



Short Communication

**Socio-Economic Importance of Fish Farming in Maiduguri,
North-Eastern Nigeria**

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ABSTRACT

The socio-economic importance of fish farming in Maiduguri, North-Eastern Nigeria was investigated through a survey. A total of one hundred (100) copies of a structured questionnaire were randomly administered to fish farmers who had at least harvested once from their fish ponds. Ninety one (91) copies of the administered questionnaire were duly responded to and retrieved. Data collected from the survey was analyzed and the results expressed as simple percentages. The results showed that 43.9 % of the fish farmers are using concrete fish pond when compared to 24.2 % plastic enclosures and the least of 2.0 % glass tank. Those using combinations of the above ponds are not many. The results also revealed that 70.0 % of fish farmers are into fish farming as business as compared to only 4.0 % meant for research. Generally, consulting experts for clinical services by farmers is below 30.0 %. Although fish farming in Maiduguri has been practiced for more than 9 years, majority of the farmers (67.0 %) started fish farming in the last 1-2 years. The study revealed that private tube wells are generally the major source of water (90.0 %) for their fish ponds. While only 43.0 % changes their fish ponds water in 1-3 days, others vary between 3-31 days and above. 63.0 % of fish farmers in the study area use stagnant water and only 3.0 % use water recycling system. The result from this survey revealed that fish farming is a growing economic activity in Maiduguri, therefore recommends that interested fish farmers and those already practicing should be encouraged through provision of soft loans and educational incentives.

Keywords: Socio-economic, Fish farming, Maiduguri, North-Eastern Nigeria,

INTRODUCTION

Globally, fish farming development has been viewed as a measure of increasing and improving food security and as a means of supplementing income to families. Aquaculture in many countries especially in Africa is carried out at subsistence level with little or no surplus production to be sold at the rural markets

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(Banze and Oddsson, 2005). This may be due to natural supplies from rivers and streams that transverse the continent.

Economic consideration in the selection of an appropriate aquaculture production system includes observations of its potential for its efficiency, farmer access to operating capital and economic returns, (Hebicha *et al.*, 1994). Economically, fish farming has the potential for growth into large industry that could lead to wider business network in terms of supply services, farming and marketing which could provide job opportunities to the teaming populace (Okechi, 2004). It could also provide investment opportunities in feed mills, equipment manufacturing, processing, packaging and the provision of raw ingredients for research and education (Okechi, 2004). Fish industry also provides alternative source of high valued animal protein needs of the populace, contributing over 60 % of the total protein intake of the rural population (Adekoya and Miller, 2004). Fish has a nutrient profile superior to all terrestrial meats and equally has a high digestible energy that can meet the nutritional requirements of the rural populace (Amiengheme, 2005).

In Nigeria, commercial fish farming started over 40 years ago (Ekwegh, 2005). Meeting the fish protein demand of the current population of over one hundred (100) million people in Nigeria may require over 1.5 million metric tons of fish. Production is currently only 500,000 metric tons (Raufu *et al.*, 2009). The consumption of nearly 19.38/output/day is low and far below FAOs recommendation of 65gms/output/day (Adewuyi *et al.*, 2010). Therefore the need to invest into fish production to increase and meet the protein needs of its populace whose demand for fish has geometrically increased Kudi *et al.* (2008) is import.

African catfish (*Clarias gariepinus*) is a disease resistant fish species Ritcher *et al.* (1987) which can tolerate extreme environmental conditions (FAO, 1999). The cultivation and growth of such specie of freshwater fish could limit losses by farmers, improve income earnings and raise fish farmer's socio-economic standards. It could also close the demand–supply gap of 0.7 million metric tons that exists nationally, and costs Nigeria about US \$0.5billion per year (Kudi *et al.*, 2008).

MATERIALS AND METHODS

Study area

This study was carried out in Maiduguri metropolis formerly Yerwa founded in 1902, the capital of Borno State. Maiduguri is located on latitude 11° 48'N and 11° 52' N and Latitude 13° 02' East and 13° 12' East. It is the largest Metropolis in the northeastern region of Nigeria (Iliyasu, 1998).

