African Journal of Tropical Hydrobiology and Fisheries **12**: 67-73 (2009)

Management of Fishing Capacity in the Nile Perch Fishery of Lake Victoria*

JOYCE IKWAPUT-NYEKO[1*], CAROL T. KIREMA-MUKASA[2], TIMOTHY ODENDE[3] AND ANGELOUS T. MAHATANE[4]

[1]*Department of Fisheries Resources, P.O. Box 4 Entebbe, Uganda*
[2]*Lake Victoria Fisheries Organisation, P.O. Box 1625, Jinja, Uganda*
[3]*Ministry of Fisheries Development, P.O. Box 142, Busia, Kenya*
[4]*Fisheries Division P.O. Box 226, Mwanza, Tanzania*
*Corresponding author: joyikwaput@hotmail.com

Abstract

The International Plan of Action for Management of Fishing Capacity encourages countries to develop regional and/or national plans of action for management of fishing capacity. The Lake Victoria Fisheries Organization (LVFO) working together with FAO have come up with the Regional Plan of Action for Managing fishing capacity (RPOA-Capacity) on Lake Victoria. This paper illustrates the problem of fishing capacity on Lake Victoria and the need for managing the fishing capacity. In managing capacity there is a need to understand the current fishing effort and fish stocks and their interactions. Optimal levels of effort in terms of fishing boats, fishing gear, manpower and time are all needed for effective setting of management measures. A bio-economic model is required to guide management decision on managing fishing capacity. There is an urgent need to collect more reliable disaggregated data on effort targeting different species for effective management of the lake fisheries.

Key words: Lake Victoria, fishing capacity, legislation, stakeholder views, action plan.

Introduction

The National Development Objectives of the three Partner States around Lake Victoria (Kenya, Tanzania and Uganda) are poverty reduction, resource sustainability, and environmental health. These objectives are important in relation to the lake because it is an important economic and social asset and large numbers of people depend on it for their livelihoods. The lake has experienced a number of environmental changes over the last three decades which initially led to great increase in fishery production (Reynolds *et al*., 1995) but the continuing expansion of the fisheries is now reducing the stocks of some species. A number of challenges will have to be met if the fisheries are to be managed effectively among them: environmental degradation and a loss of fish habitat, excessive fishing effort, outdated laws and regulations, and weak management and extension services.

In 1994, the three Partner States established the Lake Victoria Fisheries Organization (LVFO) to jointly manage the fisheries of Lake Victoria. One of its tasks was to harmonise management measures on the lake and many regional activities have been carried out to meet this objective. These include a Strategic Vision and a Fisheries Management Plan that will implement the International Code of Conduct for Responsible Fisheries (CCRF). The overall objective of the CCRF is sustainable fisheries and each country is required, amongst other things, to ensure that fishing effort is commensurate with sustainable use of fishery resources. In Lake Victoria, the Nile perch fishery is now a cause for concern because catches have declined in recent years and there have been calls for urgent action to reverse the trend. In March 2007 the LVFO Council of Ministers approved a Regional Plan of Action for Management of Fishing Capacity on Lake Victoria (RPOA-Capacity) that had been developed to manage fishing effort as part of the overall fisheries management strategy (LVFO, 2007). The objective of the RPOA-Capacity is to manage fishing capacity on the Lake, in cooperation with fishing communities and the local authorities. The intention is to give Beach Management Units (BMUs), as well as other stakeholders, the power to exercise their full rights and responsibilities as part of the co-management system established around the lake. The RPOA-Capacity document has now been published, along with popular versions in English, Kiswahili, Dholuo and Luganda, enabling information about the plan to be disseminated to stakeholders. The rules and regulations governing fisheries have been reviewed and now include legal provision for implementing the RPOA-Capacity and both national and regional consultations have been held to agree on the process of implementing it. Steps have also been taken to develop an RPOA-Capacity monitoring

***Paper presented to the Lake Victoria Stakeholder's Conference, Kampala, 27-30 October 2008**

programme and to strengthen the capacity of BMUs and other stakeholders to participate in this programme.

