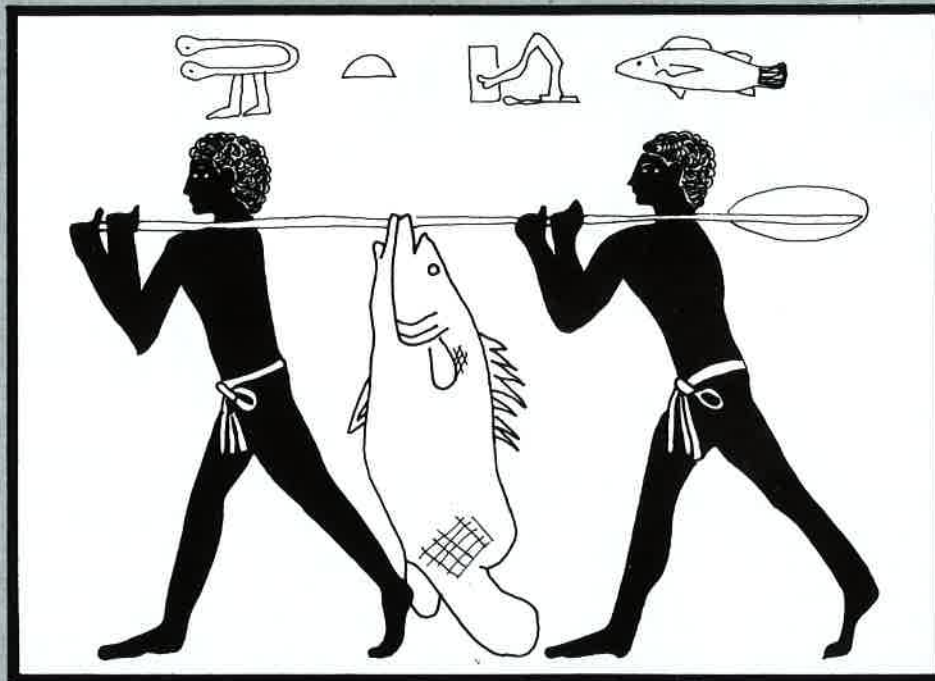


# The Controversy Over Nile Perch, *Lates niloticus*, in Lake Victoria, East Africa



Ancient Egyptian representation, from the grave of R'htp, Médûm (c. 2780 B.C.), of a Nile perch ("the fighter-fish") and two fishermen. Many mummified Nile perch have also been found, documenting the important role of this fish to ancient Africans.

## Introduction

Lake Victoria is the largest freshwater body in the tropics with a surface area of 68,680 km<sup>2</sup>, 1,300 km shoreline, a mean depth of 40 m and a maximum depth of 80 m. The lake straddles the equator between latitudes 0°30'N and 3°00'S and longitudes 31°40'E to 34°50'E. It lies mainly in Tanzania (51%) and Uganda (43%) but it also borders Kenya (6%). Lake Victoria fills a shallow depression in the center of a great plateau located between eastern and western rift valleys. There is evidence of the lake experiencing upwellings.

The Lake Victoria ichthyofauna was composed of tilapias, haplochromine cichlids, catfishes, lepidosirenids, cyprinids, characids, cyprinodontids, anabantids and mastacembelids.

In 1959 and from 1962, Nile perch were intentionally introduced into Lake Victoria amid controversy which has continued to the present. The 1950s also saw massive introductions of exotic tilapias (*Tilapia zillii*, *T. rendalli*, *Oreochromis niloticus* and *O. leucostictus*) into Lake Victoria and other lakes, dams, valley tanks and ponds in Uganda.

## T.O. ACERE

Uganda Fresh Water Fisheries  
Research Organization  
P.O. Box 343  
Jinja, Uganda

The objective of the introductions was to increase fish production for the increasing human population after the collapse of the fisheries for the endemic tilapias *O. esculentus* and *O. variabilis* and anadromous species, especially *Labeo victorinus*.

Nile perch is endemic in Lake Tchad (West Africa), Lakes Turkana (Kenya) and Albert (Uganda), and the River Nile starting from below the Murchison Falls (Uganda). In East Africa Nile perch occurs together with *O. niloticus* and other very abundant fish. Other species of *Lates* occur in Lake Tanganyika which is also very rich in fish species. *Lates* were also present in the Lake Victoria basin during the Miocene period (about 25 million years ago) and persisted until comparatively recent times in Lake Edward (Uganda). The genus failed to recolonize Lakes Edward and Victoria due to the barriers offered by the Semilike rapids and the Murchison Falls. The new stocking of Nile perch into Lake Victoria was a reintroduction.

