INTEGRATED LAKE MANAGEMENT PROJECT

Identification of System Requirements:
Report in Preparation for the Guidelines Development Workshop

Level 1- Local management Institutions (Fisher Communities)

Report prepared in contribution to DFID FMSP project
Data Collection and Sharing Mechanisms for Co-Management
(R8285)

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MRAG CARE

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Acronyms

AFDO	Assistant Fisheries Development Officer
BMU	Beach Management Unit
CAS	Catch Assessment
CPUE	Catch per unit effort
DFID	Department for International Development
DFO	District Fisheries Officer
DFR	Department of Fisheries Resources
EC	Executive Committee
FAO	Food and Agriculture Organization of the United Nations
FIRRI	Fisheries Resources Research Institute
FMC	Fisheries Management Committee
FO	Fisheries Officer
FPBC	Finance, Planning and Budgeting Committee
IDWG	Institutional Development Working Group
ILM	Integrated Lake Management project
LAGBIMO	Lake George Basin Integrated Management Organisation
LGBMP	Lake George Basin Management Plan
LGFMP	Lake George Fisheries Management Plan
LWA	Lake-wide Assembly
MRAG	Marine Resources Assessment Group Ltd
QEPA	Queen Elizabeth Protected Area

Section A- Introduction

1. Background

1.1. Purpose

For capture and enhancement fisheries important to the livelihoods of the poor, the project aims to provide managers and advisors at all levels, but particularly local fisher communities and institutions, with appropriate cost-effective systems and mechanisms for the collection and sharing of data and information necessary to improve the sustainable co-management of their resources.

The study intends to generate information from experiences of (introduction of) co-management to develop guidelines for managers and advisors involved in co-management of fisheries. As part of this process, reports of relevant experiences are prepared at different levels of management.

1.2. Report Focus

This report describes existing and potentially appropriate data collection and sharing mechanisms to meet the information requirements of local communities engaged in co-management of the fishery of Lake George in Uganda. The mechanism and institutional arrangements for co-management have been developed for Lake George, and this report focuses on the achievements there. The principles described here are currently being further refined and applied to other lakes in Uganda, in particular to the much larger Lake Kyoga, where almost 200 basic management units have been established. Where the arrangements have been altered to meet specific requirements of scale or other characteristics of the larger lake, these are mentioned as footnotes.

The process of introducing co-management of fisheries resources in Uganda has been facilitated by the Integrated Lake Management project (ILM), funded by DFID. The project started in October 1999 and is nearing completion of its 5-year life span.

Section B - Methodologies

The methodology used in preparation of this report is based on the numerous activities and subsequent project reports that have been produced throughout the ILM project.

A main characteristic of ILM has been a very high level of stakeholder participation in all elements of the project and in the establishment and development of co-management of the fishery resources of Lake George.

Specific workshops on information needs have been held. From July 2001 until July 2003, a series of seven workshops was organised on the subject of fishery management information needs. During these workshops, a mechanism for community-based collection and use of data was developed and refined through training activities and feed-back from initial experiences.

Table 1. Overview of workshops organised by ILM to develop and promote community fishery management data collection for Lake George

Dates	Workshop Subject	Objective
3-5 July 2001	Lake George fishery information collection workshop	Evaluation of strengths and weaknesses of and gaps in the existing data collection system for present fisheries management and identification of options for improved sustainable fisheries information collection and analysis systems for co-management of lake resources.
19-20 November 2001	ILM/Department of Fisheries Resources (DFR) Training workshop on fishery information collection and analysis systems on Lake George and Lake Edward	Provision of a forum for a wide range of stakeholders to meet, discuss and agree a standardised approach for the collection and analysis of fishery information that satisfies the requirements of stakeholders at all levels of integrated lake management.
19-20 March 2002	Fisheries information collection and analysis systems on Lakes George and Edward	Review of the fisheries information collection process, identification of constraints in the use of catch assessment survey forms.
18-19 September 2002	Fishery information collection and analysis training workshop	Review of progress made and training on fishery information collection
26 November 2002	Fishery information data collectors workshop	Training of data collectors in data collection and analysis, and in use of data for planning and management of lake resources
11-12 March 2003	Fishery information training workshop	Review fishery information collection and development of initial analysis procedures
2-3 July 2003	Fishery information collection and analysis: review and training workshop	Improvement of fishery information collection and clarification of the role of fishery information at different levels of co-management for planning and management

Stakeholder involvement

The content of this report reflects the current and planned situation which is the result of a participatory planning and implementation process.

Section C - Results

2. The Fisher Communities (the local management institutions) and Management Structures.

2.1. Location.

Lake George is situated in the southwest of Uganda (Fig. 1), in Central/East Africa. It is one of five major lakes in Uganda. Lake George lies on the equator at an altitude of 914 m covering a water surface area of 260 km^2 with a catchment area of 9,700 km^2. The lake is very shallow with a mean depth of 2.5 m and a maximum of about 4 m. The lake is fed by numerous rivers, most of which arise in the Rwenzori mountains to the north and northeast of the lake. The rivers enter the lake through extensive permanent swamps up to 21 km long and 14 km wide that occupy more than half the area designated as a Ramsar Site. The lake has a single outlet, the Kazinga Channel, which drains the south west corner of the lake and runs for 36 km into Lake Edward, a lake that is shared with the Democratic Republic of Congo. In hydrological terms, Lake George is remarkably stable. Despite its very shallow depth, seasonal variation in water levels is less than 1 m, with highest levels occurring in May-June and November-January, shortly after the two seasonal peaks in rainfall.

The lake is naturally eutrophic, with a very high phytoplankton biomass which results in low water transparencies. An extremely high rate of primary production is maintained throughout the year and dependent upon the rapid uptake of nutrients derived mainly from organic decomposition in the mud. The high rate of uptake is maintained by frequent, almost daily, disturbance of the bottom mud by winds due to the shallowness of the water. It is probable that the high rate of production has persisted with little seasonal variation since the origin of the lake in its present form and climatic regime. The most remarkable feature of the lake compared with other tropical lakes is the high productivity coupled with the overall stability of the biomasses of its organisms. This, in turn, is again due to the shallowness of the lake, its stable water level and the frequent winds in all seasons, which circulate nutrients from the mud more or less continuously.

About 75% of the lakeshore lies within the boundaries of the Queen Elizabeth Protected Area (QEPA), under the stewardship of the Uganda Wildlife Authority. This has implications for the use of the lake and for the livelihood strategies of the people living in the fish landing sites within the boundaries. The Rwenzori mountains, part of the Rwenzori National Park, are an imposing feature of the basin, influencing the local climate and flow of water to the lake.

The lake supports a commercial fishery, whose fleet size has been controlled by central government through licensing since the 1950s. There are six landing sites on Lake George, with another two on the Kazinga Channel supporting a population of about 13,000 people, most of whom live within QEPA.

These features of Lake George present challenges to integrated lake management. The presence of the national parks, particularly QEPA, present challenges in terms of livelihood options and access to other natural resources (such as fuel wood) for those living in fishing villages within the Protected Area boundaries. The extensive and important wetlands of Lake George must be sustainably managed and access controlled. The lake itself is connected to Lake Edward, which as an international lake, faces different management challenges in terms of bringing Ugandan and Congolese stakeholders together.

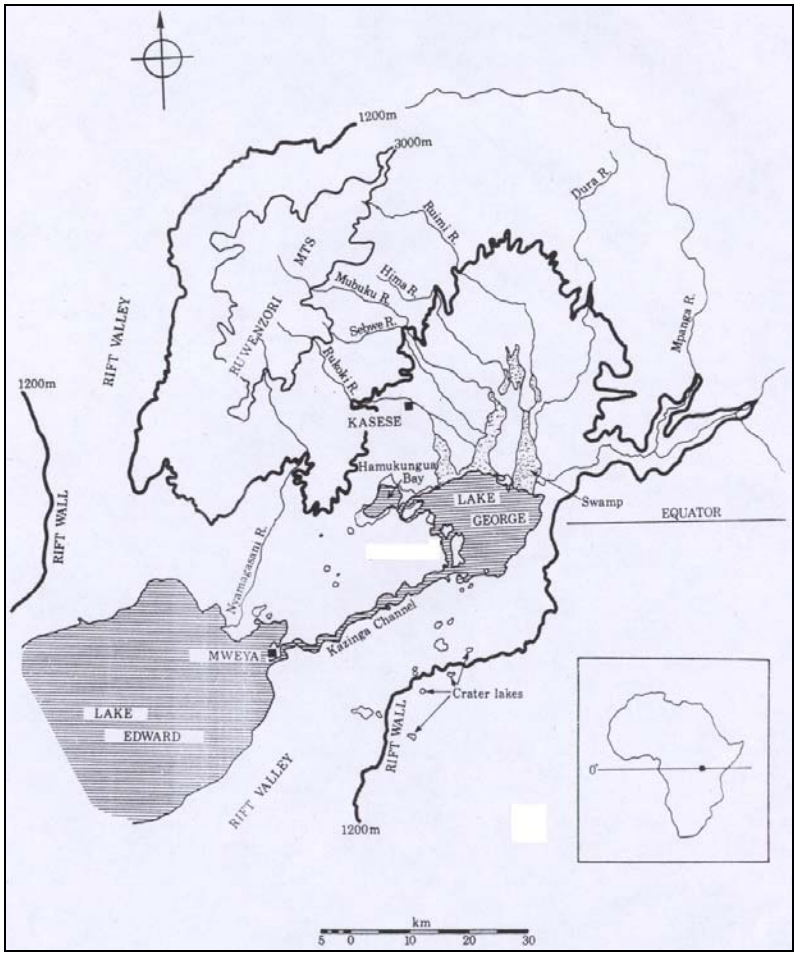

Figure 1. Lake George location and catchment area

2.2. Geographic jurisdiction of management institution.

The management of Lake George is currently assigned to a lake-wide management institution, the Lake George Basin Integrated Management Organisation (LAGBIMO). The stakeholders involved in forming LAGBIMO felt it was essential to take a basin approach to management, but also realised that it was beyond their capacity to start at a basin level. The focus of LAGBIMO is primarily on the lake itself and its immediately adjacent catchment, on the communities directly benefiting from the lake and on the local governments, and other agencies, benefiting from, and responsible for the lake. Some basin issues have been identified and incorporated into the management plan. In future, it is expected that LAGBIMO will address other basin-wide issues and expand the range of operation, and this will involve forming more partnerships and working through, and with a range of stakeholders.