Data Collection

One hundred (100) freshwater fish farmers that once harvested from their ponds were randomly served with a questionnaire each. A total of 91 questionnaires were eventually retrieved and the data generated was analyzed using percentages.

Questionnaire preparation

A structured questionnaire with the aim of finding out the socio-economic importance of fish farming in Maiduguri was administered to 100 freshwater fish farmers. The target respondents were randomly selected from fish farmers who have once harvested their farms and sold the produce.

Data analysis

Simple percentage was used for data analysis. The data obtained from duly completed questionnaire were collated, analyzed and the results presented as proportion of total respondents

RESULTS

With respect to the different types of fish pond used by farmers in the study area, results showed that 12.1 % used the earthen/dugout type of fish pond, 43.9 % used the concrete type,

24.20 % used plastic tank, 2.20 % used glass tank, 5.50 % used fibred type of pond and 6.6 % used both concrete and earthen, 3.3 % used both concrete and plastic tank, 1.10 % used both plastic and earthen, while 1.1 % used a combination of earthen, concrete and plastic tank (Table 1).

Table 1: Type of Fish Ponds Used by Fish Farmers in Maiduguri

Pond type	Frequency	Percentages (%)
Earthen	11	12.1
Concrete	40	43.9
Plastic	22	24.2
Glass tank	2	2.2
Fiber	5	5.54
Concrete and earthen	6	6.6
Concrete and plastic	3	3.3
Plastic and earthen	1	1.1
Earthen, concrete and plastic	1	1.1
Total	91	100

The purposes for which the respondents venture into fish farming are presented in Table 2. Seventy percent (70.0 %) of the respondents chose fish farming as a business, 19.0 % for consumption, 4.0 % for research and 7.0 % for recreational purposes (Table 2).

Table 2: Purpose of Fish Farming by Farmers in Maiduguri

Purpose	Frequency	Percentages (%)
Business	64	70
Consumption	17	19
Research	4	4
Recreation	6	7
Total	91	100

Similarly, results of professional consultancy to fish farmers in the study area showed that 14.0 % consult agriculturist, 29.0 % consult veterinarians and others 25.0 % are not specific as per the above professionals while 32.0% do not consult any professional (Table 3).

Table 3: Professional Consultancy Service to Fish Farmers in Maiduguri

Consultant	Frequency	Percentages (%)
Agriculturist	13	14
Veterinarian	26	29
Other consult	23	25
None	29	32
Total	91	100

The result of fish farming experience farmers in the study area showed 67.0 % having 1-2 years of farming experience, while 27.0 % had 3-5 years, and only 3.0 % had 6-8 years. Those with experience of 9 years and above in fish farming constituted 3.0 % (Table 4). For study source of water used for fish farming, the result showed that 90 % of the respondents source their water for fish farming activities privately from tube well, while 10 % obtain water from public water supply (Table 5). The number of days taken by fish farmers to change their fish pond water is presented in Table 6. The result showed that 43% of the farmers change their fish pond water within 1-3 days, 32% within 3-7 days, 9% within 8–14 days, 11.0 % within 15–30 days, while 5.0 % took up to 31 days and above to change their fish pond water (Table 6). Fish production techniques as reported by farmers in the study area showed that 63.0 % used still water, 34.0 % used the flow through system and 3 % used water recycling system (Table 7).