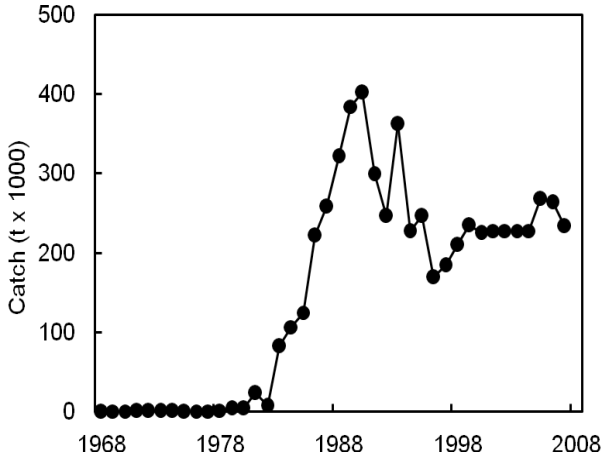

Figure 1. Estimated annual catch of Nile perch from Lake Victoria (LVFO, 2008a).

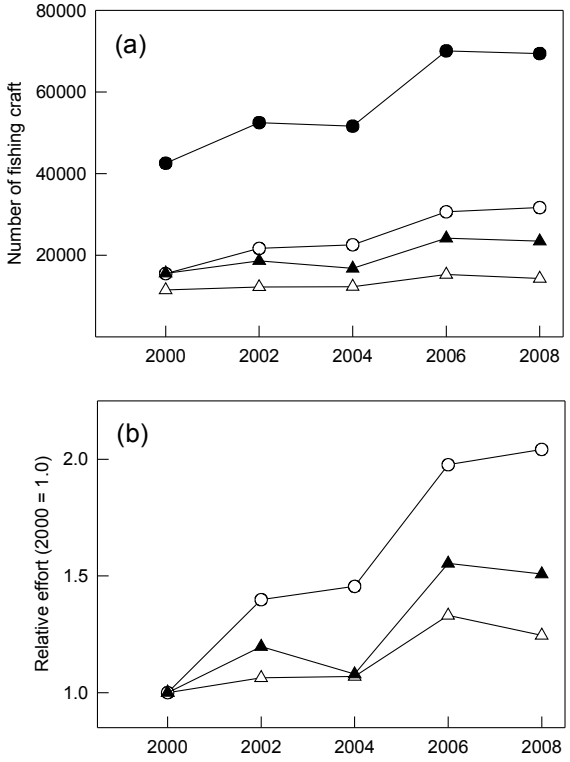

Figure 2. Distribution of fishing crafts in Lake Victoria between 2000 and 2006: (a) total numbers and (b) relative numbers with the 2000 estimate being the baseline (equal to 1.0). ● = total, ○ = Tanzania, ▲ = Uganda, △ = Kenya. From LVFO (2008a).

The current status of fishing effort and fish catches

From the time of its introduction in the 1960s until about 1980 Nile perch were of little economic importance but the population explosion that occurred from 1980 onwards led to a huge increase in fishery yields, which peaked at about 400,000 t in 1990. Catches declined after that but now appear to have stabilised around 25,000 t per annum (Figure 1). The bi-annual lake-wide frame surveys that have been carried out since 2000 provided data on trends in fishing effort which has increased since 2000 but by varying degrees in each country (Figure 2).

What is RPOA-Capacity?

The RPOA-Capacity sets out the principles, goals, interventions and specific actions that need to be taken to manage fishing effort, such as the number of fishers who can fish on the lake, the number and type of fishing crafts and fishing gears. These activities will be based on the principles of participation, phased implementation, holistic approach, conservation, new technologies, mobility and transparency in accordance with the CCRF. The RPOA-Capacity will be implemented by the Partner States directly through the LVFO institutions at grassroots level (BMUs) as well as local, national and regional government levels, and in collaboration with other stakeholders.