2.3. Numbers of fishers and socio-economic profiles including age and gender profile by main livelihood category.

The organisation of the fishery on Lake George is such that the term ‘fisher’ is not as straightforward and unambiguous as it is in many other fisheries. In order to clarify to whom the term is applicable, an overview is presented of the structure of the fishery on Lake George, indicating direct and less direct beneficiaries (Fig. 2). Strictly speaking, the term ‘fisher’ only applies to the boat crew, locally known as *baria*. They are involved in rowing the boats, setting nets and collecting and transporting the

catch to the landing sites. Many other people play an important role in the fishery, including the boat owners who hire barias and determine the activities of the boats and the catch effort.

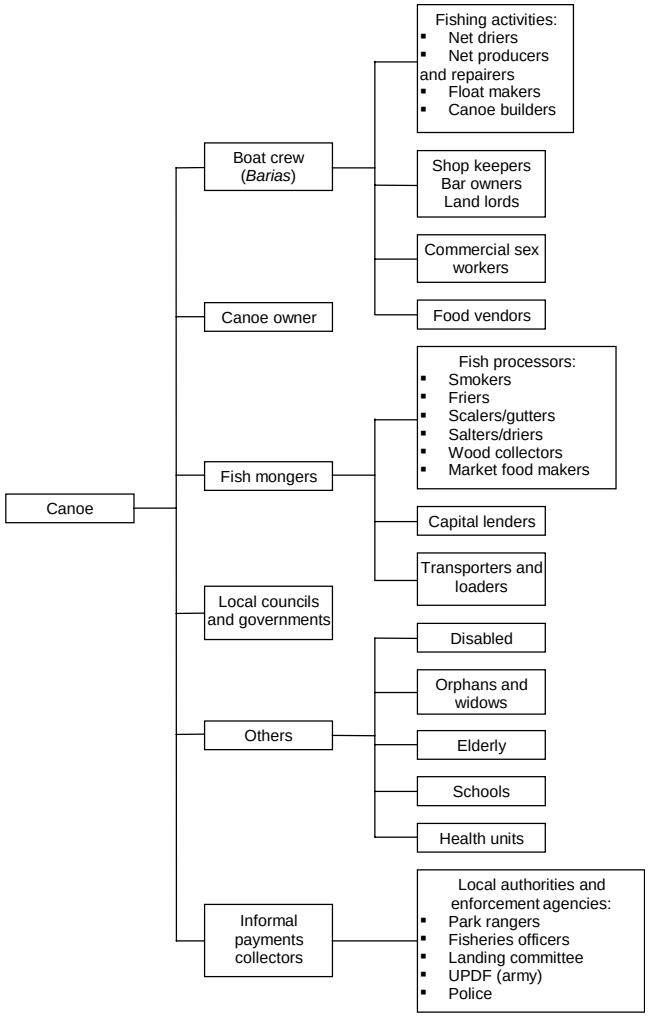

Figure 2. Direct and indirect beneficiaries of Lake George fishery

The total population in the target area was estimated based on a survey of households in the eight ILM target parishes of Lake George.

Table 2. Population and household sizes in the LAGBIMO area

Parish	Number of households	Average household size	Population
Kahendero	341	7.4	2,539
Hamukungu	282	6.3	1,765
Kasenyi	320	7.5	2,397
Katunguru K	370	6.8	2,515
Katunguru B	200	6.8	1,352
Kashaka	323	4.3	1,379
Kayinja	533	6.1	3,250
Mahyoro	516	4.9	2,503
Total	**2,885**	**6.2**	**17,701**

The number and proportion of people within the ILM operational area that are dependent on lake resources has been determined by a survey in 2001. To determine the extent of lake resource dependency amongst the communities of Lake George, heads of households were asked what are the households' sources of income, ranked in order of importance. From this, estimates were made of the number of households and individuals dependent upon the Lake George fishery. The sources of income considered as directly related to the Lake George fishery were classified as owning a boat, being a baria and fish mongering and processing. The estimated number of households that have these occupations as their primary source of income and those households that have these fishery related occupations both as a primary or other source are shown in Table 3.

Table 3. Estimates of the total number of households and individuals dependent upon the Lake George fishery

	Total number of households	Proportion of Lake George communities	Average household size	Total number of people[1]
Households with fishery related income as the primary source	1,442	50%	6.2	8,941
Households with fishery related income contributing to their livelihoods	1,689	59%	6.2	10,475

2.4. The importance of fishing to community livelihoods

Almost 60% of the populations' livelihoods are at least partly dependent on fishing. The number of people dependent upon Lake George is yet higher if one accounts for other lake resources such as papyrus and water. These resources can provide direct benefits in the form of income from craft making, and a household and livestock water supply. People also benefit indirectly from Lake George, by providing services to those directly dependent. For example, by considering traders, hotels and bars selling their services to fishers, and those fishmongers coming from outside the villages, the number of dependent people would be higher still.

The proportion of people dependent on lake resources within each parish varies. Fig. 3 shows the percentage of households in each parish with the three main fish related incomes as their primary sources of livelihood:, being a baria, owning a boat, and fish mongering/processing.

[1] The total number of people in the ILM target area based on this estimation is higher than the total estimated in Table 1. The method used for this calculation would have included some double counting as some households have more than one fishing related type of income.

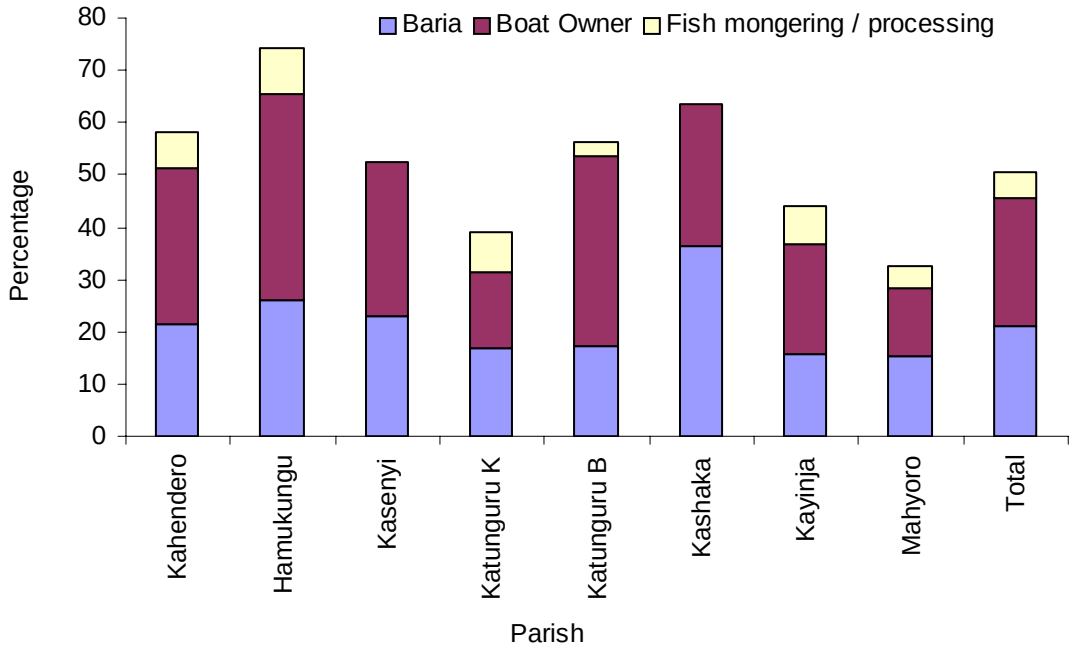

Figure 3. Proportion of parish population with fishery related incomes as primary source of livelihood

Four wealth groups have been identified, 1 to 4, with wealth group 1 being the poorest and group 4 being the wealthiest. The criteria for assigning wealth categories are detailed in Annex 1 as the physical assets that were used as livelihood indicators.

Ownership of a boat is the greatest primary source of income for the households of the Lake George parishes, closely followed by “other trading” and labouring on boats (barias). “Other trading” includes trading in a variety of commodities, including beer and food, but cannot be broken down further for this analysis. What is clear is that fishing is the single most important income source for the Lake George communities.

Considering all the primary income sources identified by households, Fig. 4 presents the number of households with each type of income as a primary income source, disaggregated by wealth group.

For the fishery related livelihoods, boat ownership is a protection against poverty, whilst barias never achieve the highest wealth among the fishery dependent households. Wealthiest households have as their primary source of income, in order of importance, owning a boat, “other trading”, cattle keeping, government salary, and cultivation.

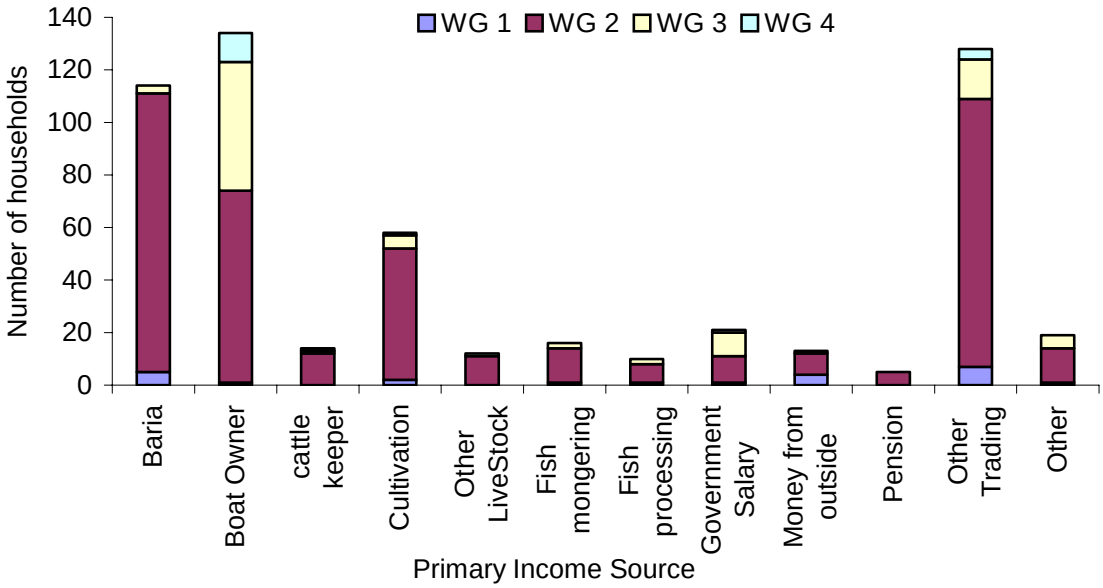

Figure 4. Number of households with each type of primary income sources, disaggregated by wealth group

In addition to the nature of the primary income, it has transpired from the surveys that income source diversification is closely linked to wealth. Households with boat owners generally have a greater diversity of income sources than those with barias. This has implications for the vulnerability of the different household types, as the ones with less diverse income sources are less resilient in case of changes to their livelihoods source(s). Fig. 5 shows that the average number of income sources per household increases with wealth group. This suggests that the livelihoods of those individuals in wealth group 1 are more vulnerable, as diversifying sources of income is a common risk coping strategy. In particular, increased diversity generally means less dependency upon lake resources. This itself reduces vulnerability to factors such as the degradation of lake resources as a result from, say, over-fishing or environmental factors.

