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Ornamental Fish Species Potentials of Ikpa River in Akwa Ibom State, Nigeria.

Imaobong Emmanuel Ekpo
Department of Fisheries and Aquatic Environmental Management, University of Uyo, P. M. B. 1017, UYO – 520001, Akwa Ibom State – Nigeria.
Corresponding address: imaobongekpo14@yahoo.com; +234-8026073996.

Abstract
Fish species were investigated for 12 calendar months from March 2009 – February 2010 forthnightly using traps, gillnets and cast nets from three sampling stations in Ikpa River. Ornamental fish species were sorted out from the pooled samples. The findings revealed that of the 2307 fish specimens sampled, 1074 specimens made up of 38 species and 19 families were of indigenous ornamental fish. The highest contributing family in terms of number of species is Cichlidae (10 species) whereas Schilbeidae (593 specimens; 55.21%) is the highest contributor in terms of total number of specimens sampled. This is followed by Mochokidae and Mormyridae with 4 species each and Cichlidae with 158 specimens (14.70%). At the species level, the highest contributor is *Physalia pellucida* (577 specimens; 53.72%) and is followed by *Erpetoichthys calabaricus* (60 specimens; 5.59%). The least contributors were *Heterobranchus bidorsalis, Periophthalmus barbarus* and *Pelvicachromis pulcher* (1 specimen; 0.09%). Twelve families recorded only one species each. These great potentials of ornamental fish have been left unexploited and hence, undeveloped. Several species of ornamental fish have been imported into and exported from Nigeria by businessmen. This paper, therefore, highlights the constraints and also makes recommendations for the exploitation and development of ornamental fishery in Akwa Ibom State and its environs.
Keywords: Exotic, Ornamental, Indigenous, Fish species, Ikpa River.

1. Introduction

Ornamental fish is often used as a generic term to describe aquatic animals kept in the aquarium, including fish, invertebrates such as corals, crustaceans (e.g. crab, hermit crab, and shrimps), mollusk (e.g. snail, clams, scallops) and also live rock (Ukaonu *et al.,* 2011). There is an ever-increasing awareness of the need to develop the ornamental fishery industry in Nigeria. This development arises from the realization of the role the sector plays in the overall socio-economic development of the country. Nigeria is blessed with a diversity of fish species most of which are of ornamental value. Ornamental fish trade gained interest in the early nineteenth century especially in the western part of Nigeria, although its development is still very much lower than what is obtained in the other parts of the world and in Africa, Nigeria has the highest population of ornamental fish industry, and with the city of Lagos as the commercial capital (Mbawuike and Pepple 2003, Mbawuike and Nwadukwe, 2007 and Ukaonu *et al.,* 2011). In East Africa where this fishery is well developed, it serves as a major foreign exchange earner. Quite like what obtains in the Upper and Lower Benue River Basin, these fish species which are of ornamental value are yet to be fully exploited for ornamental purposes. Ornamental fisheries could still be described to be at its infancy. Mbawuike *et* al., (2007) reported that live fish exporters association based in Lagos, began effective trade about 1992 when the Inland Fisheries Decree was promulgated. With the global trend in ornamental fish trade and the foreign exchange earning potential of the trade, several businessmen in Nigeria have been involved in the exportation of various indigenous ornamental fish species (NIFFR, 2002).
Ikpa River in Akwa Ibom State is blessed with several and great potentials of these species. No fishfarm rears or develops ornamental species in the State. However, there is paucity of information on these fish species. Considering the economic, social and scientific importance of ornamental fisheries, this paper, therefore aims at providing baseline information on the checklist of the various ornamental fishes that are available in Ikpa River which will serve as a benchmark for the exploitation and development of these great potentials.

