and Ifejika 2006 findings in Nigeria. The 0.0% participation of youth is indicative that they are not attracted to the business, which could be traced to the major challenges (lack of water and finance) facing the farmers in this region thus making the business less attractive to them.

Table 1. Socio-economic characteristics of fish farmers in Ibarapa Area

	Frequency	Percentage
Gender		
Female	4	6.6
Male	56	93.4
Age (yrs)		
21-30	0	0
31-40	10	16.6
41-50	45	75.0
51-60	05	8.3
Education		
No formal education	5	8.3
Primary	5	8.3
Secondary	10	16.7
Tertiary	40	66.7
Family Size		
1-5	22	36.7
6-10	28	46.7
Above 11	10	16.7

Further results in Table 1 show that majority of the respondents had formal education, (91.7%) out of which about 66.7% had tertiary education; only (08.3%) had no formal education. It has been reported by Agwu and Anyanwu (1996) that increase in educational status of farmers positively influences their perception and adoption of improved technologies and practices. It was further revealed from Table 1 that the highest mean family size is 8. This implied that more hands would be readily available for labour from the family members leading to reduced cost of labour; Igben (1988) reported large household size has an obvious advantage regarding labour supply.

3.2 Fish Farming Experience in Ibarapa

Response on years of experience in the business as shown from Table 2, reveals that 25% of the respondents have been practicing fish farming for about 20 years; thus fish farming business is not new in the region and it is also an indication that risk will be well managed since they have gained mastery of the business over the years. These are similar to Adeosun & Bankole [9], who reported similar result among fish retailers in the same region. This also means that farmers will possess knowledge of mitigation and adaptive measures on climate change and other challenges which may arise in course of the business. Krause [11] supported that experience reduces management risk. It was also be gathered from Table 2, that the business grows till about 11 – 15 years (50%), with a sharp decline over the last decade (25%) this could be attributed to water problems experienced in the region. Ikhile et al. [12] reported that water scarcity is peculiar to this region. They stated that there are some rivers that surround and traverse the town. They are very seasonal. That is, having water flowing only during the raining season. Temperature is high throughout the year (about 27°C). Relative Humidity is not less than 70% on the average. Major sources of water are rainfall and dew. Opeki dam meant to supply water to the community is perpetually dry.

Table 2. Fish farming experience in Ibarapa

	Frequency	Percentage
Fish farming experience (yrs)		
5-10	15	25.0
11-15	30	50.0
16-20	15	25.0
Type of culture system		
Polyculture (*Tilapia & Clarias* spp.)	15	25.0
Monoculture (*Clarias* spp.)	45	75.0
Preference for clarias		
Growth	18	30.0
Hardy	30	50.0
Taste	12	20.0
Water sources		
Borehole	08	13.3
River	03	5.0
Deep well	49	81.7

On type of culture system it was found that monoculture system is commonly practiced and *Clarias* is popularly cultured amongst the farmers, probing further to seek the reason for the preference of *Clarias* fish, the fish was not cultured mainly for taste or survival rate rather it was chosen because of the hardy nature of fish to withstand unfavourable conditions, they would have gained due to experience gain over time in the business. It was also revealed that fish farmers source for water using the deep well

(81.7%) as against bore-hole with (13.3), rivers accounted for only (5.0%) which aligns with the seasonal nature of the rivers [12] which makes it not dependable for all round aquaculture practice.

Table 3. Factors affecting fish farming in Ibarapa

Major problems faced by respondents		
Constraints	**Frequency**	**Percentage**
Fund	07	11.6
Water	15	25.0
Marketing	03	5.0
Security	05	8.3
Season	03	5.0
Feed	12	20.0
Transportation	03	5.0
Weather	08	13.3

3.3 Constraints to Fish Farming in Ibarapa

Results from in Table 3, presented the various constraints encountered in the course of the business; it was observed water ranked highest (25.0%) followed by high cost of feed (20.0%) this agrees with previous works of Ifejika et al. (2007) who reported water supply to be 54.5% and high cost of feed as 27.2% among fish farmers in Borgu local government of Niger state. Next in line is weather problem with 13.3%, followed by fund, (11.6%), season (wet/dry), marketing and transportation shared the same unit (03.0%).