The Partner States are currently implementing a number of agreed measures for the management of fishing capacity. They include:

(a) Implementing the decisions of the LVFO Council of Ministers, which control access to the fishery through registration and licensing of fishing crafts and fishers; control the size of Nile perch harvested by setting a slot size of 50 – 85cm and Nile Tilapia by not allowing fish < 25cm to be caught and setting a minimum gillnet mesh size of 127 mm (5”);

(b) Implementing the Regional Plan of Action for Illegal, Unlicensed and Undocumented fishing (RPOA-IUU) through monitoring, control and surveillance measures;

(c) Promoting co-management of the fisheries through the formation of Beach Management Units (BMUs) and the involvement of other stakeholders;

(d) Assessing and monitoring the fish stocks through acoustic, trawl, gillnet and other surveys;

(e) Assessing the state of the fishery and the level of fishing effort through frame surveys;

(f) Monitoring commercial fisheries through catch assessment surveys;

(g) Considering suitable mesh sizes and fishing grounds for dagaa;

(h) Prohibiting the use of destructive fishing gears and methods such as monofilament gillnets, beach seines, trawl nets, cast nets, beating the water, and poisons;

(i) Implementation of a closed season for dagaa in the Kenyan part of Lake Victoria; and

(j) Setting up closed areas and seasons to protect breeding and nursery grounds, pathways for migratory fishes, and biodiversity.

The numbers of fishers, fishing crafts and fishing gears have increased although the rate of increase has slowed down over the last few years (Table 1), suggesting that these actions may be having some impact (Table 1). The rapid increase in illegal monofilament nets is a cause for concern although the data may represent more effective enumeration of this gear and the increase may

not be as great as it seems. The optimal numbers of fishers, fishing crafts and fishing gears still need to be determined, agreed and managed.

Table 1. The rate of change in some components of the Lake Victoria fishery. From data in LVFO (2008a).

	Annual rate of increase (%)	
	2000-06	2006-08
Fishers	8.7	0.7
Boats	10.8	-0.5
Illegal gill nets (< 5")	15.0	-1.6
Legal gill nets (≥ 5")	14.6	-10.0
Long line hooks	26.4	12.3
Monofilament nets	No data	390.0

Stakeholder Consultations

The control of fishing effort in Lake Victoria has been proposed as a management tool to address the issue of overcapacity. The exact nature of such a control can only be determined once there is enough scientific information and after wide consultation with stakeholders. A considerable amount of data on the dynamics of fish stocks in Lake Victoria, their biology, ecology and exploitation patterns already exists and it is supported by information on landings and catches based on Catch Assessment Survey (CAS) and on effort based on Frame Survey (FS). This has made it possible to make a preliminary fishery-specific management plans for Nile perch (Kayanda *et al*., 2009) with other species to follow. As part of implementation of the RPOA-Capacity, stakeholder consultations were undertaken to determine their views on how to tackle the issue of fishing effort. Consultations were undertaken at two levels, the first was an exploratory study aimed at stakeholders directly concerned with fishing. Various open-ended, structured and semi-structured questionnaires were designed and administered to a cross section of stakeholders in February 2008 to solicit their views and suggestions on what should be done. The second was through national and regional consultation stakeholders' workshops to build on the findings of the first study to consolidate and harmonise proposed measures and to agree on a monitoring mechanism to manage fishing capacity. The views of various stakeholders are presented in the following sections.