2. Materials and methods

Ikpa River is situated in Akwa Ibom State within the rainforest zone of southeastern Nigeria It is a small perennial rainforest tributary located west of the lower reaches of the Cross River system. It drains a catchment area of 516.5km^2, 14.8% (76.5km^2) of which is prone to annual flooding. The stream has a main channel with total length of 53.5km between its source in Ikono Local Government Area and where it discharges into the

Cross River creek close to Nwaniba in Uruan Local Government Area. The length of the main channel lies at the interface of two different geological deposits: tertiary sedimentary rocks and cretaceous deposits (King 1994). The lower reaches are susceptible to annual flooding of the fringing low land riparian zone during the rainy season. The non-flooded zones of the upper reaches have a basin area of 440km^2 (85.2%) and mean depth and width of 2.0m and 12.5m respectively. Most of the stream is considerably shaded by overhanging canopy of riparian vegetation (mostly *Elaeis guineensis, Pandanus, Raphia hookeri, R. vinifera* and other tropical forest trees). The aquatic macrophytes are mainly *Nymphaea, Vossia, Utricularia and Musanga crinium*. The survey area is typically tropical with two main seasons: the rainy and the dry season. The rainy season characterized by heavy thunderstorms lasts from April to October, while the dry season covers the remaining months of November to March. The monthly distribution of rainfall shows a noticeable fluctuation in the month of August usually termed as- the "August break". The mean annual rainfall varies from 2250mm to about 1,500mm. The average minimum and maximum temperatures are about 25°C and 32°C respectively. The rainy season is characterized throughout the area by relatively high temperatures (25°C -33°C) and high relative humidity (85-95%). The dry season is characterized by the dry harmattan winds whose intensity is more felt from late November to early January. The mean annual potential evapo—transpiration (PET) varies from 1425mm to 1625mm (Adedipe *et al*., 1996).

Several fishing methods were used in a standardized manner to collect the maximum number of species and individuals in different microhabitats forthnightly for twelve calendar months from March 2009 – February 2010. Fishing equipment included cast nets (with mesh size of 10–25mm), gillnets (with stretched mesh size of 10-30mm) and traps (of various types and designs) during the day time in all the sampling sites. Specimens were identified from family to species levels with the aid of identification keys such as Olaosebikan and Raji (1988), Idodo-Umeh (2005) and Adesulu and Sydenham (2007). Inquiries were made through interviews with fish farm and aquaria owners within the State.

Relative abundance of each fish species was computed from the pooled data in all the sampling stations as the percentage of the number of each individual fish over the total number of fish as follows:

$$FO = n/N \times 100 \quad \text{----------(1)}$$

Where,

FO = Frequency of occurrence
n = Number of individual fish species
N = Total number of all the fish species

3. Results

Table 1 reveals that the indigenous ornamental fishery of Ikpa River is made up of 19 fish families and 38 species making up the 1074 specimens sampled; the total being 2307specimens. The highest contributing family in terms of number of species is Cichlidae (10 species) whereas Schilbeidae (593 specimens; 55.21%) is the highest contributor in terms of total number of specimens sampled. This is followed by Mochokidae and Mormyridae with 4 species each and Cichlidae with 158 specimens (14.70%). At the species level, the highest contributor is *Physalia pellucida* (577 specimens; 53.72%) and is followed by *Erpetoichthys calabaricus* (60 specimens; 5.59%). The least contributors were *Heterobranchus bidorsalis, Periophthalmus barbarus* and *Pelvicachromis pulcher* (1 specimen; 0.09%). Twelve families recorded only one species each.

The fishery in Akwa Ibom State is far from being commenced irrespective of the global trend and the abundant resources in terms of water and attended ornamental fish species in them. She is neither a member of Association of Ornamental Fish Farmers and Exporters of Nigeria (AOFFEN) nor any other body which fosters the development of ornamental fishery in and outside Nigeria. No fish farmer grows ornamental species of fish. The collectors deal directly with the fisher folks who catch these ornamentals from the wild. There are no breeders in the State. A few keepers of beautiful fish in aquaria in the parlours of their houses and offices were encountered. These were just for the fond / hobby of it but not for business, though with the attended problems. The sources of these species were either from the wild or imported. Poor handling led to mortality. The fish species were feed with diet locally made or imported feeds which sells for ₦1000:00 per small bag. Keepers of ornamental fishes were scientists (Lecturers), civil servants, politicians, and institution like Department of Fisheries and Aquaculture, University of Uyo, Uyo. Some selected ornamental fish species imported into Nigeria are presented in Table 2. A few ornamental fish owners have used some of these exotic species.

