

Angling: An Emerging Fishery in Lake Naivasha?

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Introduction

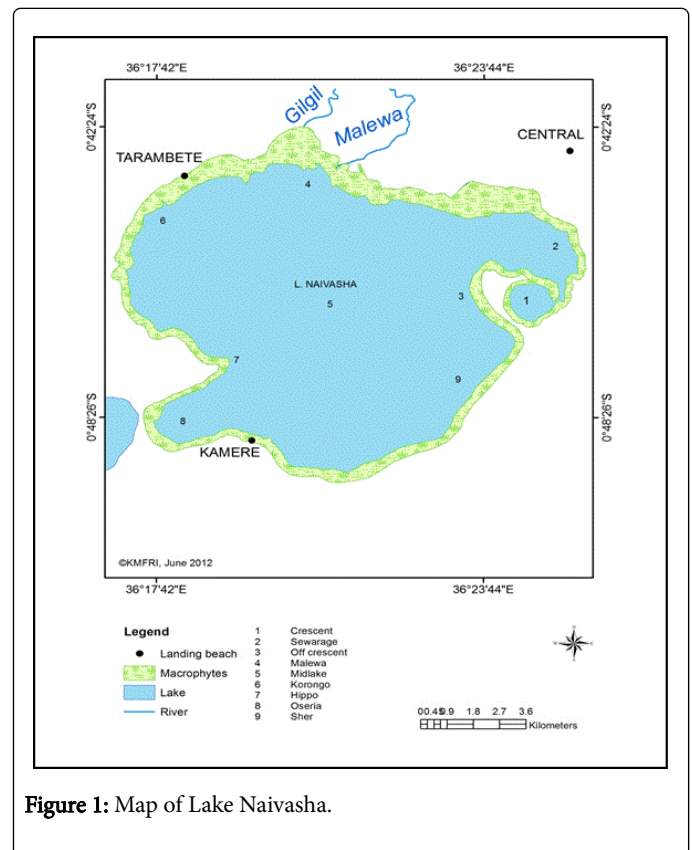
Lake Naivasha is an endorheic lake lying in the eastern part of Kenyan Rift Valley. The Lake is found south of the equator (0°45'S, 36°20'E) at an altitude of about 1890 m above sea level and about 80 km north west of Nairobi, Kenya's capital city [1]. The lake is shallow with a mean depth of 3.4 m, deepening towards its south-western part to a maximum of 8 m in depth, though the deepest part of the lake is at 16 m off Crescent Island [1,2]. The areas surrounding the lake are semi-arid with the average annual rainfall of 1350 mm in the mountains to 600 mm on the shores of the lake. The rainy season is divided into the long rains from April to May and short rains from October to November [3]. The average temperature is 25°C with minimal annual variability and the lowest yearly temperatures are recorded in May-August [4]. The Lake covers a surface area varying between 120 km² and 150 km² depending on the dry and wet spells respectively [2].

Lake Naivasha is the only freshwater Lake along the chain of East African Rift Valley saline lakes. The freshness of the lake is attributed to inflow from rivers Malewa, Gilgil, and Karati and underground outflow through seepage [5,6]. The Lake Naivasha catchment is approximately 3400 km² and contains a large amount of small-scale agriculture. River Malewa with a catchment of approximately 1730 km² is the largest and provides about 80% of the Lake's inflow, while River Gilgil drains an area of about 500 km² and contributes about 20% of the lake's inflow (Figure 1) [7].

Threats of the lake revolve around unsustainable resource exploitation both within the lake and its catchments [8]. These include exotic species' introductions and accidental arrivals, pollution from agricultural activities, sewage waste, siltation, habitat degradation, illegal fishing, climatic change, fluctuations in Lake Level and water abstraction. The lake became a Ramsar site in April 1995 [9], but this does not seem to have slowed down pressures on the lake's ecosystem and the fishery [10]. This paper looks at angling as an emerging fishery in Lake Naivasha, its challenges and suggests management strategies that may enhance sustainable exploitation of these resources. The study used a combination of literature review, interviews with the locals and personal observations by the Kenya Marine and Fisheries Research Institute and Fisheries Department.