Table 4: Fish Farming Experience of Farmers in Maiduguri

Years	Frequency	Percentages (%)
1 – 2	61	67
3 – 5	24	27
6 – 8	3	3
9 – above	3	3
Total	91	100

Table 5: Source of Water for Fish Farming

Source	Frequency	Percentages (%)
Private tube well	82	90
Public water supply	9	10
Total	91	100

Table 6: Period (days) of Changing Fish Pond Water in Maiduguri

Days	Frequency	Percentages (%)
1 – 3	37	43
3 – 7	29	32
8 – 14	8	9
15 – 30	10	11
31 and above	5	5
Total	91	100

Table 7: Fish Farming Techniques Employed by Fish Farmers in Maiduguri

Technique	Frequency	Percentages (%)
Still water fish pond	57	63
Flow through system	31	34
Water recirculation	3	3
Total	91	100

DISCUSSION

Aquaculture is an important economic activity worldwide and is one of the fastest growing areas of food production in the USA. In China aquaculture harvest grow at an annual rate of 16.7 % in 2005 accounting for 70.0 % of the world fish production (Wikipedia, 2011). Nigeria, being a country endowed with rivers and streams that transverse the plains of its land, also has potentials for aquatic resources with fish playing a vital role in the life of its citizens.

Fish farming require hard work and good management system and these combined with considerable pond size, could minimize the costs of labour, feeds, fertilizer, fixed inputs, and fingerlings which could

have joint impact on the fish output in the study area. Adewuyi *et al.* (2010) and other workers recommended the use of various methods such as integrated fish farming Gabriel *et al.* (2007) and integrated multi tropic culture (Wikipedia 2011), where wastes from animal and birds (pigs, chicken and ducks) are recycled to become inputs/food for fish, and this is the most viable, reliable productive and profitable of any fish farming enterprise (Gabriel *et al.*, 2007) and encourages the reaping of economic benefits from fish farming. However, fish farming in the arid zone of northeastern Nigeria has not well advanced especially where fish ponds are predominantly the means of fish farming as indicated by this study where earth/dugout, concrete and plastics are used as ponds.

Fish farming as a business is practiced by 70.0 % of the respondents in this study. This is an indication of the economic importance of fish farming in the study area as a source of income. This agrees with findings of Kudi *et al.* (2008), thus serving as a good source of protein. Only 4 % of the respondents are farming fish for research purposes, and this agrees with the findings of (Gabriel *et al.*, 2007). This finding suggests that there is low research activities in fish farming and therefore the likelihood exist that farmers and those intending to go into fish farming may encounter difficulties accessing information on fish farming and production, consequently resulting to poor production and low income. It was also realized that 32.0 % of the respondents rarely consult Aquaculturalist, Veterinarians or other professionals for information on fish diseases or other production needs, thereby increasing chances of losses in fish harvest and income. This could possibly be the reason why 67 % of the respondents were into fish farming in the last 1-2 years. The finding that only 3.0 % of the fish farmers spent over 9 years in fish farming basically showed that these groups of fish farmers were inspired by the booming fisheries business in the study area.

Possibly due to inconsistent public water supply, 90.0% of the respondents resorted to privately dug tube wells as source of water for their ponds. This account for the poor water change in 10.0 % of fish ponds within 15-30 days and also for the 33.0% that use stagnant water for farming when compared to water recycle system in the study area. These findings also agree with similar report by (Raufu *et al.*, 2009).

Since fish farming has been found to be a lucrative source of income, many of the farmers venture into fish farming as source of income and some for subsistence to compliment the insufficient food product and limited protein supply.

Conclusion

Aquatic production system, including fish farming should be encouraged in Maiduguri as it has been found to play an important role towards enhancing the socio-economic livelihood of its inhabitants. It was also concluded that fish farming contributes immensely towards uplifting the standard of living of the jobless and low income earners thus creating job and self-employment opportunities.

Recommendation

There is need for capacity building through workshops and seminars to provide better understanding of aquaculture with a view to improving its productivity. Fish farmers should be encouraged to form association so as to have a forum that can encourage them and improve the market value of their products and access to credit facilities from financial institutions. Fish farmers should be encouraged to consult experts in fish farming to avoid losses due to poor harvest. The use of stagnant waters should be discouraged due to poor aeration of the pond. The teeming youth population in Maiduguri should also be encouraged to participate in this industry as a means of self-employment.