In the specific case of Lake George, there is an additional difference in livelihoods sources diversity as a consequence of the limitations imposed by the Queen Elizabeth National Park regulations.

2.5. Description of co-management arrangements and activities.

The stakeholders of Lake George have formed the Lake George Basin Integrated Management Organisation (LAGBIMO). This organisation was inaugurated in early 2003 and was set up by the three co-operating local governments around Lake George – Bushenyi, Kamwenge and Kasese – and all stakeholders involved in fishery from the eight landing site communities of the lake.

The formation of LAGBIMO has subsequently lead to the development of an integrated lake management plan. The approach establishing LAGBIMO and the integrated co-management arrangements is innovative in its poverty focus, participatory and integrated approach and the implementation to date has generated many lessons. It is believed the institutional framework and the plan provide firm foundations for improved integrated and poverty focused lake management.

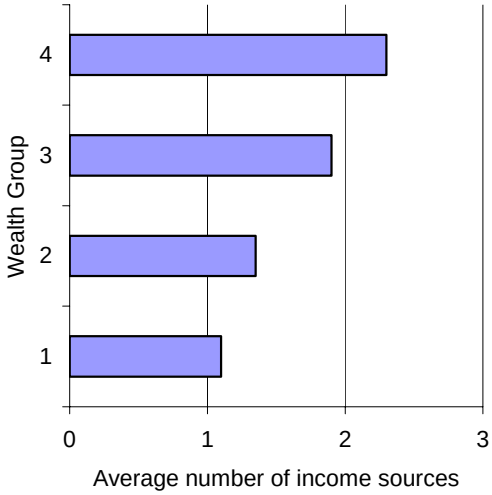

Figure 5. Average number of income sources per household in function of wealth level

Objectives

The main objectives at the basis of the lake basin natural resources integrated management are diverse, with implications for the approach to management, institutional structures and the costs and benefits of management. The overall aim of this approach implemented through LAGBIMO is poverty reduction through improved livelihoods resulting from sustainable management of lake basin natural resources. Within Uganda, the major lakes, and many of the minor lakes, are important fisheries making significant contributions to poverty reduction and economic growth by providing food, employment and incomes for millions of people. Not surprisingly, lake management has therefore tended to focus on managing the fishery resources. However, since many of the factors that influence resource productivity arise on land, lake management in Uganda is increasingly becoming more integrated and is taking a basin management approach. The focus of LAGBIMO is primarily on the lake itself and its immediately adjacent catchment, on the communities directly benefiting from the lake and on the local governments, and other agencies, benefiting from, and responsible for, the lake. Some basin issues will be addressed in the future.

Integrated management

The LAGBIMO approach is integrated at three levels (national, lake-wide/district and community) and in many ways:

- Inter-district, including bringing all three levels of local government (parish, sub-county and district) together from three districts.
- Inter-sectoral, involving sectors such as fisheries, environment, water, wetlands and community development, to provide a holistic approach to lake management, recognising the interrelatedness of the system and livelihoods.
- Inter-stakeholder, bringing together many types of stakeholders, all concerned with the improved and sustainable use and management of Lake George basin resources for improved livelihoods.

LAGBIMO

The development of the Lake George Basin Integrated Management Organisation involved the establishment of an Institutional Development Working Group (IDWG), with representatives from communities, different sectors within the relevant local governments and from national agencies. The IDWG guided the process and

undertook considerable consultation with communities, local governments and other stakeholders. Technical assistance was facilitated by ILM to provide guidance on legal and financial issues, and assessment of training needs. The result of the lengthy and in-depth consultative process is LAGBIMO and its Constitution.

The aim of LAGBIMO is "to provide a framework for coordination and coherence in the planning and implementation of any form of interventions for the socio-economic development of communities within the basin through the sustainable management of Lake George basin natural resources". The objectives of LAGBIMO, as set out in its Constitution, are to:

- Promote poverty eradication and the social and economic development of the Lake Basin communities through the integrated and sustainable management of Lake George Basin natural resources;
- Ensure collection, exchange and use of information in order to improve the management and sustainable use of the Lake George Basin natural resources;
- Increase social and economic benefits to all the parties, especially to the poor sections of the local communities within the lake basin;
- Promote alliances in the management of the lake basin natural resources by encouraging operational, economic and other partnerships among the respective central government agencies, the co-operating local governments, private sector, local communities and civil society organisations;
- In accordance with article XII of the Constitution of LAGBIMO, develop a framework whereby local communities can effectively participate in, and tangibly benefit from, the management and sustainable use of the lake basin natural resources;
- Subject to Article 178(b) of the Constitution of Uganda, 1995, establish and manage funding mechanisms and financial resources for the sustainable management of Lake George Basin natural resources including the establishment of trust funds, endowments or any other funding mechanism as may from time to time, by resolution, be determined by the Lake-wide Assembly.

LAGBIMO has the following structure:

- Lake-wide Assembly (LWA)
- Executive Committee (EC)
- Fisheries Management Committee (FMC)
- Finance, Planning and Budgeting Committee (FPBC)
- Secretariat

The detailed membership and functions of the Assembly and Committees are outlined in the LAGBIMO Constitution, but it should be noted that every Committee includes representatives from communities, sub-counties and districts. The two standing committees, FMC and FPBC, have developed detailed terms of reference to guide their operations and logical frameworks to set out what they want to achieve, how and by when.

At present, LAGBIMO is supported financially by ILM and contributions from local government. The local government commitments for 2003/04 total 27 million Ugandan Shillings. This is about 20% of the recurrent costs of LAGBIMO and over 50% of the fisheries taxation income that can be currently derived from the lake through licences and permits. The annual recurrent cost of LAGBIMO represents only a small fraction of the value of the annual catch of Lake George. Recently, it was decided that each Beach Management Unit (BMU) member should pay an annual fee of 2,000 Ugandan Shillings. If paid in full, this will generate a further 3.5 million

Ugandan Shillings for the current year. Additional funding will be needed for at least a few years.

Fig. 6 summarises the functions of the LAGBIMO, which are briefly described in Annex 2.

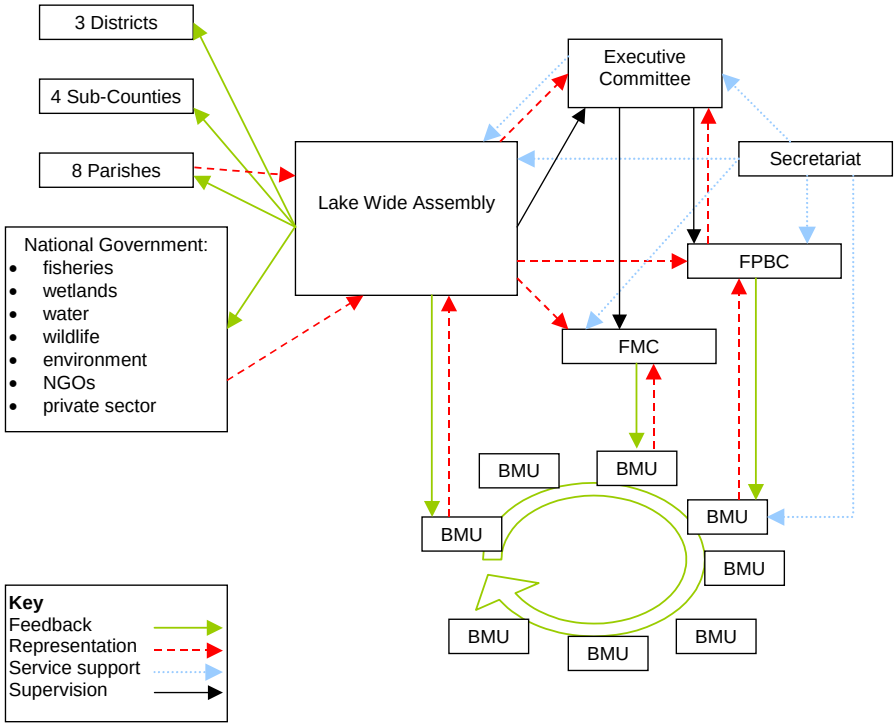

Figure 6. LAGBIMO functions

The Lake George Basin Management Plan
The Lake George Basin Management Plan (LGBMP), 2003/04 – 2005/06, is the operational plan for LAGBIMO, though there are other partners with interests in, and responsibilities for, the Lake George basin, who contributed to the development of the plan and will be involved in implementation through their own plans. The vision to be achieved through the implementation of the plan is sustainable management and use of Lake George natural resources for the improved livelihoods of poor communities within the basin by 2013. It is intended that the implementation of the plan will lead to nine outputs which in turn should contribute to the purpose and vision:

- Information for participatory and integrated planning at all levels generated, used and disseminated
- Fish resources sustainably used and managed
- Post harvest fishery efficiencies improved
- Livelihood security of lake dependent communities improved
- Equitable access to, and benefits from, natural resources within lake dependent communities
- Sustainably managed environment within the lake and its basin
- Improved capacities of BMU and other LAGBIMO structures to participate in integrated lake planning and management
- Sustainable funding for integrated lake management in place
- Monitoring and evaluation systems at all levels of LAGBIMO development and implemented

The implementation of the LGBMP will involve many stakeholders and partners, which will require integration of issues and actions into the work plans and operational plans of partners, and into local government development plans through the planning processes. Fig. 7 sets out the planning system within LAGBIMO and highlights the importance of integration into local government development planning.

The LGBMP will be reviewed on an annual basis and rolled over within the three-year time frame. LAGBIMO is supported in its first year by the ILM project and the co-operating local governments at district and sub-county levels. Further funds for the implementation of the plan and to support the operation of LAGBIMO will be sought.

