CONSERVATION AND SUSTAINABLE UTILIZATION OF NIGERIAN ORNAMENTAL FISHES

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ABSTRACT

The paper assessed qualitatively the threat status of Nigerian freshwater fishes that are presently being exported and those that have potential in aquarium trade using such criteria as rarity, size at maturity, mode of reproduction, human population density, habitat degradation, pollution and range of each species among others. For their conservation captive breeding of these fishes were proffered with information that can assist collectors, exporter and aquaculturists that wants to breed Polypterids, Butterfly fish, Knife fish, Elephantfish, Pollymyrus isidori, Arnordichthys spilopterus, Nannaethiops unitaeniatus, Killifishes, Polycentropsis abbreviatta, Cichlids, Ctenpomas, Mastacembelids and Tetraodon lineatus.

INTRODUCTION

The ornamental fishery sector in Nigeria is still young, globally the impact of this sector according to FAO is US$174 million in export value and import valued at US$257 million as at 1998 (Bartley, 2000). It must be noted that ornamental fish is a big business and represent an important source of foreign exchange earner. More than 60% of the above money, some US$130 million, went into the economies of developing countries. For instance, ornamental fish account for 8% of the volume of exported fish in Sri Lanka while around the Great Lakes of East Africa this sector have stagnated the food fisheries sector; Maldives exported to U. K. in 1994 less than 250kg of ornamental fish valued $12,400 while in contrast Seychelles in the same year exported food fish valued at $6,000 per tonne (Bartley, 2000). Asia accounts for more than 50 percent of the world supply of ornamental fish. New players such as the Czech Republic and Malaysia are now competing with the traditionally dominant suppliers. The main importers are the United States (24 percent), Japan (14 percent) and Europe, particularly Germany (9 percent), France (8 percent) and the United Kingdom (8 percent). In international trade, freshwater species represent about 90 percent in value terms. against 10 percent for marine species. Since 1985, international trade in aquatic organisms for ornamental purposes has been increasing at an average rate of 14% annually. Ornamental fishery in Nigeria though young depends on wild collection of indigenous species and breeding of exotic species. The potential of ornamental fisheries in providing foreign exchange, employment and alternative livelihood for fishermen cannot be over-emphasized considering the decline in production from capture fisheries and high rate of unemployment in the country.

For this industry to be of benefit to all stakeholders – collectors, exporters and importers alike there is urgent need to conserve these fishes for sustainability and posterity. This is imperative because of the following reasons.

1. Most of the Nigerian ornamental fish are also consume as food, which means there is competing interest meaning if ornamental trade increase there will be increase pressure their population.
2. Wild collection is not sustainable in that many collectors will try as much as possible to harvest enough to meet the demand without regard to the rate of recruitment of such fish. Also there is high post – harvest loss between site of collection, transportation, port of export, the importer and the retailer.
3. Many of these fishes are declining in abundance as a result of over fishing, dams, loss of catchments, habitat destruction, industrial and agricultural pollution. The threat of oil pollution started in the 70s when between 1972 and 1980, 836, oil spill incidents were

recorded resulting in 1,405,406 barrels of oil polluting the environment. Between January and May 1981 alone, 121 spills were recorded (Awobajo, 1981). More than twenty years after the rate of oil spillage have assumed an alarming proportion as a result of increase in oil exploration, illegal bunkering, vandalization and ethnic unrest in the Niger Delta.

4. Most of these fish being harvested, there status in the wild in term of stock structure and life histories are not well known.
5. The hazard of wild collection comes in form of snakebite, leech bite, parasitic infection like schistosomiasis and guinea worm.

The aim of this paper therefore is to highlight the status of Nigerian species of ornamental fishes and to give state of knowledge of their captive breeding where possible in order to encourage their culture as oppose to wild collection, and sustainable harvest of natural population in order to ensure sustainable growth of the industry in the country.

