LAKE VICTORIA

Lake Victoria is Africa's largest lake (68,800 sq. kilometers; at an elevation of 1133 m asl), the largest tropical lake and the second largest freshwater body in the world after Lake Superior in North America. The lake receives most of its water (80%) from direct rainfall and from Rivers Katonga and Kagera to the west, several small rivers in Kenya (Sio, Nzoia, Yala, Nyando, Sondu Miriu, Mogusi and Migori) and thousands of small streams. The Victoria Nile is the sole outflow river leaving the lake at Jinja. The lake occupies a shallow depression in the east African plateau and has a maximum depth of 84 metres and mean depth of 40 metres with a catchment area covering 184,000 sq. kilometers and a shore line of 3,440 kilometres. The lake's area is shared between Kenya 6%, Uganda 45% and Tanzania 49%). The lake supports Africa's largest inland fishery. Due to its shallowness, limited inflow, large surface area compared to its volume the lake is vulnerable to effects of pollution and climate change.

The Lake Victoria basin is home for about 30 million people many of whom depend on the lake for livelihood, largely from fishing. Today the lake exhibits eutrophic (over-fertilisation) conditions and overfishing. Oxygen levels in the upper layer are higher than those of the late 1950s, with nearly continuous oxygen supersaturation (more than 8.0 mg/litre) in surface waters. However, oxygen concentrations in the lower layers are lower today and for longer time spells, with values of less than one mg/litre occurring in waters as shallow as 40 metres compared to the shallowest of greater than 50 metres in the 1960s. The low oxygen conditions in the lake result in changes in the distribution of aquatic life especially fish. It is thus common to find low or no fish catches in some traditional fishing grounds at certain time of the year. This causes a hike in the costs of the fishing operations as the fishers require more money and time to find fish which in turn affects the market price of the fish. The changes in oxygen levels are largely a result of uncontrolled human activities in the lake basin including rampant organic burning, increased nutrient inflows from various point and non-point sources and increase pollution associated with urbanization, industrialization, commercial farming and human settlements along the lake's shores. Eutrophication of the lake may to some degree be related to the mass decline of the Haplochromine (Nkejje/Furu) species flock which used to play an important role in returning detritus and plankton back into solution. With some 80% of the Haplochromine species (feeding off detritus and also equally feeding off one another, they represented a tight internal recycling system, moving nutrients and biomass both vertically and horizontally through the water column and even out of the lake via predation by humans and terrestrial animals.



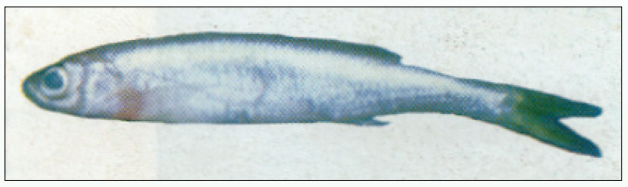
Haplochromine

The removal of Haplochromines is believed to have contributed to the increasing frequency of algal blooms (green algal scums) which has been associated with periodic fish kills. The eutrophication of the lake has gone hand in hand with pollution (water contamination) from a range of sources of which the most important are factories, urban centres and commercial farmlands around the lake. Bays close to large urban centres such as the Murchison bay near Kampala, Kisumu in Kenya and Mwanza in Tanzania are highly polluted with drastically reduced aquatic biodiversity and inherently low fisheries productivity.

Before introduction of the Nile perch during the late 1950s, the lake supported a multi- species fishery comprising cichlid fishes namely native tilapines and haplochromines of which the later had close to 600 species and catfishes, mormyrids etc occupying a wide range of ecological niches. Many of these were drastically reduced to very low stock levels due to the impacts of the ecologically dominant Nile perch while others especially the haplochromines were considered extinct