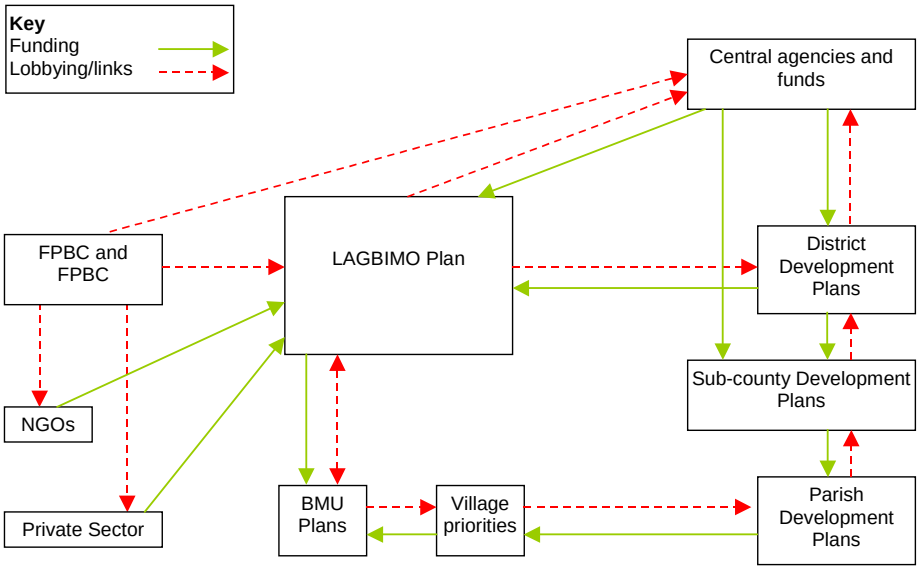

Figure 7. LAGBIMO planning system

Beach Management Units
The decentralised participatory approach is being implemented through the formation of BMUs at designated landing sites, as required by the Fish (Beach Management) Rules, Statutory Instrument No. 35, July 2003. They are the institutional structure within which fishery stakeholders will work in partnership with local and central governments, to improve planning and to sustainably manage fishery resources.

BMUs are set firmly alongside the government system. Although they are not formally part of the government system, many of the functions set out in the Statute require close collaboration with local and central government. In fact, the Parish or Village Executive Committee is charged with monitoring and supervising the operations of BMUs. The Chief Administrative Officer of the district local council has overall responsibility and reports directly to the Commissioner of the Department of Fisheries Resources (DFR).

In order to be effective in management, BMUs are required to develop local fishery management and beach development plans and advocate for their integration in other local development plans. Integration of their plans into local government development planning, through Parish Development Plans, will increase the opportunity for funding and implementation. This strong integration into the local government system ensures that a BMU works closely with government and that its

plans and activities are integrated into local government development and work plans.

Participation of users in the management of lakes in Uganda is primarily supported by the BMU Statute. The guidelines that supplement this statute set out clear allocations for different stakeholders for membership of a Beach Management Unit Committee, to ensure that all stakeholders are involved and their voices are heard.

A BMU Committee contains the following proportions of stakeholder groups, by law:

- 30% boat owners
- 30% crew (fishing labourers/barias who do not own boats)
- 30% other stakeholder groups listed in the BMU Statutory Instrument, including fish processors, boat makers, local gear makers or repairers, fishing equipment dealers, managers, and chatterers
- 10% fish mongers

A BMU Committee will, wherever possible, have 30% women. This allocation to women supports and implements government policy on gender balance.

BMUs require modest funds for effective operation. The BMU Statute sets out three sources of funding for BMUs, as follows:

- 25% of the money generated from issuing of Fish Movement Permits at the landing sites as prescribed in Statutory Instrument No. 61 of 2002.
- Profit generated from tender holding for those Beach Management Units who may win district fish landing site tenders.
- Collection of a number of fish or a set value per boat landing as established through bye-laws vetted by the lower local councils as per section 40 (1) of the Local Governments Act, 1997.

Management tools

Lake George is a controlled access fishery, with a limited number of boat licences. Access to the fishery resources on Lake George is through licences, permits and, more recently, through registration with a BMU. Prior to 2001, the issuing and regulation of licences was the responsibility of central government. There was no review of licences and they were handed down through generations. In December 2001, after lengthy consultation, the centre delegated responsibility for fisheries licensing to district governments. The new system brought in the opportunity to develop a completely new, more participatory and transparent, licensing system. The number of licences was doubled, fixed allocations for women and boat crew were set and a system for involving stakeholders in the selection process was developed and implemented. This change was institutionalised through a Statutory Instrument, to bring licensing in line with the new National Fisheries Policy.

With the establishment of BMUs, BMU Committees will become involved in scrutinising licence applications, though licences will not reviewed on an annual basis. Access to licences will be through a waiting list and licences will become available through confiscation of licences as a result of illegal fishing activities.

Lessons learned

Key lessons learned from the development of LAGBIMO and co-management of the Lake George resources are described below.

- Creating an enabling policy and legal framework at national level

Effective integrated lake management is dependent upon support from an enabling policy and legal environment to provide the mandate for institutions and processes and to facilitate allocation of funds to lake management. Those involved in lake and basin management must inform and influence policy and legislation, to support recognition of the environment and natural resource sector and, therefore, budget allocation. This requires the development and operation of information collection and monitoring and evaluation systems, that incorporate links between natural resource management and improving livelihoods of the poor. The integrated nature of lake management does, however, pose challenges for influencing policy design and implementation, as it is a multi-sectoral approach, requiring links to those responsible for fisheries, water, environment, wetlands, forestry, land and social development at a national level.

An important component of the enabling framework has been government decentralisation. The Local Government Act 1997 institutionalised decentralisation, including the decentralisation of the management of common property resources. Increasingly, through the implementation of co-management arrangements, community organisations are working closely with local governments to ensure natural resources are managed in a sustainable way, contributing to poverty reduction through equitable access and transparent and accountable governance arrangements.

- Developing appropriate and effective institutional structures

In Uganda, as in most other countries, fisheries management in the past was vested with central government and there was very little or no participation by fisheries communities in resource planning, management and development. Earlier attempts at fisheries co-management have failed as they were not representative and communities felt not involved.

The new approach, embedded within the new National Fisheries Policy, 2003, deepens decentralization through participatory fisheries planning and management. It includes marginalised stakeholders, especially poor fishing crew members (barias) and women in decision-making structures and processes governing the management of resources upon which their livelihoods depend.

The National Fisheries Policy has embraced the integrated lake management approach and is being implemented through the Fisheries Sector Strategic Plan, which clearly sets out the roles of BMUs and lake management organisations and the support needed for them to be established and effective. The plan calls for lake-wide or lake basin management bodies to be established for all major systems, though this will require central government support in terms of capacity building and funding.

- Legal mandate, setting out clear roles and responsibilities

Legal mandate for management entities at all levels is essential for ensuring that roles and responsibilities are defined, understood and accepted.

The legal mandate for Beach Management Units is set out in the Fish (Beach Management) Rules Statutory Instrument No. 35, July 2003, which describes the roles and functions of BMUs. The Statute is supported by a set of guidelines, which provide further guidance on how BMUs should be formed, how they should operate and on their role. The guidelines are also a legal document and provide further support for the legal responsibilities of BMUs in managing fisheries resources.

LAGBIMO has its legal mandate from the 1997 Local Government Act, which allows local governments to form associations and undertake certain functions through the

association. In addition, the Constitution of LAGBIMO was approved by the Attorney General, after being ratified by the three district local governments, giving it a legal mandate. The Constitution clearly sets out the roles of the structures of LAGBIMO and of key stakeholders.

- The ownership and share of lake resources

In developing and implementing co-management arrangements, raising the awareness of stakeholders about ownership of, and access to, resources is critical for ensuring they believe they have a genuine stake and role in management.

- Valuing lake resources

The lake provides an important source of livelihoods, particularly for people involved in fishery, and of revenue for local governments. Benefits to stakeholders must be clearly understood, accepted and valued for integrated lake management, so that reinvestment is encouraged and can be justified. Benefits are shared by local governments and fishery stakeholders – fishing crew, boat owners, fish mongers and processors, etc., and those that provide services to the fishing community. These benefits are being increased through the new co-management structures, as management is more participatory, there is better planning, management is more informed by better information.

- Participatory, inclusive and bottom-up planning

Integrated lake management depends upon participatory, bottom-up planning and management to ensure that plans are effective and are implemented, as all the weaker users of a resource must be fully involved.

In addition to set allocations, integrated lake management has strong poverty reduction objectives and is committed to building the capacity of women and the more marginalized members of its structures, so that they can articulate their views and concerns and genuinely represent their constituencies. Effective participation cannot come from allocating seats on committees alone, it is recognised that the capacity of those who have been largely excluded from decision-making in the past must be built so that their voices are heard.

- Community based fishery information collection

The collection of fishery information is essential for informed and effective fishery planning and management. The centralised collection of such information has failed, as it is often piecemeal, inconsistent and not effectively used.

The collection of fishery information is now provided with legal requirement through the BMU Statute. For such a system to be successful, however, the usefulness of information for the community, as well as for government must be apparent. ILM, and now LAGBIMO, is strongly supporting BMUs in planning and in contributing to local government development planning.

- Financing integrated lake management

Lake management inevitably requires funding. The institutional structures and operations of LAGBIMO require financial support to run effectively. It is essential that the management structures at all levels are institutionally ensured of funding.

3. The Fishery.

3.1. Resource and Environment.

3.1.1. Stocks/fisheries and area of operation.

Four main species of fish are targeted (local names in brackets): *Oreochromis niloticus* (*ngege), Protopterus aethiopicus* (*mamba*), *Clarias gariepinus* (*male*) and *Bagrus docmak* (*semutundu*). Several other species may also be found in the catch: *Oreochromis leucostictus* (*bambala*), *Barbus altianalis* (*njingule*), *Mormyrus kannume* (*kasulubani*), *Labeo forskalli* (*ningu*). Of these 'minor' species, *bambala* is caught most frequently, with the remainder being a rare part of the catches.

Formal rules define the legal size of fish that can be caught (in the Fish and Crocodile Act of 1964): species relevant to Lake George covered in the legislation include only Nile tilapia (*ngege*), stipulating that fish smaller than 11 inches should not be caught.

No detailed information on the stocks is available.

3.1.2. Environmental influences and threats to the resource

Environmental issues that threaten the Lake George ecosystem have been inventoried and prioritised during participatory scoping study workshops with the assistance of environmental impacts specialists.

In the immediate vicinity of the lake, there are a number of mine activities that are a source of pollution and that pose a potentially much larger environmental problem. Abandoned mining of heavy metals (cobalt, copper) has left a large number of waste piles and sources of heavy metals that can leach out and enter the Lake George ecosystem. Pollution from mining is considered the most important environmental threat.

Hillside agriculture and increasing habitation activities have led to increased erosion and runoff of solids into the lake. There are increasing levels of agri-chemicals entering the system.

The Mubuku hydropower and irrigation schemes are expected to have a substantial impact on the water budget for the lake. It also carries the risk of changed water quality.

Pollution from cities, in particular by untreated sewerage, is an existing environmental threat to the lake ecosystem integrity, which is ever increasing.

