Fish Farmers' Perception of Climate Variabilities and Effects on Fish Production in Bosso Local Government Area, Niger State, Nigeria

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...dy was carried out to investigate fish farmers' perceptions of climate variabilities and the impacts on fish production in ...Local Government Area, Niger State. Structured questionnaire was used to obtain information from the respondents for ...data which were analyzed using descriptive analysis, and results presented in frequencies and percentages. The ...ndary data was obtained from the Nigerian Meteorological Agency (NIMET) on temperature, rainfall and wind speed. For ...cio-economic characteristics of the fish farmers in the study area showed that, 87% of respondents were males in their ...ge, married, with 5 to 20years of fish farming experience. The results on the climate in the study area showed variabilities ...parameters over the months and years. The results also showed that, there was reduction in number of rainy days, ...dictable rainfall patterns, and increase in temperature and wind speed. Respondents in the study area perceived climate ...ors like rainfall, temperature and wind to have significant effects on fish production. Climate variability is a serious ...onmental threat which must be effectively managed for profitable aquaculture production.

...ords: Climate, change, variability, environment.

...duction

...ter-governmental panel on climate change defines climate change as a change in climate which is attributed directly or ...ctly to human activities which alter the composition of the global atmosphere and natural climatic variabilities observed ...a comparable period of time. Climate variability on the other hand, is referred to as, variabilities in the mean state and other ...stics such as deviation, occurrence of extreme conditions of the climate on all spatial and temporal scales beyond that of ...idual events (IPCC, 2012). Variabilitie s in climate may be due to natural, internal processes within the climate system or to ...tions in natural or anthropogenic external forces. (FAO, 2008), stated that, due to the increasing change in climate and its ...abilities, billions of people especially those in developing countries will face changes in rainfall patterns that will contribute ...vere water shortages or floodings, rising temperature which will cause a shift in aquatic organisms distributions. ...sequently, this will affect fish farmers because for a successful aquaculture, there is need for adequate water supply, stable ...perature, rainfall, wind speed and direction, proper drainages and reservoirs. Nigeria and all its states are highly vulnerable ...to its long 800km coastal line that is prone to sea level rise and the risks of fierce storms (Ajana 2000).

...study investigated fish farmers' perceptions of climate variabilities and the impacts on fish production in Bosso Local ...rnment Area, Niger State, Nigeria.

...erials and Methods

...hundred (100) questionnaires were administered to randomly selected fish farmers in Bosso Local Government Area, Niger ..., Nigera. Out of which a few were not attended to by the respondents. The questionnaires were structured to include; ...graphic profile of the farm, fish production activities, perception of farmers on climate variables and their responses. ...ndary data consisted of existing materials obtained from Nigerian Meteorological Agency (NIMET), Niger State, Nigeria ...rious forms which included meteorological data; temperature, rainfall and wind records from 1994-2014 were collected.

...riptive statistics was used for analysis of the primary data generated and presented as frequencies and percentages also; data ...subjected to chi-square test. Statistical differences were obtained at $P \geq 0.05$. The mean, standard deviation, standard error, ...idence interval of temperature, rainfall and wind data obtained were determined. Analysis of variance (ANOVA) was used ...mpare the variations in the means over the years. Multiple range tests (post-hoc) were also employed using Duncan's ...ple range test (DMRT).

...lts and Discussion

...results of the socio-economic characteristics of the fish farmers in Bosso Local Government Area, Niger State in Table ... ...ed that, most of the respondents were males accounting for about 87% of the population. This indicated that, more males ... engaged in fish farming than females. This was in line with the finding of George (2010), that, more males are involved in ... farming then females because of the laborious nature of fish farming operations, which are very tedious for females to ...dle. Furthermore, marital status revealed that, most respondents were married (61%) while 33% were single; this indicated ..., fish farming was a major source of income for the majority engaged in fish farming. For educational qualification, 58% had ...ary level of education. This was in agreement with the report of Agwu and Anyanwu (1996), who reported that, an increase ...ducational status of farmers positively influence their perceptions and adoption of improved technologies and practices. The ...ings revealed that, majority (71.9%) of the respondents had about 5-10years of fish farming experience, and 19% had less ... 5years of experience. This indicated that, those with less years of experience were new in fish farming and this may affect ... knowledge and experience of climate variabilities and the impacts in the study area and fish production.

From Table 2 the respondents with over 10years experience linked/attributed fish behavior, fish activities and [illegible] heat to climate change. They were of the opinion that, changes in or unpredictable rainfall caused decrease in [illegible] days and a total change in rainfall pattern. This finding was in line with the report of George (2010), that, farmers perc[illegible] effects of climate change from sustained changes over time in environmental temperatures, rainfalls and wind variabili[illegible]

Table 1: Fishers' Perceptions on Changes in Rainfall Patterns According to Literacy Level

Variable	Change in Rainfall			χ^2	P
Qualification	Change (%)	Decrease (%)	Unpredictable Pattern (%)		
Primary	33.3	22.2	44.4		
Secondary	41	25.6	33.3		
Tertiary	38.8	25	36.3		
Quran	0	50	50		
Adult	38.3	25.5	36.2	1.807	0.986

Table 2: Fishermen's Perceptions of Change in Temperature According to Years of Fish Farming Experience

Years of Experience	Change in Fish Behaviour	Effect on Fishing Activities	Unprecedented Heat	χ^2	P
<5yrs	46.1	46.1	7.9		
5-10yrs	46.3	46.3	7.3		
11-20yrs	44.4	44.4	11.1		
>20yrs	46.1	46.1	7.8	0.32	0.999

From the findings, different strategies have been adopted by farmers to cope with the impacts of climate variabilities. About 68% of respondents opted to erect shades over ponds close to source of water and 16% preferred using indoor facilities like re-circulatory system during high temperature; 27% preferred an adjustment in time of stocking while 6% procured weather monitoring devices; 64% provides shades over ponds during heavy rainfall about, 39% planted tress to break impacts, while 33% provided cover for ponds during strong windstorms.

The mean for temperature was distributed at 95% confidence limit. Mean temperature was 31.9317mm while the standard deviation was 3.9815mm during the study period. Between 1994 and 2000, the temperature was below average, followed by temperature distribution from 2002 to 2014, which was above average; this sharp difference implied a change in climatic condition that had taken place in the study area. This may have had both positive and negative effects on the fish production in the study area. The wind graph during the study period in the area showed variable signs from 1994 to 2003; it peaked in 1995, 2004 and 2013 while a sharp decline was visible from 2004 to 2012. Wind speed above average was also noticed in 2000, 2003 and 2014. Both high and low wind speed had its effect on fish production during the period in the area.

Conclusion

Change and variability in climate was a serious environmental threat to fish production in the study area. The study showed that, even though, fisher farmers were aware of variabilities in climatic conditions and the level of impacts, their coping strategies were still low. Hence, a multimedia enlightenment campaign on the effects and possible adaptive strategies to adopt to cope with the variabilities using available extension strategies be put in place; and government should put polices in place to regulate various environmental issues that affect fish production.

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