Field Consultations

During these consultations a few selected respondents from each identified stakeholder group were interviewed to get information on possible measures to manage fishing capacity. The sample size was agreed upon by the Regional Task Force (RTF) which prepared questionnaires for each stakeholder group. These groups included: (a) BMU committee and assembly members; (b) Local authorities (district and sub-county); (c) NGOs/CBOs representing fisher's associations and those supporting the fisher communities; (d) the industrial fish processors, their agents, managers and owners, and (e) fish traders in local and regional markets. The consultations were carried out in Busia, Bugiri, Mukono, Mpigi, Kalangala and Rakai districts in Uganda, Bondo, Homa Bay, Migori, Rachunyo and Suba districts in Kenya, and Tarime, Musoma, Ukerewe, Sengerema, Muleba, and Buloba districts in Tanzania. Three landing sites were surveyed in each district and 10 BMU respondents were targeted at each landing site.

Views from BMU's

In the opinion of most BMU members the stocks of Nile perch, tilapia and dagaa are declining across the lake although there were some who felt that dagaa and tilapia catches were increasing (Table 2). The decline in stocks was attributed to various factors such as increased illegal fishing activities, an excessive number of fishing boats and gears, environment degradation (including encroachments on wetlands) and climatic change (Table 2). Other views on status of fishing effort, reasons for illegalities, and measures for controlling undersized fish and priority alternative livelihoods are given in Table 3.

Table 2. The views of BMU respondents on the status of the fish stocks in Lake Victoria. Values are the proportion (%) of respondents holding a particular view.

Status	Nile perch	Tilapia	Dagaa
The same	1.3	3.3	19.5
Decreasing	93.5	88.7	43.6
Increasing	5.2	5.4	21.5
Do not know	0	2.6	14.4

Views from Local Authorities

Local authorities currently undertake regular patrols to enforce the regulations to curb the catching of undersized fish and the trading licenses of offenders may be suspended, while habitual offenders are denied licenses altogether. Informing and educating fishing communities on the dangers of illegal fishing was considered to be an option for controlling effort and it was felt that these actions have led to a reduction of illegal fishing and reduction in the catching of undersized fish. This was indicated by the fact that fishers were apparently changing from using gill nets with five-inch mesh (~ 125 mm) to six or seven-inch (~ 150-175 mm) nets. Some of the measures proposed by Local Authorities to reduce effort are given in Table 4.

Views of Fish Traders and processors

Fish traders were of the view that the market demand for undersized fish was driven by their low cost, which made them available to consumers with low incomes. Crop and fish farming were seen as the main sources of alternative income with other sources such as the sale of clothing or trading in cereals but these activities are constrained by inadequate sources of capital for investment. The views of fish processors and factory owners are summarised in Table 5.

Table 3: The views of BMU respondents on aspects of fishery management on Lake Victoria.

Issue	Views
Status of fishing effort	Excessive (81-97%). Recommended action: reduce number of fishers, no more than 1-5 boats per fisher; no more than 20-30 nets per boat for Nile perch and tilapia and 1-5 for dagaa; no more than 100-500 hooks per boat; license only law-abiding BMU members. Other options included facilitating investment in alternative sources of income and the establishment of closed seasons.
Reasons for illegal fishing activities	Approved gears are too expensive; the need to survive, along with greed and corruption coupled with the desire for better catches; weak law enforcement; BMUs unable to carry out law enforcement.
Sources of illegal gears	Imports from Korea and China; smuggling from neighbouring countries; beach seines and cast nets locally made at beaches.
Measures for controlling undersized fish	Ban import and manufacture of illegal gears; enforce law at landing sites, markets and border points; sensitisation and education; support alternative livelihoods.
Priority alternative livelihoods	Crop farming, animal husbandry, fish farming, trade.

Table 4. Views expressed by some local authorities around Lake Victoria on actions needed to control illegal fishing practices.

Issue	View
Existing methods for controlling fishing effort	Take action against traders in undersized fish by suspending trading licenses
Proposed new measures	Removal of all illegal fishing methods; vetting applicants for licensing and determining Total Allowable Effort (TAE); increasing license fees; allowing BMUs to conduct MCS; educate and inform communities on reasons for reducing effort; establish closed seasons Promote alternative livelihoods
Alternative sources of income	Crop and animal husbandry; fish farming; trade; investment in marine transport and tourism

Table 5. Views expressed by fish traders and the owners or managers of factories and processors on the management of Lake Victoria fisheries.