Other industrial developments (lime works, Hima cement) carry the risk of direct (pollution) and indirect (e.g., deforestation to supply fuel wood for the lime plant) impacts on the Lake George ecosystem.

In conclusion, there is a serious and potentially catastrophic pollution threat to the ecosystem from the mining activities in its vicinity. Anthropogenic changes to the hydrology of the system are a risk.

3.2. The fishery

3.2.1. Status and trends

Lake George and Kazinga channel are the major sources of fish for the heavily populated districts surrounding them. However, the fisheries have been under threat due mainly to increasing fishing effort and use of destructive fishing gears and

methods. Records of 1950-1988 showed that the average total fish catch from Lake George was 3,141 ± 159 tonnes and varied between 1,487 and 5,097 tonnes. The estimated annual catch in 1997 based on 547 boats on Lake George was 6,800 tonnes, while a 2000 survey estimated it at 2,512 tonnes based on 426 boats on both Lake George and Kazinga channel. Dunn (1989[2]) estimated the theoretical MSY figure of 3,000 tonnes on Lake George.

Boats
A plank canoe fishery operates on Lake George and the Kazinga channel; no engines are used. Sizes of the boats vary between 12 and 18 feet (6-12 planks). No information is collected on the sea (lake)-worthiness of the boats, which may be of use for management and investment decisions.

3.2.2. Gear types.

Most gear used in Lake George fishing are set from a boat. In general, a two-man crew operates each canoe, using either gillnets or hooks; rarely, a man may fish alone or in a crew of three. National regulations define legal gears: namely a minimum (stretched) mesh size of 5" gillnet, with a maximum number of nets/boat as 10 to be used passively, while hooks must not be less than size 7 and the total number/boat should not exceed 100..

Table 4. Fishing gear and practices of Lake George

Fishing practice[3]	Description
Gillnets – "*mukiira*" passive	Generally mesh of 4"-4.5", number of nets usually between 15 and 100, which are set in the evening and collected in the morning. Target *ngege*
Gillnets – "*ntega*" passive, long set	Generally mesh of 4"-4.5", can be up to 200 nets, which are left in place for up to 5 days and fish are cleared daily. Target *ngege*
Gillnets – "*sambasa*", "*tycoon*", "*ponda ponda*" active, beating	Generally smaller meshes <4.5", fewer nets (<10, often 3), used during the day and long stick used to frighten fish into net. Target *ngege*, *bambala*
Gillnets – active, boat seining	Gillnets set at one end and boat paddled in an arc to draw net in a circle. Target *ngege*
Long line – passive hooks	Series of hooks (size 6-9) on lines, can be maximum 1,000 hooks/boat, set by boat overnight and collected in the morning. Target *male*, *mamba*, *semutundu*
Hook and line – passive	Up to ~100 individual hooks (size range 6-8) tied to papyrus reeds at lakeshore, set at night, cleared in morning. Target *male*, *mamba*, *semutundu*
Angling - active	Single hooks on rod and line, during the day, small boys are usually fishing from shore, with some boat use if one can be 'borrowed'. Target all species
Basket traps	Range of bamboo baskets – up to 5/boat set without bait. Target *ngege*

Licences
Three types of licenses are currently issued for boats on Lake George and the Kazinga channel:

[2] Dunn, I. G. (1989) *Fisheries Management Study in Queen Elizabeth National Park, Uganda.* Technical Assistance to the Uganda Institute of Ecology, project No. 4100.037.42.46. 36pp.

[3] Note that "fishing practice" denotes the gear plus its use

- The original ‘formal’ licence (T or A) issued by DFR (number set in 1950s as 145 on Lake George and 44 on Kazinga Channel);
- The new veterans licence (V) issued by DFR to assist former army personnel to re-enter civilian life (total number issued on Lake George remains to be determined); and,
- Experimental licences (E) issued by DFR to promote conservation, monitoring and enforcement (originally 20 per landing site were issued, but it appears that individuals may have constructed more than one canoe under one E number)

Boats also operate without a licence although a Fisheries Resources Research Institute (FIRRI) survey of November 2000 noted a decline in the number of illegal boats since their previous survey of 1997.

Prior to ILM related fishery work, the setting of hooks in papyrus reeds has not been explicitly noted in Lake George. The two practices of angling (usually small boys) and the use of traps (may be from boats or the land) are also important to include: they are often ‘invisible’ in fisheries statistics but are important subsistence activities, often for poorer households.

3.2.3. Seasonality.

There are no outspoken differences in fishing effort between the seasons. The region is characterised by two rainy seasons and subsequent moderate changes in water levels of the lake.

3.2.4. Fishing locations.

The boundaries of the management plans need to take into consideration the distribution and mobility of unit fish stocks and the fishing communities who exploit these stocks. There is very little information on the degree of movement of fish stocks between lakes George and Edward and the degree of inter-dependence between them. There is, however, evidence of fish spawning grounds in Kazinga Channel connecting the two lakes leading to the assumption that the Channel contributes to fish stocks in both lakes. The whole Channel is therefore included within the area of the management plans. Lake Edward is excluded because, being an international lake, it requires a separate lake-wide plan to be developed and agreed with partners in the Democratic Republic of Congo which controls a greater part of this lake.

Wetlands immediately adjoining Lake George provide important fish breeding and nursery areas for lake fish stocks and are therefore also included within the management boundaries of the Plan. There is little information on the relationship between fish populations in the inflowing rivers and the lake. Since these rivers do not support commercial fisheries, there has been no need to establish BMUs along them. There are also numerous small crater lakes near Lake George and some of these support minor commercial fishing. These lakes are not included in the management plan.

3.2.5. Landing locations.

There are 6 legal fish landings on Lake George: Kahendero, Hamukungu and Kasenyi located in QENP in Kasese district; Kashaka located in Kyambura Game Reserve (Bushenyi district), Mahyoro and Kayinja (Kabalore district) and another small illegal landing called Nyakera in Kabalore district. Two landings, Katunguru (Kasese district) and Katunguru (Bushenyi district), lie in QENP adjacent to

Katunguru bridge. Fig. 1 shows the geographical setting of Lake George and the Kazinga Channel.

3.2.6. Socio-economic value of fisheries

Specific information on the total value of the Lake George fishery is not available. However, there are detailed data on revenue generation, which was assessed in collaboration with local government and communities.

Revenue is currently collected by both local and central government. Local government revenue is largely collected in the form of market fees, graduated tax and licence fees for canoes and trading activities. Central government collects income tax and specific fish trading licence fees. Currently, graduated tax and market fees (including canoe fees) each account for approximately 40% of locally generated local government revenue.

The average lake-wide revenue total generated from fishery related activities is approximately 31,000,000 Ugandan Shillings, or about US$15,500. This includes trade in other products such as food and livestock in landing site markets that is generated as a consequence of fish trade. It is estimated that revenue of about US$140,000 is collected each year in total from informal deductions from canoe landings. This revenue is more than nine times as much as the total accruing to local government. Landing site committees account for a third of this revenue. While informally collected revenue could be considered a source of lost revenue for local government, and the systems often lack transparency, it often plays an essential role in providing services for the communities. This point is critical in any potential changes to the revenue collection systems.

Currently, the benefits of the lake include revenue of 14.5 million Ugandan Shillings (US$ 7,250) in 2002/03 from the fish commodity chain from Lake George and the Kazinga Channel, resulting from an approximate annual fish catch of 3000 tonnes. This represents an increase of over 400% from 2.7 million in 1999/2000. Benefits are shared by local governments and fishery stakeholders – fishing crew, boat owners, fish mongers and processors, etc., and those that provide services to the fishing community.

The three district local governments receive approximately 90 million Ugandan Shillings in tax from a range of sources within the sector, from personal taxation to landing and trading fish.

Specific information on the socio-economic value of the Lake George fishery is presented under 2.4.

3.3. The fishers and other stakeholders

See 2.3 and further info on institutional arrangements on LAGBIMO

3.4. Management control measures and existing monitoring and control systems implemented by the local management institution

This component of the co-management is still under development. DFR staff currently continues to monitor fisheries for illegal activities. While the arrangements are not final, it is expected that the communities and co-management entities will take more responsibility and action in monitoring and control.

3.5. Fish disposal pathway diagram.

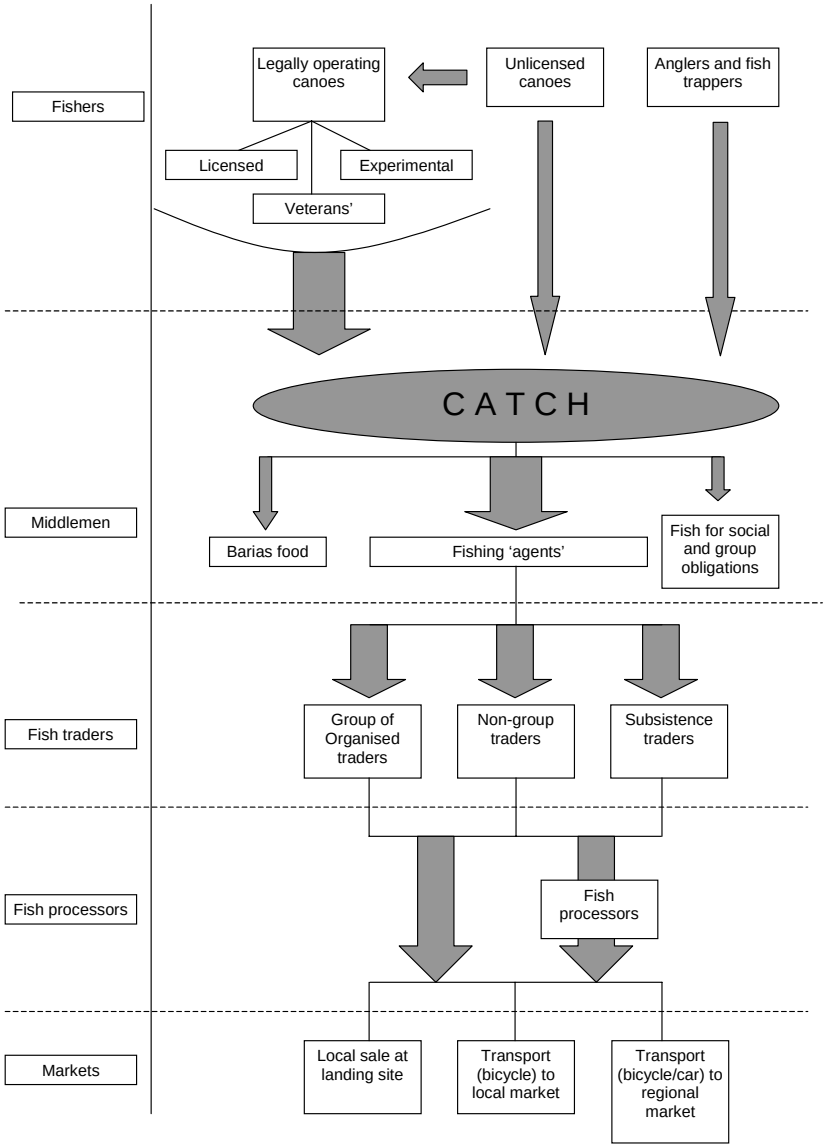

Figure 8. Diagram describing the catch process and the pathway the catch follows on Lake George

4. Description of the data and information requirements of the local management institution.

Prior to the formation of LAGBIMO, ILM assisted local government and the fishing communities in the development and implementation of a community based fishery information collection system. This system enables each BMU to collect and use information on fish catch, value and fishing effort. The communities remunerate the collectors by offering fish from the landed catch on the data recording days. This represents a major breakthrough in fisheries information collection. Communities recognise the importance of collecting information and using it in fishery management. The information is also transferred to local government and the LAGBIMO Fisheries Management Committee to inform lake-wide planning and management, before being passed on to central government to inform national policy and planning.