4. Discussion

Akwa Ibom State is blessed with numerous water bodies both inland and coastal and even marine which house several species of ornamental fish. This study revealed that there are 38 ornamental fish species distributed in 19

families. This is a high diversity when compared with its contemporaries in other water bodies or checklists in Nigeria. Some authors have researched on ornamental fish in Nigeria: NIFFRI (2002) zoned the river basins into five reported on ornamental fish composition to be as follow: Upper/Lower Benue River and Chad Basins (8 species), Hadejia-Jama'are Sokoto Rima River Basins (8 species), Upper/Lower Niger River Basins (17 species), Osun-Ogun and Owena River Basins (18 species) and Anambra/Imo Niger Delta and Cross River Basins (21 species); Mbawuike and Pepple (2003) noted that there are over fifty indigenous ornamental fish species sourced from the wild that are currently being exported from Nigeria; Mbawuike and Ajado (2005) reported of 24 species of ornamental fish species in Ibiaiegbende (Lagos); Mbawuike and Nwadukwe (2007) reported that there are about twenty ornamental fish species that are in high demand and are presently being exported from Nigeria while Ukaonu *et al.,* (2011) listed 70 ornamental fish in Nigeria.. The authors ascribed this low number of the species to be associated with the fact that several colourful species occur in Asia and South America where the ornamental fish export trade is highly developed. In East Africa where this fishery is well developed, it serves as a major foreign exchange earner (NIFFRI, 2002). The species of ornamental fish obtained have a good mix-up with different feeding habits that can be managed from locally available feedstuffs. For instance, the tilapine species can be reared on simple low cost feeds. Moreso, a good mix-up can give rise to a polyculture which with good management procedures can lead to profit making enterprise. The high relative abundance of the Schilbeidae (593 specimens; 55.21%) over the Cichlidae (158 specimens; 14.70%) is occasioned by the numerical strength of *P. pellucida* (577 specimens; 53.72%) which are very small-bodied species. *Erpetoichthys calabaricus* (60 specimens; 5.59%) is another beautiful fish that had high abundance. Other species that abound in the system include *M. electricus, O. niloticus, T. mariae, T. zillii, C. nigrodigitatus, G. courteti* and *B. nurse.* Exotic ornamental species commonly used in most parts of the country including Akwa Ibom State is gold fish (*Carassius auratus*).

The State is blessed with numerous fish farms but they are not interested in exploiting its ornamental fish potentials. The keepers chose ornamental fishes on the basis of low feeding habits, colour, shapes, sizes, hardiness, ability to adapt to life in captivity and attractive display. There is no case of any keeper who chose ornamental fish on the basis of ugliness but on the beauty of creation. There are different sources of ornamental fish species by the different keepers. NIFFRI (2002) showed that four keepers in Abia and Cross River States sourced for ornamental fish from fish farms whereas two keepers in Calabar (Metro Hotel) Cross river and Awkà, Anambra State sourced for ornamental fish by importation. The authors further reported that three keepers sourced for ornamental fish by importation and fish farm while four keepers sourced by breeding, all in Anambra State. Three keepers in Enugu State sourced for ornamental fish from Aquarium Shops. Some keepers agreed that ornamental fishes make home livelier and beautiful, reduces stress, entertainment to visitors and almost a tourism center.

Globally, the ornamental fish trade and its associated industries have important economic status and a major source of overseas income in Africa, South America and South East Asia (Ukaonu *et al.,* 2011). These authors also reported that in 2006, NAOFFEN was made up of 60 members but only 40 companies had the export permit in 2007 but between 2009 and 2010 about 29-33 companies got the export permit. This shows a decrease in the business which is occasioned by so many constraints as also observed by NIFFRI (2002) to include unstable power supply, non availability of artificially formulated feeds, lack of financial support from government and other corporate bodies, ignorance of the potentials of the fishery, unavailability of exotic species locally, ready markets, constant supply from the wild and lack of specific feeds for specific species. Therefore, the high species richness in the inland water of Ikpa River could sustain the ornamental fishery business in Akwa Ibom State if utilized and developed.