Table 1. Some Nigerian freshwater fishes of ornamental potential and their conservation status

SCIENTIFIC NAME	ENGLISH NAME	THREAT LEVEL	BREEDING
POLYPTERIDAE			
Polypterus ansorgii	Guinea Birchirs		E
Polypterus bichir bichir	Nile Birchirs	VU	E
Polypterus birchi lapredei	Birchirs		E
Polypterus (e) endlicheri	Red/Saddled Birchirs		E
Polypterus (s) senegalus	Senegal Birchirs		E
Erpetoichthys calabaricus	Ropefish/Reedfish	CR	D
PANTODONTIDAE			
Pantodon buchholzi	Butterfly fish	EN	D
NOTOPTERIDAE			
Papyrocranus afer	Reticulateknifefish /Featherback		D
Xenomystus nigri	African knifefish	EN	VD
MORMYRIDAE			
Hippopotamyrus psittacus			NK
Hippopotamyrus pictus			NK
Hippopotamyrus castor			NK
Petrocephalus bane			NK
Petrocephalus bovei			NK
Petrocephalus ansorgi			NK
Petrocephalus sauvagii			NK
Petrocephalus soudanensis			NK
Pollimyrus isidori	Baby whale	NT	D
Pollimyrus adspersus	Stonebasher		NK
Pollimyrus petricolus	Stonebasher		NK

Pollimyrus (k) kingsleyae	Stonebasher		NK
Gnathonemus petersii	Elephantnose	CR	NK
Isichthys henryi			NK
Brienomyrus (B) niger			NK
Brienomyrus (B) brachystius			NK
Brienomyrus (B) longianalis			NK
Marcusenius abadii		NT	NK
Marcusenius cyprinoides		NT	NK
Marcusenius mento			NK
Marcusenius senegalensis			NK
Marcusenius brucii		CR	NK
CHARACIDAE *Bryconaethiops quinquesquamae*		CR	NK
Brycinus leuciscus			D
Brycinus intermedius		NT	D
Brycinus longipinnis	Longfin Tetra	NT	E
Micralestes humilis			E
Micralestes occidentalis			E
Micralestes elongates			E
Rhabdalestes brevidorsalis			E
Rhabdalestes septentrionalis		CR	E
Arnoldichthys spilopterus	Niger Tetra	CR	E
DISTICHODONTIDAE *Phago loricatus*			NK
Paradistichodus dimidiatus			D
Nannocharax ansorgii		CR	D
Nannocharax latifasciatus		CR	D
Nannocharax fasciatus			D
Nannocharax lineomaculatus			D
Nannocharax occidentalis			D
Nannaethiops unitaeniatus	One-striped African characin	EN	E
Neolabias ansorgii			D
Neolabias unifasciatus			D
Neolabias axelrodi		CR	D
Neolabias powelli		CR	D
CYPRINIDAE *Barboides gracilis*			D
Barbus			E

SCHILBEIDAE *Eutropius buffei*	Debauwi Cat		VD
MALAPTERURIDAE *Malapterurus electricus*			NK
Malapterurus minjiriya		EN	NK
MOCHOKIDAE *Synodontis courteti*			NK
Synodontis filamentosus			NK
Synodontis ocellifer			NK
CYPRINODONTIFORMES *Aphyosemion bivittatum*	Two-striped lyretail	CR	E
Aphyosemion bitaeniatum	Two-striped Aphyosemion	CR	E
Aphyosemion deltaense	Delta killi	CR	E
Aphyosemion elberti	Elbert Killi	CR	E
Fundulopanchax filamentosum	Plumed lyretail	CR	E
Fundulopanchax arnoldi	Arnould Killi	CR	E
Fundulopanchax sjoestedti	Blue Gulare	CR	E
Fundulopanchax n gulare	Gulare	CR	E
Fundulopanchax calliurium		CR	E
Fundulopanchax spoorenbergi		CR	E
Fundulopanchax gardneri	Blue lyre-tail	CR	E
Fundulopanchax scheeli		CR	E
Fundulopanchax powelli		CR	D
Fundulopanchax nigerianus		CR	E
Pronothobranchus kiyawensis		CR	D
Nothobranchus rubroreticulatus	Notho	CR	D
Procatopus aberrans		VU	D
Procatopus similes		VU	D
Poropanchax normani	Norman lampeye		D
Poropanchax luxophthalmus	Lampeye panchax		D
Aplocheilichthys spilauchen	Banded lampeye		D
Micropanchax pfaffi	Pfaff's Lampeye		D
Micropanchax kingii		CR	D
Micropanchax scheeli	Pfaff's Lampeye	CR	D
Epiplatys longiventralis		CR	D
Epiplatys spilargyrieus	Senegal panchax		D
Epiplatys bifasciatus	Two-striped panchax		D
Epiplatys sexfasciatus	Six –bars panchax	VU	D
Epiplatys biafranus		CR	D
Epiplatys grahami		VU	D
Foerschichthys nigeriensis		EN	D