Issue	Views
Preventing undersized fish from reaching the factories	Enforce regulations; appoint inspectors to monitor self policing; reject undersized fish at factories and report to inspectors; educate suppliers on dangers of harvesting undersized fish
Impact of self policing on factory operations	Supply of raw materials reduced for a short time during initial stages; short-term retrenchment of workers; reduction in exports of chilled and frozen products; increase in cost of fixed overheads in relation to income
What government can do stop the harvesting of undersized fish	Empower BMUs to monitor slot size compliance at landing sites and to confiscate illegal gears; enact laws to regulate supplies of fishing gears; provide more resources for constant and sustained MCS activities; educate fish suppliers on the dangers of catching undersized fish
What government should do to control decline of fishery	Establish closed seasons for fishing and processing; reduce fishing effort on agreed terms; enforce regulations on slot size in all three countries; confiscate immature fish from local markets
Alternative sources of Nile perch	Uganda; Lakes Albert and Kyoga. Tanzania; none. Kenya; possibly Lake Turkana. Develop fish farming

National and Regional Workshops

Findings from field surveys were presented to stakeholders at national workshops where it was agreed that the main problems of the fishery were (a) excessive fishing effort, (b) illegal gears and (c) the catching of undersized, mostly immature, fish. A stakeholder workshop in Bukoba, Tanzania, in March 2008 discussed the implementation of the RPOA-capacity and drew up an action plan, summarised in Table 6 [see page 73].

Priority areas for legislative action to manage fishing capacity

The RPOA-capacity activities also involved a review of the legislation in the three countries to see how far they support the management of fishing capacity. The RPOA-capacity provides for fishing effort to be limited to the level it was in 2006 (based on data from the 2006 Frame Survey) but current fisheries legislation does not adequately provide for the limiting of fishing effort. The review of the legislation undertaken by the Fisheries Policy and Legislation Regional Working Group identified priority areas for legislative actions and indicated a number of gaps (Table 7). The main priority areas for legislative action that were identified included:

(a) The harmonisation of the policy and legal framework for management of fishing capacity;
(b) Regional and international collaboration;
(c) Recognition of BMUs in principal legislation as agencies for the management of fishing capacity;
(d) Legal requirement for information and sharing;
(e) Legal powers for Fisheries Departments to limit fishing licenses to regulate fishing effort in accordance with agreed limits including the ability to limit Nile perch vessel licenses to the 2006 level;
(f) Systems for licensing boats, gears and fishers, and regulating the importation, manufacture and trade of fishing gears; and
(g) Sustainable financing mechanisms for fisheries management and development.

Table 7. The present legal power of Fisheries Departments to regulate fishing in line with agreed limits.

Area to be limited	Kenya	Tanzania	Uganda
No. of vessels	No	Yes	No
No. of gears	Yes	No	No
No. of fishers	No	No	No
Duration of fishing trips	No	Yes	No

Implementation of the RPOA-Capacity

The main issues facing the Nile perch fisheries of Lake Victoria are the increase in fishing effort as a whole and in particular the use of illegal fishing methods against the declining fish stocks. This has led to a decline in the stocks, which in turn creates more pressure to use illegal methods, such as small-mesh nets, to meet the demand for fish and the need for fishers to maintain their income (Figure 4).

Implementing the RPOA-Capacity may therefore make it necessary to impose strict measures that will directly affect the livelihoods of people in the fishing communities, reduce the revenue earned by local authorities and national governments and affect the fish trade in the short run. Managing fishing capacity may require a reduction in the number of fishers or fishing gear and boats to a sustainable level in order to maintain a reliable and sustainable supply of fish to the fish processing industry. It is imperative that mitigation measures to lessen the adverse effects on the affected communities are developed and implemented. The lake-wide consultations provided an opportunity for policy makers to understand the views of the stakeholders and their ability to cope with the loss of income from fisheries. It is necessary to continue informing them about the need to manage fishing capacity and to solicit their views on how best to implement the RPOA-Capacity. It is also important for them to understand their role in the management of fishing capacity and to appreciate the benefits that may accrue to their communities in the long run.