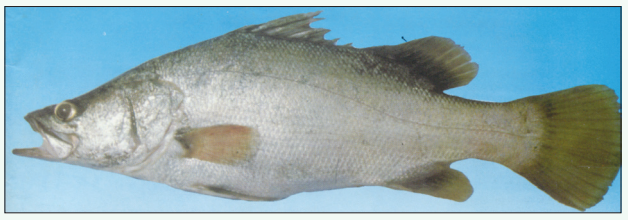


Nile tilapia



Mukene

The few native species that survived the perch remained restricted to highly structured habitats in the lake such as rocky outcrops and shorelines and areas with lush wetland growth as well as satellite lakes in the Lake Victoria basin. By the mid-1980s, the lake's fishery had been reduced to three species, namely the introduced Nile perch and Nile tilapia and the pelagic cyprinid, Rastrineobola argentea (Mukene/Omena/Dagaa). The Nile perch increased tremendously to become the leading export species by the mid-1990s fetching 144 million US dollars for Uganda. By 2008, the Nile perch lakewide yield was standing at 300,000 tones per annum.



Nile perch (Mputa)



A lone mature Nile perch dominated by many immature fish has become a common sight

The perch was then co-dominant with Mukene. Mukene catches showed significant increases between 2006 (95, 734 tones, corresponding to a beach value of 18,668 million shillings) and 2007 (113,791 tones with a beach value of 19,175 million shillings) thus becoming the leading harvested species in the Uganda part of the lake. The latter has in the last two decades supported a significant regional market in neighboring countries of DR Congo, Southern Sudan, Rwanda and Burundi. Proliferation of fish processing factories along the lake shore line encouraged much increased harvest of the perch using all sorts of fishing gears and by the mid- 2000s, the perch dominance in the fish catches had stared showing signs of waning. This downward trend of the Nile perch has, on the other hand appeared to release and enhance growth of some of the remnant populations of other fishes especially some insect and zooplankton-eating haplochromines which have continued to increasingly appear in fish catches. Over the past five years there has been a general decline of the fisheries catches of Lake Victoria with corresponding decline in the benefits for the fisher communities and the riparian countries. For example estimated total catch of the Nile perch in 2006 was 91,000 tones with a beach value of 175, 0000 million shillings and just one year later in 2007 had dropped to 86,000 tones with the beach value reduced to 147 million shillings. Nile tilapia has exhibited similar catch trends over the same period. Declining fish catches have resulted from over-fishing and the rampant catch of immature fish especially the Nile perch. About 40% of fish received in fish processing factories were immature, but self policing is reducing further damage. These points to considerable inefficiency in enforcement of regulatory measures especially with regard to the recommended gillnet slots, hook sizes besides sustained commercial fishing operations in near-shore areas that act as nursery and breeding grounds for fish.

A number of research projects on the fisheries and environment of the lake have generated the much needed data and information to guide management of the important fisheries resources on the lake.



NaFIRRI laboratory complex at Jinja

Three major regional projects that have contributed to the information generation are the Lake Victoria Regional Fisheries Project (LVFRP), the Implementation of the Fisheries Management Plan (IFMP) and the Lake Victoria Environment Management Project (LVEMP). The need for coordinated management of the lake's resources were boosted by the establishment of the regional body, the Lake Victoria Fisheries Organisation (LVFO), an apex organization of the East African Community formed through a convention signed in 1994. LVFO has since worked closely with the research and management institutions in the East African partner states to ensure proper management of the lakes resources through providing a forum for regional decision-making over the use of a shared resource with national actions for their implementation.



The Headquarters of the Lake Victoria Fisheries Organisation (LVFO) at Jinja

The future of Lake Victoria ecosystem and its fisheries with depend on the continued collaboration of the three partner states (Uganda, Kenya and Tanzania) that share its resources. There is need for intensified enforcement of the various fisheries laws and regulations to curtail not only the current downward trend of the fisheries but also ensure sustainable exploitation of the fisheries for generations to come. There is yet another threat of water environment deterioration in form of pollution, which currently threatens mostly shallow bays and near-shore areas in the vicinity large urban centres, industries and commercial farmlands. With the growing industrailisation, urbanization and increased human settlements in the basin area, this threat is bound to grow and continue to impose its negative impacts on the lake resources. There is thus need for all players and partners to regularly get together and chart the best way forward to preserve Lake Victoria through coordinated actions.



RV Hammerkop, a vital tool for lake-wide fisheries research