5. Conclusion and recommendations

With this rich endowment of ornamental species from the wild, farm owners and other businessmen can go into the business in large scale and become registered members. However, greater awareness need to be created on the economic, scientific, ecology, biology and social benefits of ornamental fishes in the State and Nigeria at large.

From the foregoing, the following recommendations are proffered:

1. There should be statistical data documentation of ornamental fishery resources in the State.
2. Researches on the biology and culture of these species should be encouraged by the Government and institutions.
3. The State map with pictures of all ornamental fishes in all the water bodies in the State should be prepared.
4. The Socio-Economics and Extension Programme should be supported to carry out an enlightenment campaign

on the values of ornamental fisheries.
5. Closed areas should be created with laws prohibiting fishing in those areas.
6. Obnoxious fishing methods should be stopped with penalties attached.

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References
Adedipe, N. Q.; Bakshi, J. S.; Odegbaro, 0. A. and Atiyu, A. (1996). Evolving the Nigerian Agricultural Research Strategy plan: Agro-ecological inputs. National Agricultural Research Project (NARP) 486 p.
Adesulu, E. A. and Sydenham, D. H. J. (2007). The freshwater fishes and fisheries of Nigeria. Macmillian Nigerian Publishers' Ltd, Nigeria. 317pp.
Idodo-Umeh, G. (2003). Freshwater fishes of Nigeria. Idodo-Umeh Publishers, Nigeria. 229pp.
King, R. P. 1994: Seasonal dynamics in the trophic status of *Papyrocranus afer* (Gunter, 1868) (Notopteridae) in a Nigerian Rainforest Stream. *Revue of Tropical Hydrobiology,* 27(2): 143-155.
Mbawuike, B.C. and Pepple, P.C.G. (2003). Inventory of locally available ornamental fish species in Nigeria export trade. *Journal of sustainable tropical agriculture research (JOSTAR)*, 403:1-7.
Mbawuike, B. C. and Ajado, E. (2005). Assessment of ornamental fish species and fishing methods in Ibiaiegbende, Lagos state, Nigeria. *African Journal of Applied Zoology and Environmental Biology*, 7: 23-27.
Mbawuike, B. C. and Nwadukwe, F. O. (2007). The role of women in ornamental fish industry in Lagos State, Nigeria. *African Journal of Applied Zoology & Environmental Biology*, 9: 59 – 62.
Mbawuike, B. C.; Nwadukwe, F. O. and Ayaobu-Cookey, I. K. (2007). Handling and transportation of ornamental fish in Lagos State, Nigeria. *African Journal of Applied Zoology & Environmental Biology,* 9: 38 – 43.
National Institute for Freshwater Fisheries Research (NIFFR) (2002). National survey of ornamental fishes in Nigeria inland water bodies. NIFFR Occasional Paper No.3. New Bussa, Nigeria. 40p.
Olaosebikan, B. D. and Raji, A. (1988). Field guide to Nigerian freshwater fishes. Federal College of Freshwater Fisheries Technology, New Bussa. 103 pp.
Ukaonu, S.U., Mbawuike, B. C., Oluwajoba, E. O., Williams, A. B., Ajuonu, N. Omogoriola, H. O., Olakolu, F. C. Adegbile, O. M. and Myade, E. F. (2011). Volume and value of ornamental fishes in the Nigerian export trade. *Agriculture and Biology Journal of North America,* 2(4): 662 – 664.

Dr. (Mrs) Imaobong E. Ekpo became a member of Fisheries Society of Nigeria (FISON) in 2008 and Organization of Women in Science for the Developing World (OWSD) in 2012. The author was born in Ibiaku Ntok Okpo (Akwa Ibom State – Nigeria) in 1968. She obtained her B.Sc. in Fisheries and M.Sc. in Hydrobiology & Fish Biology from University of Uyo, Uyo and Ph. D in Fisheries and Hydrobiology from Michael Okpara University of Agriculture, Umuahia. She is a lecturer and research environmental scientist in the Department of Fisheries and Aquatic Environmental Management, Faculty of Agriculture, University of Uyo, Uyo in Nigeria. Her research interest is in the areas of hydrobiology, fisheries and biodiversity.