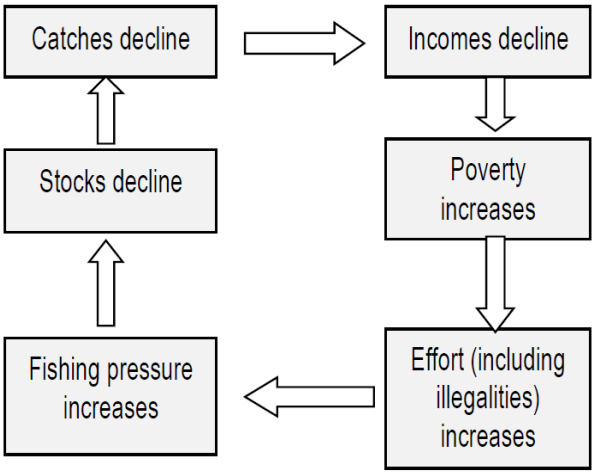

Figure 4. The positive feedback loop that promotes increased fishing effort for Nile perch on Lake Victoria.

Conclusion

Excessive fishing capacity is a problem that, if not managed, could contribute substantially to depletion of the fish stocks and significant economic losses. It was generally agreed that fishing effort had increased to an undesirable level and stakeholders suggested effort could be reduced by combating illegal fishing, limiting the number of boats owned by an individual and limiting the number of gears per boat, as well as providing alternative sources of livelihood. Limiting access to the fishery through licensing should be strengthened and fishing communities should be given training in fishery management and effective utilisation of income from the fishery.

In conclusion, it was recommended that the following actions need to taken as a matter of urgency:

(a) Fishing effort should be controlled through means suggested by the stakeholders and further consultations to harmonise the methods is needed before they can be implemented.

(b) Effort could be controlled through the use of licensing as a limited-entry management tool but since fishers with a long history who could be given fishing rights licences cannot be identified all those currently participating in the fishery could be licensed. There should also a 5-year moratorium on new licences and effort reduction would then occur through natural attrition. Future licenses would then be limited only to BMU members.

(c) The size of boats, together with the maximum number of nets, longlines and hooks per boat should be specified on the licences. The aim should be to eliminate the dugouts and "parachute" boats which fish in breeding and nursery grounds for tilapia and young Nile perch.

(d) The importation and manufacture of prohibited gears should be controlled with customs officials and traders or suppliers of fishing gear being provided with guidelines for the identification of illegal gears. Enforcement should be strengthened and extended to cover local markets with all involved in the fishery being further educated on the impact of such gears.

(e) Alternatives sources of livelihood such as farming, horticulture and fish culture should be encouraged and supported but practiced away from the shoreline to avoid possible degradation of wetlands. To be able to achieve such diversification, technical skills should be developed along with partnerships with private sector and financial institutions.

(f) Fishing communities should be given adequate training to enable them to manage fishery resources and effectively utilise their income from the fishery.

(g) More investment should be made in law enforcement but the stakeholders should have a greater involvement in MCS activities in line with the current efforts in co-management.

(h) The extension arms of the fisheries management agencies should be separated from the law enforcement sections to avoid conflicts between intensified MCS activities and the provision of much-needed extension services in education and awareness campaigns.

(i) The control of gear distribution in the region should be carried out in line with the spirit of co-management and this will require harmonisation of tariffs to eliminate price differentials between the countries.

Acknowledgements

Funding from the Food and Agriculture Organisation to initiate the implementation of the RPOA-Capacity and from the European Union is greatly appreciated. The input of the stakeholders towards developing the action plan and the time spared by the BMUs to provide valuable information is acknowledged.