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REFERENCES

- Adekoya, B. and Miller J.W. (2004). Fish Cage Culture Potential in Nigeria-An Overview, National Cultures. *Agricultural focus*, 1:5-10.
- Adeyemi, A., Phillips B.B, Ayinde I.A and Akerele D. (2010). Analysis of profitability of Fish farming in Ogun state, Nigeria. *J. Hum. Ecol.* 3(3): 179-184.
- Amiengheme, P. (2005). The Importance of Fish in Human Nutrition. A Paper Delivered at a Fish Culture Forum. Federal Department of Fish farming in Abuja.
- Banze, I. S. and Oddsson, G. (2005). Planning of Sustainable Small- Scale Aquaculture in Mozambique. *Fisheries Training Programme*. The United Nation University. Iceland. 22-26
- de-Graaf, G. and Abdul, L. (2002). Development of freshwater Fish Farming and Poverty Alleviation. A Case Study of Bangladesh, *Aquaculture Asia*, 7(2) 5-7.
- Ekwegh, K.R. (2005). "Fish for All." A Report of a Study for New Pond, *J. Hum. Ecol.*, 6-7
- FAO (1999). Fish and Products: World Apparent Consumption Statistics Based on Food Balance Sheets, E. Laurenti (ed.) Nigeria. *Aquaculture – UTF/feb.* 2000 Annex II, project UTF/Nig 047. Nigeria, 23Pp.
- Hebicha, H. A., Gamal A.R. and Green, B.W. (1994). Economic Analysis of Different Tilapia Pond Culture System in Egypt. *12th Annual Technical Report, 1994 PD/A*. CRSP Office of International Research and Development, Oregon State University, OR, USA, 181-189.
- Iliyasu, A. (1998). Analysis of egg marketing in Maiduguri Metropolitan Council, Borno state, Nigeria. *A Final year project*, Department of Agric. Economics, Faculty of Agriculture, University of Maiduguri.
- Gabriel, U.U., Akinrotimi, O.A., Bekibele, D.O., Anyanwu, P.E and Onunkwo, D.N (2007). Economic Benefit and Ecological Efficiency of Integrated Fish Farming in Nigeria. *Science Research and Essay*, 2(8) 302-308.
- Kudi, T.M., Bako, F.P and Atala, T.K (2008). Economics of Fish Production in Kaduna State, Nigeria. *ARPN Journal of Agricultural and Biological Science*, 3(586); 17- 21.
- Okechi, J. K. (2004). *Profitability Assessment: A Case Study of African Catfish (Clarias gariepinus) Farming in the Lake Victoria Basin, Kenya*.
- Raufu, M.O., Adepoju, A.A., Salau, A.S. and Adebisi, O.A. (2009): Determination of Yield Performance in Small Scale Fish Farming in Alimosho Local Government Area of Lagos State, *International journal of Agriculture and Rural development*, 2(1):9-14.
- Ritcher, C. J. J., Viveen, W. J. A. R., Eding, E. H. M. Sukkel, A, J. Rothuis, M. F. P. M. Van Hoof, F. G. J. Van der Berg, and P. G. W. J. Van Oordt, (1987). The Significance of Photoperiodicity, Water Temperature and an Inherent Rhythm for Production of Viable Eggs by the African Catfish, *Clarias gariepinus* kept in Subtropical Ponds in Israel and Under Israeli and Dutch Hatchery Conditions. *Aquaculture*, 63: 169 - 185.
- Sikiru, B.O., Omobolanle, N.M., Ayorinde, B.J.O. and Adegoke, O.O. (2009). Improving Clarias productivity towards achieving food security in Ijebu-Ode, Ogun state, Nigeria: A socio economic analysis. *Advances in Biological Research* 3(1-2): 24-28
- Wikipedia, (2011). Aquaculture-Wikipedia, the Free Encyclopedia. 1-17. Retrieved 11/7/2012 Available on: [^http://www.gazetteer.de/wg.php?x=&men=gcis&lng=fr&dat=32&srt=pan&col=aohdq&geo=-158](http://www.gazetteer.de/wg.php?x=&men=gcis&lng=fr&dat=32&srt=pan&col=aohdq&geo=-158).