NANDIDAE *Polycentropsis abbreviata*	African Leaf-fish	CR	E
CICHLIDAE *Astatotilapia bloyeti*		NT	E
Gobiocichla ethelwyannae		CR	
Gobiocichla wonderi		NT	
Pelvicachromis taeniatus		NT	E
Pelvicachromis pulcher	Rainbow krib	NT	E
Chromidotilapia (g) guntheri			E
Hemichromis bimaculatus	Jewel fish		E
ANABANTIDAE *Ctenopoma nebulosum*			D
Ctenopoma murei			D
Ctenopoma kingsleyae	Tailspot ctenopoma		D
Ctenopoma petherici			D
MASTACEMBELIDAE *Aethiomastacembelus sexdecimspinus*		CR	D
A. nigromarginatus			D
Caecomastacembelus Cryptacanthus			D
Caecomastacembelus decorsei			D
TETRAODONTIDAE *Tetraodon lineatus*	Puffer fish	NT	E
Tetraodon pustulatus		VU	E

*KEY: CR – Critical endangered
EN – Endangered
VU – Vulnerable
NT – Near threatened
E - (E) easy to breed
NK - breeding habit is not known
VD - very difficult to breed
D - difficult but can be bred.

BREEDING HABITS OF SOME NIGERIAN ORNAMENTAL FISHES

This account is based on personal observations, experience, and knowledge gain from networking with other aquarists and little that is known about the biology of these fishes.

1. **Polypterids**

According to Britz and Bartsch (1998), this group can be bred in captivity under favorable condition. They are aggressive and should be kept in covered aquaria. In the wild they breed in the swamp at the height of rainy season. They can be sexed by the size of the anal fin, which is bigger in male than female. They require vegetated condition on which to deposit their weakly adhesive eggs. Courtship involve male chasing the female for hours before spawning takes place. The parents must be separated from the eggs to avoid cannibalism.

The larvae, which have external gills, should be fed with newly hatched brine shrimp or mixed zooplankton.

2. **Pantodon (African butterfly fish)**

Little is known about the breeding habit of this splendid fish, however, recently some hobbyists have succeeded in breeding them using this method: The water (pH 6-7.5)) in the breeding aquarium is lowered to about a quarter full for about 2 weeks, and then refilled with soft slightly acidic water. The male will chase the female for sometime until spawning, which can continue for several days. The eggs are floating and must be picked using spoon and brood separately. Hatching takes two days. The larvae are difficult to raise because they feed on minute organisms like Paramecium, rotifers then latter on newly hatched brine shrimp. The adults are very aggressive, more active at night and can easily jump out of the aquaria if not well covered. The male can be distinguished from the female by the shape of the anal fin, -that of the male is curved while that of the female is straight.