4.1. Details of any management plans (activities) including enhancement activities

The LAGBIMO has elaborated a lake basin-wide management plan (LGBMP) in 2003. As part of that undertaking, a Lake George Fisheries Management Plan (LGFMP) is being prepared, which forms an integral part of the broader LGBMP. Whilst the LGFMP focuses primarily on fishery, the LGBMP takes a wider, more holistic view and incorporates the interests of a wider range of stakeholders, a wider geographical focus and a broader multi-sectoral planning approach. The LGBMP includes a variety of catchment influences relating to agriculture, forestry, wildlife management, wetland management, water resources development, industrial activities and urban growth. The LGBMP also addresses wider development aims within lake dependent communities, including health, education, infrastructural development and the development, where necessary, of alternative livelihood strategies.

The LGFMP has for purpose to maximise poverty-focussed and gender-sensitive access to, and benefits from the sustainable exploitation of fishery resources within a clean and healthy environment. There are six outputs which, if successfully delivered, will together achieve the purpose of the LGFMP (Table 5). The plan is still under preparation.

Table 5. LGFMP outputs and activities

Outputs	Activities
1. Fishery information collected, used and transferred for planning.	This output covers a range of different activities that provide the rational basis of making, revising and monitoring the fishery management plan. It involves routine, community-based collection of fishery information by BMUs, its transfer between BMUs and different levels of government, and its analysis and use for planning purposes within local communities, LAGBIMO, local and national government. Fishery research is also included under this output: a demand-driven approach and local service delivery through the LAGBIMO Fisheries Research Unit.
2. Fish resources sustainably captured.	This output covers a wide range of management measures designed to avoid over-exploitation and damage to fish stocks. Activities include periodic review of fisheries regulations, based on incoming information, to ensure that they remain relevant to the needs of the fishery. Enforcement of prevailing regulations will be undertaken using the LAGBIMO Monitoring, Control and Surveillance Unit. The prevention of environmental fishing malpractices is also addressed under this output.
3. Access to, and benefits from fisheries resources equitably controlled.	The equitable control of access to and benefits from fisheries
4. Post-harvest efficiencies increased.	Technological improvements in fish processing. Infrastructure development, hygiene, water & sanitation, monitoring, control and surveillance of marketing, co-operative input supply and sale of product, price negotiations within BMUs between producers and traders
5. Human resource skills improved.	Training needs identification and subsequent training
6. Sustainable funding for management and development secured.	Tax levels; tendering

4.2. Management objectives.

The objectives of the lake-wide management plan (LGBMP) are to:

- Improve the livelihoods of poor lake basin communities.
- Ensure a healthy, clean and productive environment within the basin.
- Sustainably and effectively manage the Lake George basin fishery for increased productivity and improved livelihoods.
- Develop integrated, poverty focused and participatory planning systems for sustainable management of basin resources.
- Support a co-ordinated and effective conservation management approach and community-QEPA relations.

Within this lake-wide inter-sectoral plan, the fishery management plan has developed its own specific objectives. The FMC recognised that Lake George and the Kazinga Channel must be managed for commercial fisheries and that a range of social, economic and environmental aims needed to be included in the overall management objective. These comprised the following:

- Increased fish catch
- Increased income from fishery activities
- Increased standard of living
- Increased employment
- Sustainable management of fisheries resources for improved livelihoods
- Environmental protection
- Fisheries development

Taking these into account, the following single management objective statement was developed and agreed: "Maximised poverty focussed and gender sensitive access to, and benefits from the sustainable exploitation of fisheries resources within a clean and healthy environment".

4.3. Decision-making methods for each management objective

Under development

4.4. Data and information requirements to control and regulate the fishery.

A workshop comprising representatives of all stakeholders involved in the co-management of Lake George fishery identified the following types of information as required for effective management:

Biological
- What is the daily catch size (kg)?
- What is fish catch per boat per day?
- In which months are catches highest and lowest?
- Average catch per canoe?
- What kinds of species are caught and which are dominant?
- What types of baits are used and how are they obtained?

Technical
- How many canoes are on the lake?
- How many illegal boats by landing site?

- How many canoes and size of boats do you use?
- How many of boats by type are present?
- How many illegal nets and boats are destroyed annually?
- What types of nets are used?
- What kind of gear size and number do you use?
- What size of nets/hooks are in use?
- What kind of fishing practices are used
- What is your fishing time i.e. duration
- What type of nets do you use i.e. single or double?
- How many registered experimental and unlicensed fishers?
- Where are the fishing grounds for each landing site?

Marketing and Socio-economic
- What is monthly income from fish catches by landing site?
- Which markets are fish sold to?
- What processing methods are in use?
- What is fish price per landing site?
- How do you market your fish and the means of transport used?

Miscellaneous
- What is the landing population?
- What data collection equipment is there at landing sites?
- Who are the foreign people involved in fishing?
- What are the problems met on the lake e.g. crocodiles, hippos?
- What is your landing population by sex and age?
- Are there illegal landing sites?
- What are the organisations (community-based organisations & NGOs) found on the landing sites?
- How are fish handled after landing site do you have potable water?
- Do you have fisheries staff?
- How can an outsider access other landing sites?

5. Description of existing, and identification of potentially appropriate, data collection tools, sources and methods

5.1. Existing data collection sources, tools and methods (including strengths and weaknesses) – particularly their relevance to the management undertaken.

Previous existing system
As part of the participatory process of creating the institutional framework and entities for integrated management of the lake resources, the existing system of fishery data collection and use was assessed. The system in place until recently was a top-down imposed data collection and analysis system. Fisheries officers collected data on catches and catch efforts. Sample sizes were small and not representative, frequency was low, analysis limited and the use of data collected for planning and monitoring limited.

The major constraints that were put forward to this existing data collection and analysis system were (i) need of training in data collection and analysis; (ii) lack of data collection equipment; (iii) need for more effective systems to use the collected data and information for planning; (iv) related, the need for more effective systems for

data and information exchange between the different levels of management involved; and (v) the need for improved data storage facilities.

New, co-management system
A new fisheries information collection and analysis system was developed based on FAO systems and that satisfied requirements of all levels involved in the co-management of the fishery resources.

Data collection tools
In response to the requirements identified in 4.4, Catch Assessment (CAS) forms were designed for use at all relevant levels of management. These forms are included in Annex 3. The system was introduced on Lake George in December 2001. The CAS forms are used in the collection of basic data and information on catch volume, composition, value and effort.

Data collection organisation
All primary data collection is done at the BMU level. They are responsible for primary information collection, analysis, use and transfer.

Data collectors appointed by each BMU at the landing sites are collecting information on all catches on data collection dates. They are being paid for this service by receiving part of the catch, usually one fish per boat surveyed. The number of recorders has been agreed by BMUs in consultation with local fisheries officers.

Currently, all catches are surveyed on the survey dates and data are collected from all landings. Single weighing check points have been established at each landing site for recording fish catches. All fish in catches is being weighed and counted. Sub-sampling the catch is avoided.

A Fisheries Officer is working directly with community representatives to collect fishery information for between 4 to 8 days a month, surveying 1 to 2 days in each week by random selection of days sampled. No prior notice is given to fishers on survey dates. Local rules have been established at each landing site for information collection. These include setting times of landing catch and ensuring catches pass through the survey check points on survey days.

ILM has provided initial support to information collection by funding, where appropriate, recording shades, information storage facilities in community and government offices and items of field equipment (rain coats, weighing containers). LAGBIMO supports one fisheries officer to guide, support and monitor the CAS at all landing sites. The same officer will combine and analyse data from all landings to provide lake-wide information.

Information system
The information system builds upon the current local government community information collection systems and is not intended to interface with the fishery enforcement decision and activities.

The sub-county fisheries officer serves as a transfer and collection point for information. The officer collects copies of CAS 1 (BMU-level) and CAS 2 (parish-level) forms by 15th of each month and completes a CAS 3 form to the district FO before the end of the same month. The district Fisheries Officer (DFO) then completes a CAS 4 form and submits that to district authorities and to DFR, Entebbe, by end of the same month (Fig. 9). DFR produces synthesised information for the entire lake (CAS 5).

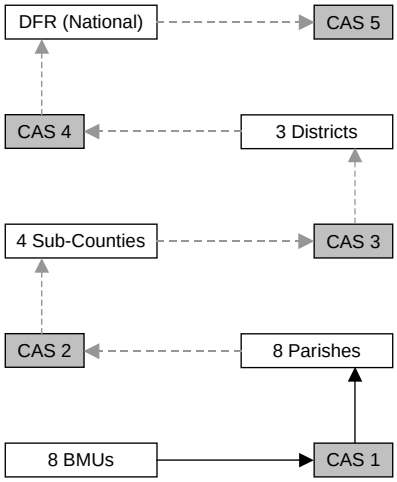

Figure 9. Data collection activities and actors. Solid arrows indicate original data, dashed arrows indicate flow of synthesized information.

A sensitization program has been implemented whereby community leaders and fisheries officers raised awareness to increase co-operation of fishers and traders in providing fishery information.

Experimental fishing
Catch per unit effort (CPUE) has been recognised as a key indicator for fisheries management. Specifically for Lake George, the catch per net (4.5 inch mesh) per night of *ngege* (*Oreochromis niloticus*) is regarded as one of the key resource management indicators for the fishery. A local experimental fishing team will be established to measure by "participatory research" fishing this indicator each month.

5.2. Potential improvements to existing system particularly in relation to use and dissemination.

The uptake is still limited, and the motivation of data collectors needs to be improved to increase the coverage of landings surveyed.