Illegal Fishing on Lake Naivasha

Currently we have observed there are various techniques of illegal fishing being practiced on Lake Naivasha. For example fishers using passive gillnets as active gears (used as seines), seine nets and monofilament nets by both legal and illegal fishers. There is also use of



gillnets of 3.5" and below to target the smaller sized *Oreochromis niloticus*, *Oreochromis leucosticus* and *Tilapia zillii*. This has rendered common carp as a by-catch of the tilapia fishery and capture of immature fish. Experimental gill netting studies shows that gears below 4" mainly capture fish below size at first maturity. The fishers usually use illegal nets/mesh size to fish in shallow, protected areas which act as breeding and nursery grounds for most fishes. We also observed fishers targeting the bigger brooder specimen of the *Cyprinus carpio* using gillnets of 8" to 10". The use of undersize nets that catch juvenile fishes and large sized nets increases fishing effort than may be permitted and seining by illegal fishers has the potential to affect the performance and sustainability of the fishery (Figure 2) [11,12].



Figure 2: Active fishing using illegal gears on fish breeding areas.

Illegal Angling has also been observed to be an emerging fishery in Lake Naivasha being practiced by both legal and illegal fishers. It is a selective fishing method in nature targeting a particular species and had been previously introduced in Lake Naivasha strictly for sport fishing with black bass or *Micropterus salmoides* being the target species. However with the dwindling catches of the common carp which since 2002 constituted up to 95% of the total annual fish landed from Lake Naivasha, the fishers have resulted to engaging in intensive fishing using the hook and line. The fishing lines are tied on to the papyrus vegetation along the lake shore or on the boats. (Figure 2). Illegal fishers practicing this fishery use *ugali* or boiled maize as bait for the carp species (Figures 3 and 4).



Figure 3: Carp is the target species of angling.



Figure 4: An illegal fisher displaying a fishing hook baited with *ugali*.

The legal fishers set gillnets overnight and lift them at dusk and then proceed to sell them to the traders/middlemen at the fish landing beaches. By 8.00 am they return to the lake to start fish angling. It has been observed that fishers using this technique can harvest approximately 15 Kg or (20 pieces) of fish within three hours which is three times more than what they harvest from gillnetting (Figure 5). It was also observed that the fishers use hooks of different sizes ranging between 8 and 12 inches targeting mainly brooders.



Figure 5: Total harvest from three hours of angling near Kamere beach.

Angling in Lake Naivasha has attracted many people due to its high yields and low investment level; it's predominantly being carried out by male youths who are school dropouts, former workers of the collapsed floriculture and horticulture farms and individuals who are looking for a source of livelihood.

Boat crew members have also abandoned their regular fishing activities to participate in this illegal activity due to its quick and high returns. This has led to huge losses for boat owners who now lack boat crews to harvest for them fish from the lake [13-15].

From an environmental perspective, illegal angling has totally changed the landscape of Lake Naivasha due to the large deposits of plastic waste that are strewn all over the riparian zones and particularly in areas with papyrus fringes and macrophyte population which act as refugee for fish and other water birds have been degraded and in some cases completely destroyed as a result of their fishing activity (Figure 6).



Figure 6: Environmental degradation along the papyrus fringes.

This therefore raises a big environmental concern on the impact of this fishery on the sustainability of the fish populations, the impact on the ecological integrity of the lake and the social economic impact.

Further, the two fold increase of illegal fishers, fishing using hook and line pose a serious problem to the Lake's fishery negating the efforts by the State Department of Fisheries of controlling the fishing effort. This is mainly because illegal angling is mostly done in far off areas where enforcement of the fisheries regulations is difficult and without licenses.

Recommendations

Illegal fishing is mostly undertaken in far off 'hidden' areas where enforcement of the fisheries regulations is almost impossible or difficult. Fisheries Managers need to devise an effective Monitoring Control and Surveillance Program to stem this menace which is increasing fishing pressure.

The government through the ministry of fisheries, agriculture and livestock development should strive to sensitize and educate the fishing communities on the dangers associated with illegal fishing and in particular destruction of the fish refuge which are critical for feeding and breeding. They should also address issues concerning waste management and pollution of the ecosystem.

Conclusion

Angling should be undertaken in an environment that aims to promote collection of good catch statistics and encourages clean and safe management practices to avoid polluting the lake with plastics. Increased and uncontrolled fishing pressure has been heavily blamed for the decline of Lake Naivasha fisheries. Such vital information as good fish catch statistics, biological parameters, and indices of the distribution and abundances of commercial fish species, which are needed for defining management policies, should be sought regularly.

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