Table 1: Checklist of indigenous ornamental fish species in Ikpa River, Nigeria.

Family	Scientific name	Common name	N	%N
Malapterinidae	*Malapterurus electricus*	Electric fish	16	1.49
TOTAL			**16**	**1.49**
Cichlidae	*Hemichromis bimaculatus*	Jewel fish	1	0.09
”	*H. fasciatus*	”	14	1.30
”	*O. niloticus*	Nile tilapia	31	2.89
	Tilapia guineensis	Guinea tilapia	14	1.30
”	*T. mariae*	Spotted /zebra tilapia	33	3.07
”	*T. zillii*	Red belly tilapia	25	2.33
”	*Chromidotilapia guntheri*	Mouth brooder	8	0.74
”	*Pelvicachromis pulcher*	Kribienis	5	0.47
”	*P. taeniatus*	”	1	0.09
”	*Sarotherodon galilaeus*	”	10	0.93
TOTAL			**158**	**14.70**
Mormyridae	*Brienomyrus brachyistus*	Whales short-nose	2	0.19
”	*Mormyrus rume*	Elephant snout fish	6	0.56
”	*Gnathonemus petersii*	Trunkfish	7	0.65
”	*Marcusenius ihuysi*	Marble catfish	5	0.47
TOTAL			**20**	**1.87**
Clariidae	*Heterobranchus bidorsalis*	Catfish	1	0.09
	H. longifilis	Mud catfish	11	1.02
TOTAL			**12**	**1.11**
Schilbeidae	*Physalia pellucida*	Glass catfish	577	53.72
”	*Schilbe mystus*	Butterfly fish	16	1.49
TOTAL			**593**	**55.21**
Bagridae	*Auchenoglanis occidentalis*	Catfish	2	0.19
”	*Chrysichthys nigrodigitatus*	Silver catfish	28	2.70
TOTAL			**30**	**2.89**
Channidae	*Parachanna obscura*	Snakehead	2	0.19
TOTAL			**2**	**0.19**
Citharinidae	*Citharinus citharius*	Moon fish	8	0.74
TOTAL			**8**	**0.74**
Anabantidae	*Ctenopoma kingslayae*	Climbing perch	5	0.47
TOTAL			**5**	**0.47**
Mochokidae	*Synodontis gobroni*	Catfish	6	0.56
”	*S. courteti*	”	34	3.17
”	*S. eupterus*	”	13	1.21
”	*S. nigrita*	Upside down catfish	7	0.65
TOTAL			**60**	**5.59**
Notopteridae	*Papyrocranus afer*	Feather back	5	0.47
TOTAL			**5**	**0.47**
Polypteridae	*Erpetoichthys calabaricus*	Reed fish	60	5.59
TOTAL			**60**	**5.59**
Characidae	*Brycinus nurse*	Silversides	48	4.47
”	*B. leuciscus*	Blue diamond	13	1.21
TOTAL			**61**	**5.68**
Hepsetidae	*Hepsetus odoe*	African Pike	33	3.07
TOTAL			**33**	**3.07**
Osteoglossidae	*Heterotis niloticus*	Bony tongue	8	0.74
TOTAL			**8**	**0.74**
Icthyboridae	*Phago loricatus*	Pike	4	0.37
TOTAL			**4**	**0.37**
Monodactylidae	*Monodactylus sebae*	Mono	10	0.93
TOTAL			**10**	**0.93**

Lattidae	*Lates niloticus*	Lates	4	0.37
TOTAL			**4**	**0.37**
Gobiidae	*Periophthalmus barbarus*	Mudskipper	1	0.09
TOTAL			**1**	**0.09**
GRAND TOTAL			**1074**	**100**

Table 2: List of some exotic/imported ornamental fish species used in Nigeria.

Family	Species	Common name
Cyprinidae	Carassius auratus	Gold fish
Cichlidae	Gitong biyayo	Red tilapia
Betontidae	Betontiid sp	Gouramis
Cyprinidae	Cyprinus sp	Koi carp
Pomacanthidae	Pomacanthus paru	Angel fish
Chaetodontidae	Chaetodontis arcuatus	Butterfly fish

Source: NIFFR, 2002