3.4 Awareness and Perception of Climate Change on Fish Farming

On awareness/ perception of respondents on climate change (Table 4). Majority (75%) of the farmers are aware of the change in climate, extent of farmers' knowledge shows that 31.7% of the respondent does not have knowledge of climate change and what it implies, only little is known by the farmers (46.7%) those that knows to a great extent are just 10%. This result is in line with the reports of Nzeadike et al., [13] that the level of awareness of local communities on climate change impacts was still low in the Niger Delta region of Nigeria. On how the information on climate was sourced; personal experience took the lead with 33.2% which can be traced to the farmers' long-standing experience in the business which confirms Krause [11] statement that experience reduces management risk.

Table 4. Respondents on awareness/ perception of climate change impacts

	Frequency	**Percentage**
Awareness		
Yes	45	75
No	15	25
Extent of knowledge		
Know very less	19	31.7
Know less	28	46.7
Reasonable	07	11.6
High	06	10.0
Sources		
Extension workers	02	3.3
Friends/neighbours	11	18.3
Internet	03	5.0
Personal experience	20	33.2
Newspapers	02	3.3
Radio/Television	13	21.7
None	09	15.0
Perceived climate change impacts on fish farming		
Drastic change in weather condition	30	50.0
Poor harvest of fish	03	5.0
Heavy wind storm	04	6.7
Excessive sunshine	05	8.3
Increased incidence of flooding	03	5.0
Increased incidence of drought	11	18.3
High temperatures	04	6.7

This finding agrees with Tologbonse et al. [4] found out that the most important information source on climate change was personal experience followed by radio and television. Friends/ neighbours and Radio/television followed with 18.3 and 21.7% respectively. While probing on how farmers got informed about the concept of climate change; sourcing from extension agents and newspaper both had 03.0%. On perceived impacts of climate change on fish farming business, half of the respondent agrees to drastic change in weather condition as a major effect climate change had on their business, followed by increased incidence of drought (18.3%) which they claim is responsible for their dependence on deep well as a reliable source water supply. Excessive sunshine had 08.3% followed by heavy storms and increased incidence of flooding which had 06.7% both. The farmers are of the opinion that poor fish harvest had the least impact. These findings are in line with George [6] that farmers perceived climate change effects from sustained changes over time in environmental temperatures, rainfall intensity and pattern and also wind variability.

Table 5. Relationship between perception of climate change and other variables

Variable	Coefficient	P-value
Age	0.268	0.418
Level of education	0.346	0.215
Fish farming experience	0.219*	0.031
Family size	0.144	0.685
Extent of Knowledge	0.513	0.016

**Significant at 5% (P<0.05)*

3.5 Relationship between Perception of Climate Change and Other Variables

The result of the Correlation analysis in Table 5 indicated that significant relationship existed between perception of climate change and two of out the independent variables considered; fish farming experience ($r=0.219$; $p<0.05$) and extent of knowledge ($r=0.513$; $p<0.05$) Fish farming experience represents the number years and level of experience gathered in fish farming investment. Those with higher number of years are more likely to grasp perceive climate change effect more. Likewise on the extent of knowledge, the higher the knowledge level on changes in climate, the more the farmer perceives climate change effects to be significant on fish production.

4. CONCLUSION

The results from this study confirm that climate change impacts are only slightly felt on fish rearing in Ibarapa, though the farmers were aware of the phenomenon, their level of knowledge about the impacts of climate change is still considered low. The farmers indicated relying on personal experience rather than on the mass media or extension agents as their main source of information. It is, therefore, necessary to enlighten the farmers on issues bordering on climate change and how well to manage its effect, by placing more emphasis on extension services which are found to be relatively low in the area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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