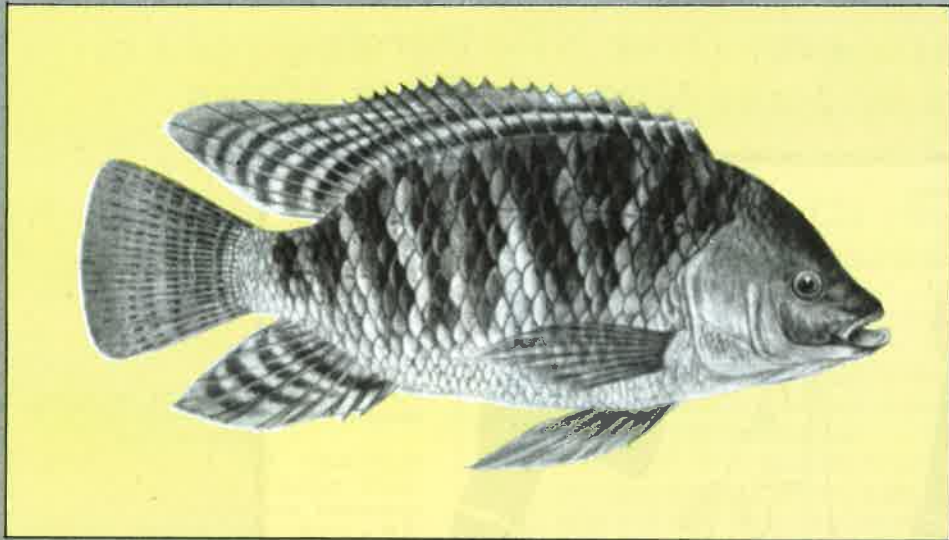
Nile perch is an opportunistic feeder and participates in almost all the trophic levels above the primary producers. It is not "voracious" as some eminent scientists have painted it in both the scientific and popular western media. Rather it eats as much as would be expected from a fish of its size and rather less than more active fishes, such as tuna.

The purpose of this discourse is to explain the events which took place concerning the fisheries of Lake Victoria before and after the stocking of Nile perch and *O. niloticus*. This, it is hoped, will enable the reader to understand and fully participate intellectually in the Nile perch controversy.

## Development of the Fisheries

Fishing has always been an important occupation of the people around Lake Victoria. Before the introduction of the cotton gill nets in 1905, hooks and lines, harpoons, lances, fences and basket traps were the main fishing gears used. The fishing pressure was determined by the subsistence needs of the people living around the shores. The main fish species





Nile tilapia, *Oreochromis niloticus*. Painting by Saleh.

caught included tilapias (*O. esculentus* and *O. variabilis*), mormyrids, catfish, anadromous cyprinids (*Labeo victorianus* and *Barbus* spp.) and lungfish.

The introduction of cotton gill nets in 1905 and flax gill nets during 1916 stimulated higher catch rates and created a fishery based primarily on *O. esculentus*. With the completion of the Mombasa-Kisumu railway in the early 1900s the demand for fish was very high, leading to an increased number of gill nets being used. This uncontrolled entry into the fisheries confined to the shallow inshore waters soon resulted in decline in catches per unit effort, particularly in the Kenya part of the lake. The average catch for the herbivorous *O. esculentus* per standard 45 m net per day was about 100 fish in 1905, 30 in 1921 and 7.8 in 1928. By the 1920s the existence of a problem was realized and Mr. Michael Graham of Lowestoft carried out a survey in 1927-1928 to establish the status of the fishery.

Consequently certain measures were instituted: (1) By 1933 the gill net had a mandatory stretched mesh size of no less than 127 mm to avoid catching immature *O. esculentus*. Beach seines were retained. (2) The collection of catch statistics was started. (3) In 1947 the Lake Victoria Fisheries Service was created, with authority for complete control of fishing power. The East African Fisheries Research Organization (EAFRO) was formed in the same year.

As fishing effort increased during the late 1940s, the catch per net further dropped and the average size of the marketable fish was significantly reduced. The absence of a big price differential between large and small fish encouraged the use of undersized gill nets to maximize the catch in numbers. However,

catches in smaller mesh gill nets did not stay high for long.

During the 1950s several other developments happened within the fishing industry and the fisheries of the lake. In 1952 terylene and nylon gill nets with a high initial cost but with higher catching efficiency and a longer working life than flax gill nets were introduced and outboard engines began to be used from 1953. Initial increases were short lived. The average catch per net fell from 2.7 to 1.6 fish in 1954. By 1957-1958 the catch rate of *O. esculentus* per net in Uganda (Jinja) of mesh sizes 81, 91, 96, 102, 112 and 123 mm was 6.4, 8.4, 5.5, 2.4, 1.7 and 0.7 fish, respectively.

