

LAKE VICTORIA - A Nightmare Come True

By Norm Halliwell

Introduction

Most of the following details were extracted from a paper by Micheal N. Bruton of the J.L.B. Smith Institute of Ichthyology "The conservation of the Fishes of Lake Victoria, Africa: An ecological perspective", as well as a number of my own viewpoints with regards to the very serious problem of introducing species to areas that they are foreign to. As this is an ongoing problem, which will not stop here, I believe very strongly that the actions of various scientific individuals should be closely monitored here in Australia, to ensure that no such catastrophe occurs here.

It had to happen sooner or later!!

The African Rift Lakes are considered to be rather fragile ecosystems that are relatively resistant to minor changes from which they have evolved, but highly vulnerable to major disturbances such as over-fishing, alien species, pollution and environmental changes. This Lake provides food, income and employment to many of the lakeside communities, and have supplied many scientists with unequalled opportunities to study the patterns and processes of evolution.

Over the past forty years or so, advances in technology and increased human populations, and all the interactions that this entails, have threatened the survival of many creatures on this Earth, none so more as in Lake Victoria's cichlid fauna. Threats are posed by over-fishing, habitat alteration, introduction of alien fish species, for example the Nile Perch - *Lates niloticus*, through heavy predation of the cichlid flocks, and Nile Tilapia *Oreochromis niloticus*, from overcrowding and competition for food sources, plus oil pollution from commercial drilling operations (Fryer 1960, 1972, 1973, 1984).

The Nile Perch is alien to Lake Victoria, and due to its enormous size and growth rates, in a very short time, the cichlid fishes generally have not been able to co-evolve with it. Similarly, Nile Tilapia, also an introduced species, has created severe problems with the endemic cichlid flocks through competition for sites and food resources, and due to the speed of it becoming established, has begun to overcrowd certain areas, and therein, push out various endemic cichlid species from habitats formerly known as their domain.

Lake Victoria is the largest freshwater Lake in the tropics, with a surface area of 68680 square kilometres, a mean depth of 40 metres and a maximum depth of 80 metres. So, comparing it to Lakes Malawi and Tanganyika, it is very shallow in comparison.

The Lake straddles the equator and lies mainly in Tanzania (51%), Uganda (43%) and Kenya (6%). The populations of Nile Perch were first introduced from the Lakes Turkana and Albert in the 1950's and early 1960's (Arunga 1981) despite repeated objections from scientists (Fryer 1960, Jackson, 1960. Anderson 1961).

Nile Perch are opportunistic predators, and has now become well established in Lake Victoria where it preys heavily upon endemic Haplochromine stocks. Nile Perch presently represents 90% by weight of the trawl catch in Tanzanian waters. Because of the Nile Perch invasion a huge fishery has commenced in the Filleting, canning and marketing of Nile Perch, so much so, that further problems have now emerged the frying and smoking of Nile perch flesh consumes large amounts of wood which has caused numerous problems with de-forestation.

This is probably the biggest single man-made species introduction the World has known, and the full consequences have still not been fully recognised, as it is still on-going with massive de-forestation problems. Management of Lake Victoria will, in future, have to take into consideration the introduced populations of Nile Perch and Nile Tilapia.

Recent expeditions from the National Museums of Kenya and the British Museum of Natural History have found that the areas where Haplochromines are scarce, were caused by over-fishing or intense fishing techniques. In other areas where fishing is not allowed, or where there is little fishing effort, large numbers of Haplochromines exist. From this, it would seem that over-fishing, as well as increased predation by Nile Perch are affecting the Haplochromine populations (Ogari and Dadzie 1988).

The latest scenario is that there is a strong likelihood that some cichlid species will be lost from Lake Victoria, although not as many as first suggested by HEST (1986a, b). The most critical scenario is that the structure and function of the fish communities left, in particular the endemic cichlid communities will be irreversibly altered. Introduced species rarely affect indigenous species in isolation, but, usually form part of an overall environmental change that causes stress on endemic species, such as the cichlid flocks of Lake Victoria, and this stress manifests itself in the form of predation by the Nile Perch and hybridization, overcrowding and competition for food and site resources as in the Nile Tilapia.

It seems reasonable to assume that the complex relationships of a mature ecosystem, like Lakes Victoria, Malawi and Tanganyika, once disturbed by alien predators, over fishing and the like, will be far harder to re-establish at some later time. Man's constant intervention into these situations cause unstable environments, thus causing specialised species, such as the cichlid flocks of Lake Victoria, which are closely in tune with the environment, to become rare or extinct in some cases. This is exactly what had happened in Lake Victoria, and will go the same way with Lakes Malawi and Tanganyika if the reports that I hear come into play. I sincerely hope not, for the sake of all concerned, especially the fish communities already established in these two Lakes, introducing an alien fish Predator to Lakes Malawi and Tanganyika would have a far greater impact on those fish communities, than it has already had on Lake Victorian species, as these lakes have a more diverse species selections with far more marked trends towards specialisation than that of Lake Victoria.

Currently, there are three proposed conservational measures that are hypothesised for Lake Victoria: the captive propagation of endangered cichlid species, the reduction of Nile Perch densities, - and the closure of the Haplochromine trawl fishery. Captive propagation.

The establishment of self-sustaining captive populations of rare and endangered animals, or animals from highly disturbed habitats, like Lake Victoria, is a widely supported conservation measure endorsed by the international Union for the Conservation of Nature and Natural Resources (IUCN).

