

Project Proposal

Title: The potential to develop aquaculture in and around Lake Naivasha in Kenya

By: Cyrus Mageria

Background

Capture fisheries are a major economic activity of some 200 million people, which provides an important protein source to more than 1 billion people globally (UN, 2005). While the human population increases rapidly, global annual per capita consumption of fish is expected to amplify from the current rate 16 kg to 21 kg in 2030 (FAO 2004; UN, 2005). The world's fishing areas have almost reached their limit of fish production relative to the current demand (FAO, 2004). Aquaculture has great potential of meeting this increased demand. It has been projected that aquaculture production can increase fish production by 50 million metric tons by 2050 (Tacon and Forster, 2001). The aquaculture sector is currently the fastest growing segment of food production in the world. Statistical evidence indicate that in 2002, aquaculture contributed approximately 30% of fish production worldwide (FAO, 2004). This industry can therefore contribute to food security in the developing world, especially the malnourished populations in eastern Africa.

The demand for fish in eastern Africa, especially in Kenya has increased while production has declined (Fisheries department Annual Report, 2004). Part of the problem is attributed to declines in subsistence fisheries yield. Among the major fish production source in Kenya are marine and inland capture fisheries (L. Victoria, Naivasha etc). Lake Naivasha is centrally located to serve the demand for fish in the neighbouring urban centres and horticultural estates, whose population recognise importance of including fish protein. Lake Naivasha is a shallow freshwater lake of approximately 160 km². Its fish production has declined tremendously almost 15 fold from 1150 metric tonnes in 1970 to only 66 metric tonne being harvested now (Hickley et al., 2004). The decline is attributed to habitat destruction due to papyrus cover damage, decline in water level and over predation of macrophytes by introduced crayfish (Hickley et al., 2002). Originally the lake contained only one endemic species *Aplocheilichthys antinorii*; however, from 1925 other species were introduced into the lake with mixed success (Muchiri and Hickley 1994). Currently, only five species are present in the lake: *Oreochromis leucostictus*, *Tilapia zillii*, *Macropterus salmoides* (black bass), *Barbus amphigramma* and *Poecilia reticulata* (guppy).

Aquaculture can therefore be an important alternative in improving fish production and minimizing habitat degradation. A number of propositions have been given by various

stakeholders around the lake include: restocking and enhancement of the lake with existing species or new varieties, installations of enclosures and cage cultures, and land based aquaculture. Contrary, restocking and enhancement of the lake with existing species or new varieties requires a thorough ecological assessment and careful consideration. On the other hand, cage cultures are not viewed as a good option due to the shallowness of the lake and the technological requirements. Therefore, a preliminary evaluation of these options based on literature and expert opinion shows that land based aquaculture may have the highest potential.

The current project is a joint initiative of Nutreco, Prof. Owiti (director of the training college of the Kenyan Wildlife Service at Naivasha) who is also linked to WWF, and Wageningen University. The study aims at elucidating the potential of developing aquaculture around L. Naivasha. The task envisages possibilities of aquaculture development for reducing pressure on the natural resources. The study also seeks provision of alternate sources of livelihood and food supply. The research will involve surveys on resources and communities of L. Naivasha.

Objectives

The objective for this study will be to assess the resource availability and the capabilities and entrepreneurship for aquaculture development around the Lake Naivasha. It will also assess the social parameters of having aquaculture developed around the Lake.

The project will assess the possibilities, capabilities, entrepreneurship and potentials for aquaculture development around the Lake. Aquaculture development will be assessed with following aims in mind (i) possibilities of starting a land base culture by assessing the potential of the area around the lake and potential fish farmers (ii) possibilities of starting lake based aquaculture (iii) possibilities for lake stock enhancement and restocking using farmed fish fingerlings. The need for rehabilitation of a hatchery will be reviewed in the light of the outcome of this assessment.

Questions

1. Is our preliminary assessment on the various possibilities of aquaculture development correct?
2. What is the feasibility of having local farmers or fishermen moving into land based aquaculture?
 - a. what are the capacities and outlooks of local people (farmers, fishers, flower growers) to develop aquaculture (training needs, type of support?)
 - b. which species? Local/market preferences? Potential?
 - c. what is the availability of land/soil quality/easiness of digging ponds
 - d. what is the availability of markets and threshold for market prices?
3. What is the potential to rehabilitate the existing hatchery?

Description

The evaluation will be based on (1) a literature survey focussing on a description of the ecological developments in the lake and the surroundings and (2) an assessment of the potential for aquaculture based on interviews with a broad range of stakeholders. The present proposal for Aquaculture without Frontiers is directed to the funding of a number of activities under point 2 (interviews with stakeholders). NUTRECO will sponsor other activities including travel and stay.