5.3. Attitudes towards participatory data collection systems, required incentives etc.

Use of data for enforcement
A major point of concern, both among communities and local government and DFR staff was the relationship between data collection and enforcement. It was questioned whether data should be collected from illegal fishers while ignoring the fact that they are illegal. If they are to be monitored, it was suggested that enforcement should be in place. It was stressed that while care should be exercised to ensure that enforcement does not sabotage data collection, the monitoring system is not intended for undermining enforcement practices. Indeed, it may well be used as a tool for determining whether illegalities are a threat to the fishery and hence used for future management decisions, which may include enforcement measures.

Apart from some minor problems with Fisheries Officers claiming part of the catch for their services, there seems to be an overall positive attitude by fishers and barias towards the collection of data about the catches.

6. Data storage and processing methods.

ILM has provided the BMUs with box files for storage of the CAS data recording sheers. At district level, computers have been supplied and staff trained in data analysis.

Each BMU produces a quarterly fishery report using the analysis of information obtained from the CAS system operating at their landing site. Each report will provide the foundation of fishery management discussions and planning. Information from the CAS system will form the basis of regular reporting by government officers to their reporting officers.

The stakeholders identified the following types of fishery information as what they need for planning and management of the fishery resources:

- Catch (kg) per boat per day
- Catch per boat per day of each fish species
- Cause of differences in catch rates (seasonal)
- Types of fish caught (sampled and unsampled)
- Fishing method (sampled and unsampled)
- Fishing gear type
- Number of gears per boat
- Which landings use illegal methods
- Boat type
- Breeding grounds
- Fishing grounds
- Fish processing methods
- Fishing income
- Best markets for fish

Government fisheries staff added the following:

- Number of different fishery stakeholders
- Number of illegal boats
- Number of gears,
- Gear size (mesh and hooks)
- Hanging ratio of nets
- Colour of nets
- Length of boats

In summary, these information requirements are covered by the following analysis outputs:

(i) Total fish catch
Total fish catch can be calculated in different ways for different purposes:

- for different periods, e.g., per day, month and year;
- for different geographical areas, e.g., per landing site, parish, sub-county, district, lake and nationally;
- for different gears;
- for different fish species;
- for all gears and all species combined.

On Lake George total catch can be obtained from full (census) surveys since there are only 8 designated landing sites (6 on the lake and 2 on Kazinga Channel) and all landings are sampled on survey days. CAS 1 is designed for sampling all fishing boats (or almost all) on designated sampling days. If all boats are sampled on each sampling day then it is possible to obtain all the above listed catch estimates from the completed CAS forms 1, 2, 3, 4 and 5.

Catch through time
Fish catches are not usually weighed in Uganda because the lack of weighing balances. An exception is Lake George, where balances have been provided by ILM and catches have been weighed since December 2001. Daily catches are normally used as a basis from which to estimate catches for longer time periods. The daily catch usually has a reasonably high degree of variability making it necessary to sample several days to obtain a reliable estimate for the longer-term, e.g., month. On Lake George it was agreed that a minimum of one day per week would be sampled and a maximum of two per week. Monthly catch estimates are useful for identifying broad seasonal trends in fish availability and for quickly spotting any problems that affect fish abundance. Annual catch data are useful in identifying long-term changes in fisheries, giving a rough indicator of stock status which can be used to further investigate a particular issue.

Catch by geographical area
Estimates of catch for different geographical areas serve different but inter-related functions. Knowledge of the total catch from an individual landing site provides local users with an approximate indication of the current state of the fish stocks. The information gives local planners and administrators an idea of the relative importance of the site, the amount of business carried out there and, when linked to fish price data, the value of fisheries at that site.

Lake George catch estimates
Community data recorders were expected to sample all fishing boats landing at a designated landing site on 4 to 8 sampling days per month. In reality, they sampled far fewer boats than expected (only about 25%). This means that it is not possible to calculate accurately total daily, monthly or annual catch by gear type when a major part of the fishing fleet is not sampled by recorders. The stakeholders are committed to improving the situation and increase coverage of surveying to required levels.

(ii) Fishing effort
The government has for many years attempted to regulate fishing effort on Lake George by restricting the number of licensed fishing boats with the legal right to fish. It also combined this regulation with a second rule that restricted the number of gillnets and hooks that were allowed to be used by each licensed fishing boat.

In December 2001, the DFR increased the number of licensed fishing boats on Lake George and its Kazinga Channel (Table 6). The total number of licensed boats increased from 188 to 326 whilst the maximum number of stationary set gillnets increased from 10 to 30 per boat, and hooks from 10 to 100 per boat. Thus, the total allowable number of stationary set gillnets and hooks is now (326 x 30 =) 9,780 nets[4] and (326 x 100 =) 32,600 hooks.

[4] with each net defined in law as having the following dimensions: 90 metres stretched length and 26 meshes deep

Table 6. Numbers of licensed fishing vessels

Landing site	Number of boat licences in 2001	Additional licences 2002	New total licences 2002
Kahendero	24	24	48
Hamukungu	28	20	48
Kasenyi	28	20	48
Kashaka	28	20	48
Mahyoro	22	18	40
Kayinja	14	20	34
Total Lake George	*144*	*122*	*266*
Katunguru K	14	16	30
Katunguru B	30	0	30
Total Kazinga Channel	*44*	*16*	*60*
Total Lake & Channel	*188*	*138*	*326*

The actual situation is, however, very much different to this. Fishers are using a variety of ways of illegally increasing fishing effort in order to increase catches and incomes. These include:

- Increasing the unit size of gears by using *muchira* nets, made by joining two gill to double the depth of the net;
- Increasing the number of gears above the legal limit, e.g., many long-lines use up to 1200 hooks and many fishers deploy over 30 gillnets per night;
- Increasing the catching power by using illegal active fishing methods such as *Kikubo* (driving fish by beating the water) and *ponda ponda* (boat seining);
- Extending the fishing period into both day and night;
- Increasing the number of fishing units by using unlicensed fishing boats (often combined with the use of illegal gears or methods).

Knowledge of fishing effort is critically important to planning and management. It is essential that an accurate estimate of effort be obtained from the CAS. Currently, recorders sample only a small proportion of the fishing fleet, leaving a major gap in information on fishing effort. Coverage of landings will be improved to required levels and monitoring and control of fishing activities by BMUs will be increased.

7. Identification of potentially appropriate data sharing mechanisms

7.1. Opportunities and pathways for sharing.

Opportunities for sharing
At the levels of parish, sub-county and district, catch information should be used in making local government development plans. In doing so, it must be linked to other types of social, economic and environmental planning information. Without this information, it is usual for local fisheries to be taken for granted, under-valued and unable to attract investment from local governments.

At a lake-wide level, catch estimates are one of the key indicators on the state of shared fish resources and it is at this level that rational resource management decisions must be taken.

Nationally, catch data are compiled to provide an overall indication of the scale and significance of fisheries to the country. This information, when combined with others,

is used to guide broad national planning and policy decisions. National catch data are transferred internationally to FAO where global catch data compilation is undertaken.

Current fishery information transfers, and links to planning
Transfer of information from one stakeholder to the next as it currently takes place under the recent co-management arrangements is shown in Fig. 10.

The BMU data collector works with the fish guard or the FO at the landing site and parish level, collecting data and registering those by using CAS 1 forms. They compile this information using CAS 2, which they give to the sub-county, which in turn uses CAS 3 to summarise the information received. At the district level, the form used is CAS 4. Each at their appropriate level, the information contained in the CAS forms is used in the local government planning process, i.e., for the development of Parish Development Plans, Sub-county Development Plans and District Development Plans respectively.

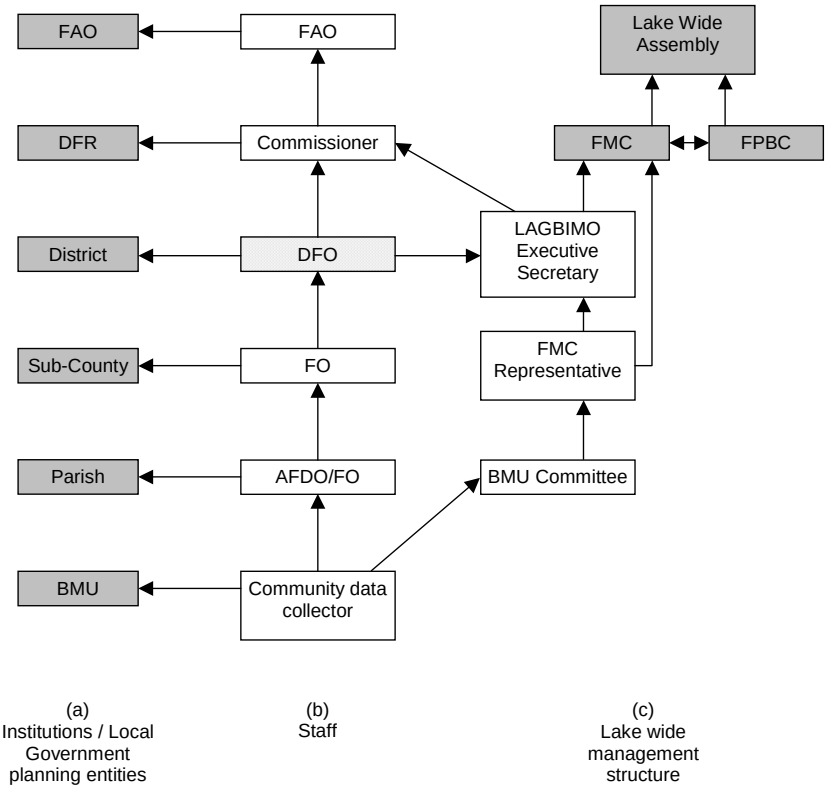

Figure 10. Fisheries information flow and use in planning. The greyed boxes indicate instances where data analysis and use in planning occur. The hashed box (DFO) indicates the level where data are stored and processed on computers

However, it has been noted by some of the planners that the CAS forms do not provide enough information on the state of the fishery, and there is a need for further data analysis and interpretation.

The DFO coordinates the distribution of this information throughout his district and sends it to LAGBIMO. The DFO also sends information to DFR as a contribution to the compilation of the state of fisheries in Uganda. DFR is then responsible for making policies, laws and plans based on the information collected. DFR then sends this information on to FAO, which uses the information for normative activities.

The DFOs also send the information regarding their district to the Executive Secretary of LAGBIMO.