3. **Notopterids (Knife-fish)**

There are only two species in this group, juveniles of which are attractive in the aquarium. They prefer quiet part of the water (pH 6-6.5) with a lot of vegetation. A small pond with good shade will be adequate for breeding them. They are substrate guarders. It takes about two week for the eggs to hatch during which the fish will be fanning the eggs. The system should then be well aerated. The young fry will need newly hatched brine shrimp as starter feed.

4. **Mormyrids**

This group is well sort after by aquarists but their breeding habit is not well understood. They are good aquarium fishes that are not aggressive. They breed during the raining season and so are depended on environmental condition for reproduction. Such species like *Marcusenius, Petrocephalus* breeds in swamps and floodplains while *Gnathonemus* are common in rocky pools and deep waters around falling trees, where the current is not swift. Species like *M. brachystius* are negatively phototactic. *Pollimyrus isidori* have been reported to be fractional spawners and a nest builder. The male is reputed to build the nest and guides it by producing electric discharges. They require soft water with pH 6-8.

5. **Characids (Characins/Tetras)**

Brycinus longipinnis lives in clear streams and breeds in the rainy season depositing egg in the sandy substratum. Spawning is either in pair or in school.

Niger tetra (Arnoldichthys *spilopterus*) The anal fin of the male is wider and colour brighter than that of the female. They need sandy substratum to deposit egg. During breeding the male drives the female until spawning takes place and the eggs hatch 30-38 hours after. The parent must be separated from the broods to afford cannibalism.

6. **Distchodontids**

The most popular among this family found in Nigeria is one-striped African characin (*Nannaethiops unitaeniatus*), are ready breeders that deposits eggs among fine leaved grasses. The eggs hatches within 48 hours and fry fed with newly hatched brine shrimps.

7. **Cyprinodontiforms (Killifish)**

Killifishes are daily spawners depositing few eggs everyday. Based on spawning behavior, killifish can be categorized into two groups:

a. Plant spawners. These include *Epiplatys*, most *Aphyosemion*, and some *Fundulopanchax*. These can be either surface or bottom spawners. To breed this group of fishes require the use of mop (a miniature kakaban), which can be made from uncoiling rope yarn and attach to a floater. During breeding, mop is

place in the breeder's tank. Every two to three days the mop is removed drained gently of water and the eggs (1-2mm) are picked using piece of broom stick (not sharp) into small brooder tank. It take between 7-12 days for them to hatch. The larvae are fed with paramecium, rotifers or newly hatched brine shrimp.

For those with outdoors tanks or small ponds, what is require is plenty of floating aquatic plants, this group will breed easily on their own without the problem of brooding the larvae.

b. Soil spawners. The soil spawners are of two groups – the truly annual killies like the *Pronothobranchius* and *Nothobranchius* that inhabit temporary pools that dries up annually. To perpetuate themselves these fish lays eggs that can resist desiccation in the soil and as soon as their pool is having water in the following year they hatch.

The non- annual Killies like *F. filamentosus* and *F. sjoestedti* whose eggs also undergo a drying period, but this drying period is not a requirement for successful propagation.

8. **Nandids (African Leaf-fish)**

This is represented by one species. They are found in soft water of pH 6-6.5. Their spawning habit involves the male making bubble nest among leaves into which the female will deposit singly about 100 eggs. It is advisable that the female be removed after spawning. The fry is fed on newly hatched brine shrimps.

9. **Cichlid (Tilapia)**

This group of fishes has parental care for their eggs and young, and can breed easily in aquaria. They are divided into

(a) Substrate guarders are usually monogamous, that is they form a pair that may last for the breeding season. There is no sexual dimorphism between the male and the female. Once a pair is form they both set up a territory that they defend from intruders and courtship takes leading to spawning. This may be on a substrate like stone, plant or in a hole (e. g. *Pelvicachromis*) and the eggs, which are usually a thousand plus are adhesive. The pair protects the eggs and aerates them until hatching. The care continues with the fry until they are old enough to fend for themselves. Substrate guarders include the *Hemichromis. Chromidotilapia and Pelvicachromis.*

