

**Original Article****Ecological perception of fish farmers in Yenagoa Metropolis, Nigeria****Sylvester Chibueze Izah\*** and Tariwari C. N. Angaye

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**Abstract**

The environment plays a keystone role as a hub for biotic and abiotic interaction. Ecological interactions (positive or negative) are reflection of the environmental status quo. Some human activities have grossly infringe on vital components of the ecosystem. A total of 100 questionnaires were administered to fish farmers in Yenagoa metropolis, Nigeria and 80% were retrieved (55% male and 45% female). Furthermore, about 62.50 – 77.50% is with the opinion that temperature, flooding rate, precipitation and pollutants depositions have increased and wind pattern getting warmer, while 43.75 – 52.50% responded that there is change in spawning time, decrease in fish production and juvenile availability, extinction and presence of invasive species. The study confirm the need to adopt multifaceted approaches in sustaining our ecosystem in order to mitigate adverse effects as well as ensure the bioavailability of keystone species.

**1. Introduction**

Environmental issues are amongst the challenges confronting the sustainability of the ecosystem including biotic and abiotic compositions. Over the past few decades, scientists have reported abrupt global climate change which has resulted to adverse environmental effects [1]. Adverse climate effects are influenced by natural and anthropogenic activities. Nigeria being a member nation of organization of petroleum exporting country flares nearly about 75% of total gas produced [2]. Also, Nigeria is a major importer of refined petroleum products, where the products are consumed in large quantity due to increase population.

Typically the combustion of petroleum products also releases pollutants gases, aerosols into the environments [1, 3]. For instance, Ohimain et al[4] reported that during palm oil processing by smallholders, pollutant gases such as oxides of nitrogen, carbon, suspended particulate matters, volatile organic compounds etc often exceed the permissible limit recommended by Department of Petroleum Resources and Federal Ministry of Environment. Additionally, these human activities could trigger natural disasters. Some potential activities natural environmental dilapidation include tropical cyclones, earthquakes, flood, drought, precipitation [5]. The effects of these disasters could be detrimental to the ecosystem thereby affecting its biological composition.

The earth is a unique habitat to several biodiversity. Global biotic compositions are found in the land (terrestrial habitat), water (aquatic habitat) and air (free-arboreal animals). Due to the effects of prolonged environmental degradation, inhabitants are exposed to uncommon environmental phenomenon. These include changes in climatic/meteorological pattern i.e. temperature, precipitation, sea-level, relative humidity, quality of air, water, food at various human settlements [1, 3]. Sea rise could lead to loss of habitats [6].

Furthermore, the adverse effects of natural and anthropogenic activities could also lead to change in the breeding pattern of biodiversity, pollination potentials of plants by pollinators and nutrient cycle [3]. This could lead to reduction in food production, and loss of valuable biodiversity including plants, animals and microbes.

In the coastal region of Nigeria i.e from Lagos in the West to Calabar in the East [7] are dominated by wetland, several rivers and creeks [8]. Due to the abundance of water bodies in this region and changes of the climatic conditions, several flooding episodes occurs on yearly basis especially in Major cities like Aba, Yenagoa, Lagos etc. For instance, in the central Niger Delta i.e. Bayelsa state, water flooding events occurs between May to October. Generally, the Niger Delta inhabits over 20 million people, covering about 7.5% of Nigeria total land mass (nearly 1 million sq km) with four ecological zones including barrier island, mangroves swamps forest, freshwater swap and lowland forest [9]. The Niger Delta has three major tributaries including River Focadoes, River Nun and River Orashi, which are linked to major tributary originating from northern most offshoot at *Ebueto* [9].

Fish farming is a major occupation in Nigeria especially in Bayelsa state [10 – 12]. With the depletion of fish in their natural stock i.e. rivers, attention has gradually turned into the use of pond for fish recently. However, some fishermen still harvest fishes in their natural habitats (rivers). Due to the effects of environmental dilapidation i.e. climatic change, the ecology and biological composition could be changing. Hence, this study aimed at assessing the perception of fish farmers with regard to the change in the ecology of fishes in their natural habitats.

**2. Materials and Methods****2.1 Study area**

Bayelsa state is a sedimentary basin that is virtually riverine and estuarine and fish farming is the major occupation of the inhabitants [13]. Yenagoa is the capital of Bayelsa state and is a coastal settlement with an average height of <15 meters above the sea level [1]. The state has a lot of peatland/depression with water [14]. Most of the peatland alongside the rivers, stream, creek and creeklets harbor several fish diversity. The cultivation of these fish is a source of livelihood to several families.

## 2.2 Data gathering

Quantitative techniques i.e structured questionnaires were used to obtain data from respondents in the month of August 2014 in Yenagoa metropolis, Nigeria. Data gathered are mainly socioeconomics of the respondents as well as the ecological and biological perceptions in relation to fish farming. A total of 100 questionnaires were administered, and 80 representing 80% was retrieved, analyzed and used for the study.

## 3. Results and Discussion

Table 1 - 3 presents the socioeconomics (sex, educational status and age of the respondents. Of the 80 questionnaires retrieved 44 persons representing 55% are male, while the rest 36 respondents, representing 45% are female (Table1). Based on the educational status, 37 respondents, representing 46.25% are first degree and above graduate, 21 respondents, representing 26.25% are diploma holders, 17 respondents, representing 21.25% are senior school certificate examination (SSCE) holders, 4 respondents, representing 5.00% is first leaving school certificate (FLSC) holder and 1 respondents, representing 1.25% do not have any form of formal education thus < FLSC (Table 2).