The biological overfishing of the inshore fish stocks of Lake Victoria had the effect of forcing fishermen to extend their geographical range. Simple economic overfishing would have been followed by rapid recovery of the fishery as soon as the fishing pressure declined. These experiences show that biological overfishing is a real danger to fisheries based upon mouth-brooding tilapias and anadromous species.

Meanwhile, since enforcement of the 127 mm mesh size regulation was very difficult, the government of Uganda and Tanganyika (Tanzania) repealed the regulation in 1957 and Kenya followed in 1961.

By the time the catch per net with smaller meshes had declined to an uneconomic low level, the stocks of *O. esculentus*, *O. variabilis* and other endemic species had been seriously depleted. In Uganda, near Jinja, a slightly higher yield (above the then current annual catch of 272 t) would have been obtained with mixes of 114 mm nets (30%) and 127 mm nets (70%) for the

exploitation of *O. esculentus* and *O. variabilis*.

Despite the decline, an "expert" from an international organization, after a three-day visit in 1957, provided a grossly erroneous and misleading estimate of maximum sustainable yield of 1,800 t for the above stocks. This estimate was used to support expenditure of several thousands of pounds sterling on the Jinja market. This market was threatening to become a white elephant because of poor catches. The introduction of *O. niloticus* and *Lates niloticus* saved Jinja Fish Landing and others on the shores of Lake Victoria from becoming monuments of mismanagement.

### Management Predictions

The effect of the 1956-1957 change from 127 to 102 mm and smaller mesh nets was that all the noncichlid species, i.e., *Bagrus*, *Clarias*, *Barbus* and *Protopterus*, gave poorer yields. However, *O. variabilis* was lost to the fishery as it seldom grows to a size large enough to be captured in 127-mm mesh nets and the retention range for it is about a centimeter lower than for *O. esculentus*. In 1961 it was predicted that the catch of *O. variabilis* would not increase substantially and should have been an acceptable loss if the alternative with continued 114-mm net fishing was biologically overfishing *O. esculentus* and a catastrophic decline in catches.

It was suggested that if 114-mm mesh fishing continued, the fishing effort should be reduced to 0.75 nets per acre (0.4 ha) per month to preserve breeding stocks. The maximum yield without the possibility of biological overfishing required the reintroduction of 127-mm mesh nets and encouraging fishermen to fish more nets.

In the early 1960s, gill nets below 90-mm mesh came into use for the tilapias although some noncichlids had disappeared from the catches because of the previous use of small mesh gill nets and traps at the mouths of rivers. By the late 1960s, 38 to 46-mm mesh gill nets were being used to harvest smaller fish species such as the haplochromine cichlids and *Synodontis* which previously had been unexploited. The beach seines, which harvest haplochromines and large numbers of brooding and juvenile tilapias and juvenile Nile perch, have also been spreading around the lake since then. The



mosquito seine (13-mm mesh), which also captures juvenile haplochromines, has recently become popular in the more heavily exploited parts of Lake Victoria in Kenyan and Tanzanian waters. Between 1972 and 1973, *O. esculentus* began declining in Kenyan and Tanzanian waters of Lake Victoria, and there was a slow but equally consistent increase in large predators such as *Bagrus* and *Clarias*. This was long before the introduced Nile perch had established itself. By 1981 the haplochromines had disappeared from Kenyan waters, while *Clarias*, *Bagrus* and *Protopterus* were rare.

To compound further proliferation of gear types, cast nets below 76-mm mesh were introduced into the Lake around Jinja area in the early 1980s. The cast nets catch brooding populations of *O. niloticus* and juveniles of Nile perch and they also interfere with the breeding activities of these fish.

Trawl nets experimentally introduced in the late 1960s and commercially used since the 1970s have completely destroyed haplochromines in the Nyanza (Kenya) and Mwanza (Tanzania) waters.

Since 1952 medium gill nets (52-65 mm) have been used at river mouths and have removed ripe fish from the popula-

tion at the beginning of their spawning migration. This has resulted in great loss in the number of recruits to the population of the following year. There was, therefore, every danger of overfishing the Lake Victoria population of *Labeo victorianus* owing to its extreme vulnerability to exploitation during its concentration at river mouths immediately before spawning, and also large numbers of fry being taken in scoop traps. This extended to other anadromous species including *Schilbe mystus*, *O. variabilis*, *Alestes nurse*, *Synodontis* spp., *Clarias mossambicus*, *Bagrus docmac* and *Protopterus aethiopicus*.

Finally, even the presently booming fisheries of *Lates niloticus* and *Oreochromis niloticus* are doomed if the use of small mesh gears including trawling and beach seining continues unabated. At present the two species contribute 70-100% of the total tonnage landed in various areas of Lake Victoria (and in nearby Lake Kyoga their catch is almost 100%).