The first computer comes in at the district level in the DFO's office. The computer is used for storage and analysis of the data received. The analyses and interpretations are then passed to the Executive Secretary and DFR. The data collectors use calculators for the analysis of the data at their level. This allows communities to take decisions based on the information they collect. This in turn motivates data collectors and fishers to participate in the data collection as they can see immediate impact and outcomes of their efforts.

The LAGBIMO Executive Secretary is responsible for compiling information at lake-wide level for planning purposes. The information from the districts is compiled and sent to the FMC members. The FMC could also acquire this information from its BMU representatives members. The outcome of the FMC meeting is distributed to the other committees in LAGBIMO.

Information use
BMUs have been actively analysing their data and producing conclusions about some relevant trends in their fishery. The challenge is for them to draw conclusions that are appropriate for the level that they are managing, and then to interpret data and results correctly. Furthermore, there is the challenge to translate any conclusions in appropriate and effective management actions.

This is still under development at this point. The co-managers need further technical capacity building to analyse data, draw level-appropriate conclusions and translate these in realistic and effective management actions. There is, however, capacity to absorb and use data from other sectors that is currently underutilised. In part, this integrated management planning happens through the interaction with local government planning and monitoring, but this is still at an early stage, and the effectivity of the existing approach is yet to be assessed.

7.2. Identification of requirements for sharing (giving and receiving).

The flows of information described higher are mostly limited to fishery-related activities and parameters. The need for data and information from other sectors that are relevant for local management entities is limited by their capacity to use this information in the monitoring and planning at their level.

8. Existing or previous activities to develop data collection and sharing systems.

Decentralisation is a fairly recent development in Uganda. The data collection that existed since the 1950s as described under 5.1 resulted in very little use of data for planning at local levels or in management at all.

Annex 1. Classification of Wealth Groups.

Wealth Group	Indicators
Group 1 (Poorest)	• Has no shelter or stays with relatives or abandoned houses • May own a small grocery • Does not pay government tax
Group 2	• One semi-permanent house or rents • Owns a licensed or unlicensed boat • Owns at least a small grocery • Owns less than 10 nets & hooks • Owns at least a bicycle • Struggling to school children • Pays less than 15000 Ugandan Shillings as government tax
Group 3	One permanent house One semi-permanent house At least a medium grocery A Licensed boat Fishing nets and hooks Owns a motor cycle Children in school Pays 25,000 Ugandan Shillings as government tax
Group 4 (Wealthiest)	• One or more permanent house(s) • Two or more rented house(s) • Medium and or large Grocery • Licensed boat and or other types of boats • Fishing nets and Hooks • One or more vehicles • One or more motorcycles • One or more bicycles • One or more grinding mills • All children in school • Pay 30,000 Ugandan Shillings as government tax

Annex 2. Functions of LAGBIMO structures

The Lake-wide Assembly(LWA)
One of the constitutional responsibilities of the Assembly is to ensure harmonisation of management plans and projects to be implemented by different stakeholders, including central government institutions. The Assembly will annually review, update, and approve the Lake George Basin Management Plan (LGBMP) and budget. It will also advocate for integration of the plan into local government development plans and budget cycles. In particular, this will involve lobbying to ensure that the sub-county budgets take into account the priorities of poor people and support the sustainable use and management of the Lake George basin natural resources. The LWA approves Standing Committees and ad hoc Technical Committees required for efficient implementation of LAGBIMO activities. The Assembly will meet at least twice a year.

The Executive Committee of the Lake-wide Assembly(EC)
On behalf of the Assembly, the EC commissioned the preparation of the LGBMP for its consideration and approval. It has a constitutional responsibility to mobilise and sensitise communities on relevant government policies, plans and programmes and ensure that these policies, plans and programmes remain focused on the poor. It will also ensure appropriate interaction of co-operating local governments and their counterparts from central government agencies. It too will ensure that LAGBIMO plans and interventions are pro-poor and address the needs and aspirations of community stakeholders. It will advocate for the incorporation of LAGBIMO plans into the district and sub-county development processes and plans, and will commission and approve technical assistance, including service provision, to guide and support activities of LAGBIMO. The EC meets at quarterly intervals to approve work plans, technical reports and budgets.

The LAGBIMO Secretariat
As a support and resource centre for LAGBIMO, the Secretariat is responsible for the recording, documentation, dissemination and custody of all information relating to the operations of the organisation. It provides support to the other organs of the organisation including provision of technical guidance in inter-sectoral planning and coordination as well as implementation of work plans. On behalf of the EC, the Secretariat prepares annual work plans and budgets of the organisation.

The Fisheries Management Committee
This committee leads all activities relating to lake-wide fishery planning and management. It is responsible for ensuring that fishery monitoring information is collected and analysed on monthly basis by BMUs and governments. It will use this information on a quarterly basis to review the status of the fishery and identify priority issues to be addressed and develop agreed actions to address these issues. It will also ensure that priority fishery management issues identified at LWA meetings are appropriately addressed. It has developed a Lake George Fisheries Management Plan, which has been incorporated into this plan.

The Finance, Planning and Budgeting Committee
This committee is tasked by the EC to lead on all activities related to planning, budgeting and finance. The Committee is responsible for ensuring participation and consultation in the development of the LGBMP, and overseeing the implementation. The Committee is responsible for advocating for the incorporation of the LGBMP and BMU plans and activities into the development plans, work plans and budgets of local government and other agencies at appropriate levels. Information management and monitoring and evaluation systems will be critical to the development and

implementation of management and work plans, and the Committee is responsible for the development of these. The Committee is also responsible for overseeing the budget, co-ordinating the raising of funds and ensuring that appropriate audit systems are in place.

Role of BMUs

BMUs are responsible for developing and implementing local fishery management plans and more holistic beach development plans within their area of jurisdiction. They will advocate for the integration of LGBMP and BMU plans into parish development plans using community action plans as a pathway. They will collaborate with local government partners in the collection, use and dissemination of fishery and environmental information for the improved management of resources. At lake-wide level, BMUs are well represented in the Assembly, EC, FMC and FPBC. They are empowered under the Fish (Beach Management) Rules 2003, Statutory Instrument No. 35, to undertake a range of functions and responsibilities.

Annex 3. Catch Assessment forms

CATCH ASSESSMENT SURVEY: CAS 1 - DAILY FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE

TOTAL FISHING BOATS LANDING …… (A)

NAME OF LANDING SITE……

TOTAL BOATS -SURVEYED……(B)

DISTRICT……

RAISING FACTOR C (=A/B)…… (C)

SUB-COUNTY……PARISH……

DAY. ……MONTH……YEAR……

NAME OF RECORDER……

FISHING UNIT																		
BOATS		GEARS/METHODS			NGEGE		SEMUTUNDA		MALE		MAMBA		BAMBARA		NJUNGURI		OTHERS		TOTAL
TYPE	REG. NO.	TYPE	MESH/ HOOK SIZE	NO.	NO.	WT.	NO.	WT.	NO.	WT.	NO.	WT.	NO.	WT.	NO.	WT.	NO.	WT.	WEIGHT
SURVEYED TOTAL (WT= 1)																			TOTAL WT =
AVERAGE PRICE PER KG (= 2)																			
TOTAL VALUE = (1*2)																			

** UNITS : WT in KG ; value in Ush. BOAT TYPES: NB = Ntega Boat , D = Dingy

Page ……/…….. DATAESTIMATED BY RECORDER AND NOT REPORTED BY FISHERMEN IS MARKED BY ASTERIX

GEARS G = Stationary GILLNET, Muchira GILLNET, Ty= TYCOON, LL= LONGLINE, FH= FLOATING HOOKS, R= ROD & LINE, T = TRAPS, O = OTHERS

CATCH ASSESSMENT SURVEY: CAS 2A - MONTHLY PARISH FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE, KAZINGA CHANNEL & EDWARD
TOTAL DAYS IN MONTH……...(D)

DISTRICT……..
TOTAL DAYS SURVEYED……..(E)

SUB-COUNTY……..

PARISH……
RAISING FACTOR F (= D/E)……(F)

MONTH……YEAR……
RECORDER……

PART A: UNRAISED CATCHES (From CAS 1)

			FISH GENERA/SPECIES LANDED															
DATE SURVEY	BEACH MANAGEMENT UNIT	RF C	NGEGE		SEMUTUNDU		MAMBA		MALE		BAMBARA		NJUNGULI		OTHERS		TOTAL WT	TOTAL VALUE
			NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT		

CATCH ASSESSMENT SURVEY: CAS 2B - MONTHLY PARISH FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE, KAZINGA CHANNEL & EDWARD
TOTAL DAYS IN MONTH……...(D)

DISTRICT……..
TOTAL DAYS SURVEYED……(E)

SUB-COUNTY……..

PARISH……
RAISING FACTOR F (= D/E)……(F)

MONTH……YEAR……
RECORDER……

PART B: RAISED CATCHES (CAS 1 x RF C)

				FISH GENERA / SPECIES LANDED											
	RF C	Tilapia		Bagrus		Clarius		Protopterus		Leuco		Others / Njuguri		TOTALS Wt	Value
		NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT		
/ Catches (															
thly Catch F)															

CATCH ASSESSMENT SURVEY: CAS 3 - MONTHLY SUB-COUNTY FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE
DISTRICT……

SUB-COUNTY……..……

MONTH……YEAR……
RECORDER……

ARISH / ANDIN SITE	FISH GENERA/SPECIES LANDED															
	NGEGE		BAMBARA		MAMBA		SEMUTUNDU		MALE		NJUNGULI		OTHERS		TOTAL WT	TOTAL VALUE
	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT		
UB-OUNTY OTAL																

CATCH ASSESSMENT SURVEY: CAS 4 - MONTHLY DISTRICT FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE
DISTRICT……

MONTH……YEAR……
RECORDER……

UB-OUNT	PARISH	FISH GENERA/SPECIES LANDED															
		NGEGE		MALE		MAMBA		SEMUTUNDU		BAMBARA		NJUNGULI		OTHERS		TOTAL WT	TOTAL VALUE
		NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT		
UB-COUNTY OTAL																	
UB-COUNTY OTAL																	
ISTRICT TOTAL																	

CATCH ASSESSMENT SURVEY: CAS 5 - MONTHLY LAKE WIDE FISH LANDINGS

NAME OF WATER BODY: LAKE GEORGE **MONTH……YEAR……..**

RECORDER……

UB-COUNT	PARISH	FISH GENERA/SPECIES LANDED															
		NGEGE		MAMBA		MALE		SEMUTUNDU		BAMBARA		NJUNGULI		OTHERS		TOTAL WT	TOTAL VALUE
		NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT	NO	WT		
UB-COUNTY TOTAL																	
UB-COUNTY TOTAL																	
UB-COUNTY TOTAL																	
ISRICT TOTAL																	
AKE WIDE TOTAL																	