**Table 1: Sex distribution of respondents in this study**

Sex	Number of respondents	Percentage (%)
Male	44	55.0
Female	36	45.0
Total	80	100

**Table 2: Educational status of respondents in this study**

Educational status	Number of respondents	Percentage (%)
Below FLSC	1	1.25
FLSC	4	5.0
SSCE	17	21.25
Diploma	21	26.25
First Degree and Above	37	46.25
Total	80	100

Based on age, 1 (1.25%), 2 (2.50%), 20 (25%), 35 (43.75%) and 22 (27.50%) falls within the age range of 61 and above, 51 - 60, 41 - 50, 31 - 40 and 21 - 30 years respectively (Table 3). The educational information shows that a large number of the respondents are educated to provide reliable information about the ecological perception of fish distribution and trends. Like education, the age levels indicate that the respondents are also matured to provide adequate information.

**Table3: Age distribution of respondents in this study**

Age	Number of respondents	Percentage (%)
21 - 30	22	27.5
31 - 40	35	43.7
41 - 50	20	25.0
51 - 60	2	2.5
61 and above	1	1.25
Total	80	100

The ecological perception of fish farmers in Yenagoa metropolis is presented in Table 4. About 59 respondents, representing 73.75% is with the opinion that temperature has increased, 13 respondents, representing 16.25 indicate that there is no increase in temperature and 8 respondents, representing 10.0% do not have idea about temperature increase in last few years. The high respondents are indications that the farmers are aware of the effects of temperature in the environment [3]. Staudinger et al. [6] reported that increase in temperature could lead to species and population shift. When these

occur in fisheries, it could be detrimental because fish resources are vital source of animal protein.

**Table 4: Ecological perception of fish famers in Yenagoa Metropolis, Nigeria in the past few years**

Ecological	Yes	No	No idea
Temperature increase	59 (73.75)	13 (16.25)	8(10.00)
Precipitation increase	52(65.00)	17(21.25)	11(13.75)
Flooding rate increased	57(71.25)	15(18.75)	8(10.00)
River level risen	42(52.50)	31(38.75)	7(8.75)
River level decreased	18(22.50)	58(72.50)	4(5.00)
Wind pattern getting warmer	50(62.50)	24(30.00)	6(7.50)
Increase pollutant depositions	62(77.50)	14(17.50)	4(5.00)

Data in parentheses is expressed in percentages

Like temperature, about 77.50% of the respondents indicated that there is increase deposition of pollutants in the environment including the aquatic ecosystem. The high deposition of these pollutants could be attributed to the effects of urbanization and population growth. Some of the substances deposited into the environment could contaminate potential habitats of fisheries i.e River, thereby rendering it unfit for fish life and other domestic uses.

About 65% of the respondents are with the opinion that precipitation have increased in the past few years. In coastal areas, high precipitation could lead to increased intensity of frequency of rainfall. Also, 52.50% is with the opinion that river level has risen over the years. About 62.50% is with the opinion that the wind patter is getting warmer. About 71.25% responded that flooding rate has increased in the past few years. While, 18.75% and 10% respondents that water flooding events have not increased and do not have idea about flooding increase respectively. Flooding is one of the natural disasters observed in Yenagoa metropolis during the rainy season. Timilsina-Parajuli et al. [15] and Izah et al. [3] reported that precipitation has led to shifting of rainy season, which made the intensity and pattern of rainfall uncertain. The increase in natural disaster such as flooding could lead to mortality and disease outbreak [6]. Most of the potential disease outbreaks are enteric diseases. These could cause different types of diarrhea depending on the causative agent or pathogen.

Table 5 presents the biological perception of fish farmers in Yenagoa metropolis, Nigeria. About 52.50%, 21.25% and 28.75% are with opinion that fish spawning time have change, no change and do not have idea respectively. While 43.75% is with opinion that invasive species are now found in natural stocks and decrease in juvenile fish availability. About 47.50% of the respondents also indicated that fish production has decreased and 45.00% also showed that some fish species have gone into extinction.

Fisheries are source of animal proteins to human. Fishes have found application in the animal feed production, pharmaceutical and curative medicines. Typically, aquatic ecosystem is the natural home of fishes; change in the ecological parameters such as temperature, precipitation, relative humidity sea/river rise could alter the biological pattern of fisheries in terms of species and distribution. In this study over 52% of the respondents showed that the spawning period of fisheries have increased.

**Table 5: Biological perception of fish famers in Yenagoa Metropolis, Nigeria in the past few years**

Biological	Yes	No	No idea
Changes in spawning time	42(52.50)	17(21.25)	23(28.75)
Invasive fish species	35(43.75)	21(26.25)	24(30.00)
Decrease in fish production	38(47.50)	37(46.25)	5(6.25)
Decrease in juvenile fishes availability	35(43.75)	27(33.75)	18(22.50)
Extinction of fishes	36(45.00)	22(27.50)	22(27.50)

Data in parentheses is expressed in percentages

In attempt to control fishing from its natural stock (Rivers), laws regulating fishing practices are stipulated. In this study, about 60% of the respondents indicates that there are law regulating fish practices in the study region, while 33.75% and 6.25% claimed that there no law of such and have no idea respectively.

#### 4. Conclusion

Anthropogenic activities and natural disaster have grossly impaired the ecosystem. This study assessed the ecological perception of fish farmers in Yenagoa metropolis, Bayelsa state, Nigeria. The study found that fishes have decreased in their natural stock and presence exotic species. Also, there abrupt rise in temperature, precipitation which could lead to increased flooding incidence. In order to sustain the ecosystem, there is the need to adopt multifaceted approaches like; carbon sequestration, sparing juvenile, time-gap fishing, mesh sizes, litigation amongst others.

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