### The Controversy

Although overfishing is clearly the major cause for the decline of the

haplochromines of Lake Victoria, a number of eminent taxonomists and other naturalists have attributed this decline to the piscivorous habits of adult Nile perch.

The anti-Nile perch campaign is ill-conceived. In the 1960s there were sharply worded exchanges based on practical experiences from scientific observations on the part of the proponents (fisheries biologists) against purely academic speculations advanced by some eminent scientists. The anti-Nile perch group dismissed the results of the UNDP/EAFFRO stock assessment trawl survey of Lake Victoria, 1968-1971. The UNDP/EAFFRO trawl survey revealed the existence of about 600,000 t of ichthyobiomass, of which 80% was composed of haplochromines. These results were called as a waste of time and money. In the mid-1980s, the controversy erupted again.

However, the emergence of the fisheries composed of exotic *O. niloticus*, which grows to over 3 kg and Nile perch, which can grow to 200 cm is welcome to both urban and rural East Africans. Nile perch can be fried in its own content of fat, saving cooking oil which costs no less US\$2.00/l. Nile perch costs less than US\$1.00/kg on the shores of Lake Victoria, whereas beef, mutton, pork, chicken and poultry products cost US\$3-5.00/kg.

The haplochromines are small bony fishes which were unpopular with the consumers. They were being used for fish meal for poultry production and occasionally they were used medicinally against measles. One should acknowledge, though, that they are unique, endemic species and that they are threatened by overfishing, particularly with the introduction of commercial trawling in Kenyan and Tanzanian waters of the Lake. Even Ugandan areas, e.g., the Jinja area, which were intensively trawled, experienced severe declines of haplochromines.

Although the eminent scientists did not pinpoint directly the cause for the decline of the haplochromines, it is the concern of every scientist to see to it that no species are eliminated at all from the face of the earth. Fisheries scientists should be very much in the forefront to conserve aquatic resources for posterity.

\*This paper was written during a visit by Dr. Acere to ICLARM funded by the Commission of the European Community, as part of a cooperative research project between the Uganda Freshwater Fisheries Research Organization and ICLARM.

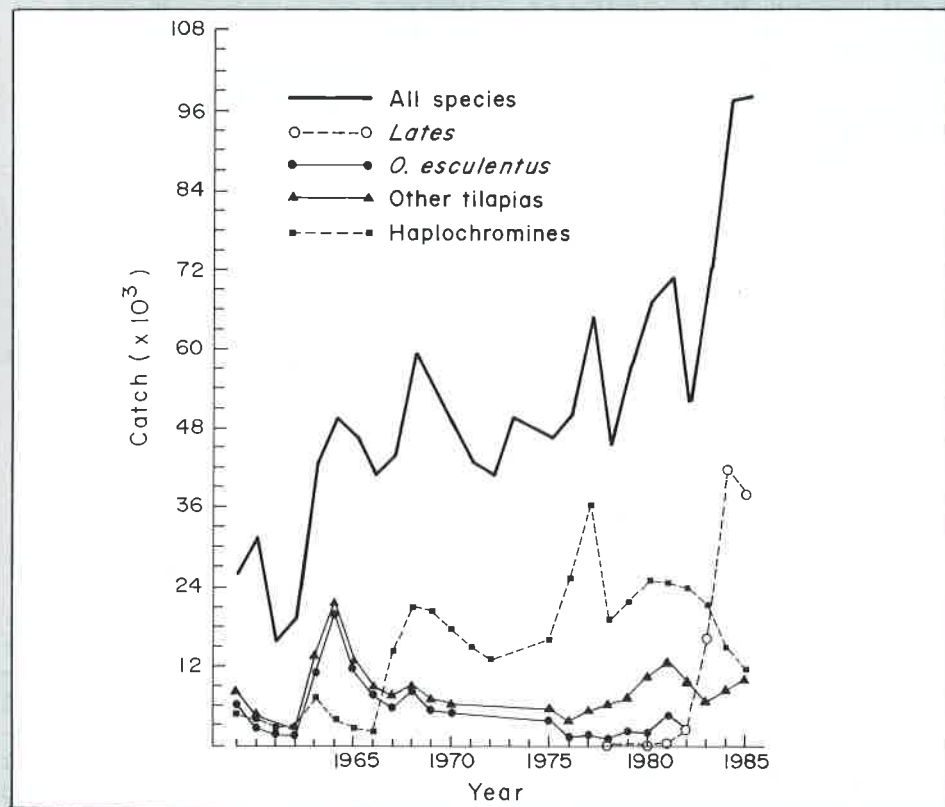


Fig. 1. Annual catches in Tanzanian waters of Lake Victoria, 1959-1985.