References

Ikwaput Nyeko, J. (2005). *Co-management and Value Chains: The Role of the Nile Perch Exports in Poverty Eradication in Lake Victoria Fishing Communities*. Final project report, Fisheries Training Programme, united nations University, Reykjavik, Iceland: 66 p.

Kayanda, R., M. Taabu, R, Tumwebaze, L. Muhoozi, T. Jembe, E. Mlaponi and P. Nzungi (2009). Status of the major commercial fish species and proposed fishery-specific management plans for Lake Victoria. *African Journal of Tropical Hydrobiology and Fisheries* **12**: 15-21.

LVFO (2007). LVFO Regional Plan of Action for the Management of Fishing Capacity in Lake Victoria. Lake Victoria Fisheries Organisation, Jinja, Uganda: 28 p.

LVFO (2008a). Regional status report on Lake Victoria bi-annual frame surveys between 2000 and 2008. Lake Victoria Fisheries Organisation, Jinja, Uganda: 54 p.

LVFO (2008b). Report of the FAO/LVFO RPOA-capacity project regional consultative stakeholder's workshop on measures to manage fishing capacity, Bukoba, Tanzania, March 2008. Lake Victoria Fisheries Organisation, Jinja, Uganda: 37 pp.

Reynolds, J.E., D.F. Gréboval and P. Mannini (1995). Thirty years on: the development of the Nile perch fishery in Lake Victoria. In: T.J. Pitcher and P.J.B. Hart (eds). *The Impact of Species Changes in African Lakes*. Chapman and Hall, London, pp. 181-214.

Table 6. A summary of the action plan for the management of fishing effort on Lake Victoria. Adapted from LVFO (2008).

Issue	Causes	Action	Timing
Excessive fishing effort	Too many boats, gears and fishers on the lake.	Amend legislation to limit the number of vessels, number of fishing gears per boat, number of boats per fisher, number of fishers and duration of fishing initially targeting boats in the Nile perch fishery.	1 year
	Lack of standardised estimates of fishing effort.	Amend TAFIRI and NARS Act to enable the collection of necessary information.	2 years
	Low level of information exchange on fishing effort in the region.	Disaggregate frame survey data by fleets targeting species and identify data gaps in the fishery-specific management plans.	Ongoing
	Inadequate law enforcement to contain illegal fishing.	Maintain and improve MCS activities on land and water.	Ongoing
	Failure of licensing to restrict access to the fishery when main objective is to generate revenue for the local government.	BMUs to register and license only legal fishers and include agreed limits in vetting and licensing process.	1 year
	Inadequate information and education of stakeholders.	Support the preparation of the LVFO Information and Data Policy.	3 months
	High demand from processing factories as a result of over-capacity.	Regulate processing capacity following assessment of processing capacity in relation to resource and if necessary limit new entrants to the industrial processing sector.	1 year
	Lack of alternative (or diversified) livelihoods.	Members of Parliament to use 'Prosperity for All' and 'Constituency Development Fund' to support AIGs for women and disadvantaged groups.	Ongoing
Persistent use of illegal gears	Legal gear is too expensive.	BMUs to lobby government and NGOs to provide legal gears in exchange for illegal ones or provide credit facilities.	Immediate
	Availability of illegal gears in the market.	Enact law on importation, manufacture and trade of fishing gear including registration of dealers.	1 year
	Local and political interference in law enforcement.	Educate politicians and BMUs to expose corrupt politicians in the media.	Immediate
	BMUs failing to control members.	Change BMU leadership and deregister BMUs involved in illegalities; develop effective deterrent measures and sanctions.	Immediate
Continued capture of undersized Nile perch	Demand for undersized fish drives the illegal fishery.	Direct resources and effort to tackle local and regional trade in small Nile perch.	Immediate
	Use of undersized gill nets and beach seines.	Liaise with neighbouring countries on the issue.	6 months