(b) Mouth brooders are usually polygamous with the male being more colorful than the female. It is the male that prepare the nest and then attract females. When a pair is formed it only last for the period of spawning. The female lay the eggs while the male fertilizes them after that the female takes all the eggs into it mouth or in some species both of them (biparental mouthbrooding). The eggs are usually less than a thousand in number depending on the size of the female. The male then chase away the female and start attracting another female into the nest. The female on the other hand incubates the eggs in it mouth for 2- 3 days during which it will not eat. When the eggs hatches the fry remain in the mouth coming out to feed and when there is danger running back into the mouth of their mother. This continues until they are old enough to fend for themselves. E.g. *Oreochromis.*

10. **Anabantids**

These are represented in Nigeria by 6 species of Ctenopoma. The breeding habit of the genus is not well known but since they belong to the same group as the Siamese fighting fish, they are probably bubble nest builders.

11. **Mastacembeiids**

These are represented by four species. They depend on favourable environmental condition to spawn on aquatic plants.

12. Tetraodontids

Muratov (2003) has reported that he breeds Nile puffer easily. According to him they breeds all year round and a few days without food motivates spawning. They are aggressive and become mature at about a year old. The demersal eggs are slightly sticky and take three or four days to hatch. The young are fed on newly hatched brine shrimp or hard boil egg yolk.

CONCLUSION

The challenge before every stakeholder is to start breeding Nigerian ornamental fish for export as problems of environmental degradation and the lack of sustainable collection practices make this a more viable long-term alternative. However, breeding of ornamental fishes has been left in the hand of hobbyist for too long by the aquaculturists and with the growing market in this sector it hope that some of our fish farmers will specialize in culturing native ornamental fishes. Also there is need for fish biologist to study the basic biology and ecology of most these ornamental fishes. Presently FAO has realized the importance of this sector and are making effort in giving it attention. Finally, to make this sector grow in Nigeria, there is need to abrogate the section of Inland Fisheries decree No 108 of 1992, section 8 of which prohibit the importation, and exportation of live fish except for research purpose.

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Parental care and social organization of the spiny eel, Aethiomastacembelus platysoma, in Lake Tanganyika.

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Source: Environmental biology of fishes. The Hague; vol. 52, no. 1-3, pp. 271-280; 1998

ISSN: 0378-1909

Abstract:

This is the first report demonstrating the occurrence of parental care in mastacembelids. Social organization and parental care of a spiny eel Aethiomastacembelus platysoma were studied in Lake Tanganyika. Both males and females maintained individual territories though the frequency of aggressive interaction was low. The male guarded offspring in a rock hole within its territory. The egg size was large (2.5-2.7mm in diameter) and the brood size in a nest was 5.7 on average in spite of more oocytes in the ovary (65 large oocytes on average). The duration of guarding was around 30 days after hatching and the young became independent just after they began to feed. Guarding males seldom attacked fishes that approached the nest, and often went out of the nest to forage though the stomach contents of guarding males were less than those of non-guarding males. Compared with Tanganyikan cichlid fishes that show prolonged parental care at open sites, the post-hatching guarding interval is short and the egg size is large, which seem to be traits common to fishes that utilize closed spaces as guarding sites in the lake.

Title: Breeding Nile puffers, Tetraodon lineatus.

Author: Muratov, D

Source: Freshwater and Marine Aquarium (Sierra Madre); 26(4): pp. 110-116; 2003

ISSN: 0160-4317

Publisher:

Title: Pelvicachromis taeniatus "Nigeria".

Author: YOUNGMAN, F.J.

Source: Cichlidae - The British Cichlid Association; Vol. 10(1), pp. 16-18; 1989

The world commission on environmental development in 1996 emphasized that poverty was one of the major causes of accelerated depletion of the earth resources and degradation of its forest, soil, species,fisheries, water and atmosphere.