Cichlids are probably one of the most suitable candidates for captive population because they readily breed in aquaria (Ribbink 1986). However, before re-introduction of any species into an area which has been impacted by predators etc, the recommendation should only proceed where sufficient funds are made available to ensure that the whole scheme can be completed, as well as the causes of the eradicated fishes has been removed, e.g., the Nile Perch and Nile Tilapia, have been removed, as well as the burden of over-fishing or intense fishing have been removed. Obviously, in Lake Victoria, this is practically impractical, and, as a huge fishery is now well established, highly unlikely that anything will come of this proposal, which makes this topic not worth discussing any further.

Reducing Nile Perch stocks

It has been proposed that the Nile Perch should be intensively fished in an attempt to reduce its numbers and restore the Lake to its original condition.

For those who have stated this proposal, they must also believe in the "Tooth Fairy", as Lake Victoria is not a small body of water, but an inland sea.

Nile Perch have now colonised the feeder rivers of Lake Victoria (Crapon de Caprona and Fritzch 1989) which makes their eradication even less practical. All that can be done now is to allow the system to settle and establish itself and once this has happened, through their own interactions, the numbers of Nile Perch, may be reduced slowly by their own predation, and so, helping to do what the scientists have proposed here in reducing Nile Perch stocks.

Closure of Haplochromine trawl fishery

Information from HEST research (1986a) supported by recent collections made for the British Museum of Natural History strongly suggest that over-fishing not only by trawling - has played an important role in the decline and even the eradication of various species of Haplochromine cichlids from various areas of Lake Victoria.

Currently studies are underway to ascertain the effect of trawling on Nile Perch numbers and their biology, but this information is not yet available. It is possible that a drastic reduction in trawling activities on Haplochromine habitats may have beneficial results on those Haplochromine species regularly taken from such trawls.

An overall ban on trawling would be practically impossible right now, but certain areas could be stopped or reduced in order to allow the Haplochromine populations to re-generate to acceptable levels.

Nevertheless, any decision to halt trawling would have to take into consideration a variety of socio-economic factors, but, based on the information available at present, this decision is one that should be looked at very closely.

The closure of various parts of the coastline of Lake Victoria could also be pursued, in order to establish reserves, similar to that in Cape Maclear in Lake Malawi. These reserves would not of course exclude Nile Perch or Nile Tilapia, as these will inevitably be present, but at least the over-fishing of these areas can be stopped in order to give the endemic species a chance to re-establish pockets of resistance to over-fishing.

The only disadvantage of such reserves, is that they would only conserve local populations of the species involved. Reserves have already been established by the Kenyan Government in Winam Gulf and have apparently been successful, so a precedent has already been established for further attempts to conserve some areas for later study, to see what effects if any these reserves have had on the endemic fish communities present there.

In conclusion

There is a considerable body of evidence to show that various interactions have been severely disrupted in Lake Victoria not only by the introduced fish species, but also by over-fishing (Ogutu-Ohwayo 1985, 1990). The introduced species were put there primarily as a food source for the local communities, without the slightest thought as to the consequences of such actions.

The endemic Haplochromines converted numerous protein-rich sources algae, zooplankton, insect larvae, shrimps, molluscs, diatoms and bacteria - into fish protein for consumption by higher levels man.

The Nile Perch Preys mainly upon juvenile Nile Perch, Haplochromine species and the juvenile Nile Perch feed mainly on zooplankton and smaller Haplochromine species, and together with the overcrowding for space and food resources of the Nile Tilapia, the end result is a Lake, which is similar to that described for Australian waterways - depauperate.

Thus, the man-made changes to this Lake must be regarded highly as negative and the economic consequences to be of unknown value in the long term, even though these decisions may be considered by some to be of benefit in the short term.

Some scientists feel that the fourth recommendation made by the Fifth Congress of European Ichthyologists (increased research effort) should be strongly supported. However, very few resource managers and scientists in Africa and elsewhere have the expertise to assist the various Governments in this kind of project.

To my way of thinking, this is a waste of time, as no one solution is going to solve this problem. It would be far better to use the limited time left available to study the process of change within this Lake, as nothing can be done that would satisfy everyone, as these changes are basically irreversible. By studying these changes one can obtain a better understanding of the devastating effects that man can have on an environment as fragile as that of Lake Victoria.

Records should be kept in detail of the changes that are taking place almost daily, and of the specimens that are left within the Lake, plus, I believe that certain areas of this Lake should be set aside as "No Fishing" areas, or as reserves, to enable some of the endemic species to re-colonise these areas, and so eliminate one of the major reasons why various Haplochromine species have been lost, and that is over-fishing.

A limited captive program is already underway at the Horniman Museum (London) and the New England Aquarium (Boston), and provided that the species being bred are true in all respects, and no hybridization has occurred, and that specimens are culled for the very best quality, then I also believe that various numbers of these specimens, can be re-introduced into areas, where these may already be present in Lake Victoria, and then these areas where these re-introductions have occurred, should be classified as "No Fishing" or as a reserve, so that further studies can be done, to see how successful if any, these re-introductions have been.

To gather all of this information in detail, would not be an easy task, and would require a large-scale international effort from the scientific community, but, over time, it would be worth the effort, and may at some later stage prevent such an occurrence in other parts of Africa, e.g., Lakes Malawi and Tanganyika. Currently, the Governments of Malawi, Tanzania, and Zambia have policies in place that non-indigenous species should not be introduced into Lakes Malawi and Tanganyika, and these policies should be applauded.

The above comments add further to the Nile Perch controversy, and the potential threat of the Nile Perch or any other species for that matter, should never be underestimated, when considerations are given to introducing an alien species into a habitat where it is not endemic to. Currently, a number of these projects are being considered by scientists and biologists within the Australian Society of Fish Biologists, and caution should be of the utmost, before any decision is finally taken.

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