Six weeks of field research will involve mainly an assessment of the availability of capacity, outlook and entrepreneurship of local people to develop aquaculture, with a focus on land-based aquaculture and associated knowledge gaps. This will be done through semi-structured discussions with a range of stakeholders around the lake: these are local fishermen organised in the Lake Naivasha Riparian Association; local entrepreneurs organised in the Lake Naivasha Growers Group; local farmers and fishermen; the Kenya Wildlife Services (training college at Naivasha); Kenya Marine & Fisheries Research Institute etc.

The discussions will include (i) an assessment of species preferences (marketability) and their potentiality for being cultured and reared in captivity, as well as their acceptability by the intended farmers and consumers (ii) Assessing local support for the project and their attitude towards starting and adopting such kind of a project. (iii) Assessing availability of land/soil quality/easiness of digging ponds and availability of markets and threshold for market prices. For background information on the ecology of the lake and catchments area will be sought from a.o. Dr. David Harper Department of Biology, University of Leicester; information on with fisheries and restocking will be sought from Rob Britton (robert.britton@environment-agency.gov.uk) who contact of people doing fisheries related work in this Lake. The total duration of the project is three months.

Budget (all items in Euro)

Budget items 1, 2 and 3 (+10% contingencies) are requested as subsidy from AwF (€1900)
Budget items 4 and 5 are requested from Nutreco (€2370)

Activity	Requirement	Unit cost (€)	Total Cost (€)
1 Focus group Discussion	-transport		
a) Fishermen from 3 (10 per) landing site total of 30 fishermen will be involved	-snacks and drinks	@ 15€ per participant	450
	-stationary assorted	@15€ per participant	150
b) Fish traders at Naivasha municipal market	“	“	“
	“	@15€ per	225

(≈ 10 traders) c) Stake holders -LNRA -Flower farms Local municipal etc (About 15)		participant	
2 Meeting and consultations • Fisheries department & Kenya Fisheries research Institute Naivasha • Other research organisation • Universities (Moi and Nairobi) • National environmental management authority	Snacks and Drinks and occasionally Lunch Transport to Eldoret		130 50
3 Travelling and Accommodation a) Transport and communication • Hiring of motor bike for 4 weeks (15 days) • Boat hiring for 1 days	Hiring cost Fuel Hiring cost Fuel coxswain	@ 45€per day All included @ 50 € per day	675 50
4. Literture survey and reporting costs			100
5 Accomodation and travel 42 days			2000
Contingencies 10% (1-3)			170
Grand Total			4000
Nutreco			2100
AwF			1900

Explanation notes for the budget

1. Stakeholders meeting will be held in various places as it's difficult and even more expensive to meet in on place. The purpose will be to (i) get their views on aquaculture potential (ii) potential for integrating aquaculture with their various activities.
2. Fishermen will also be targeted for meeting and discussion to get insight knowledge of the fishery status problems and the future and their own opinion on starting up an aquaculture based fish production. Since they don't have permanent places, the only way to get a group together is moving to various landing site and organise a meeting there. With snacks and drinks as incentives to compensate for their time.

3. Money will also be required to facilitate meeting with the fish traders and consumers in order to assess the species preference and the market demand for farmed fish and various species possible for culturing. This will involve gathering these people whenever an opportunity arises.
4. To obtain insight in the technical aspect of species requirements and possibly for hatchery as well as stock enhancement in the lake will involve visits to various researchers.
5. Information concerning the species whether they can be reproduced , reared under captivity , water hydrology, soil chemistry and breeding techniques in a hatchery will be sourced from the department of aquaculture and fisheries of Moi University; the Kenya Marine and Fisheries Research Institute as well as Fisheries department with Ministry and other conservation bodies.
6. Transport will be sourced privately. A motorbike is the most convenient mode of travel because of the road conditions and fuel consumption. Moving to some island in the Lake will require hiring of a boat.

References

FAO, 2004. The State of World fisheries and Aquaculture (SOFIA). FAO Corporate Document Repository. www.fao.org

Hickley, P., Bailey, R., Kundu, R., Muchiri, M., North, R. and Tylor, A. (2002). The status and future of the Lake Naivasha fishery, Kenya. *Hydrobiologia* 488: 181-190.

Hickley et al., (2004). Habitat degradation and subsequent fishery collapse in Lakes Naivasha and Baringo, Kenya. *Ecohydrology & Hydrobiology* Vol.4 No. 4, 503-517.

Muchiri, S. M., P. Hickley, D. M. Harper & E. North, 1994. The potential for enhancing the fishery of Lake Naivasha, Kenya. In Cowx, I. G. (ed.), *Rehabilitation of Freshwater Fisheries*. Oxford: Fishing News Books, Blackwell Scientific Publications: 348–357.

Tacon and Forster, 2001. Global Trends and Challenges to Aquaculture and Aquafeed Development in the New Millenium. *International Aqua Feed Directory and Buyers Guide*. Turret RAI PLC, Uxbridge, pp 4-24.

United Nations, 2005. World population prospects: the 2004 revision. *Population Newsletter* 79, 1- 5.