The Strategic Action Programme for the Sustainable Management of Lake Tanganyika
July 2000

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This programme was duly adopted by the four riparian states at the final meeting of the LTBP Regional Steering Committee held in Nairobi, July 13, 2000.

ON BEHALF OF:	*SIGNATURE*	*NAME/TITLE*
Government of Burundi	_____	_____
Government of the Democratic Republic of Congo	_____	_____
Government of Tanzania	_____	_____
Government of Zambia	_____	_____

Preface

The Strategic Action Programme for the Sustainable Management of Lake Tanganyika establishes an agreed framework for implementing priority interventions to promote conservation of biodiversity and the sustainable use of the lake and coastal resources and to manage activities in the wider catchment that have negative impacts on these resources.

This document is the result of the regional planning process undertaken with the support of The Lake Tanganyika Biodiversity Project, "Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika", financed under the UNDP/Global Environmental Facility (GEF). In January 1998 the project Regional Steering Committee gave the task of preparing the Strategic Action Programme (SAP) to the Technical Advisory Committee SAP Planning Group, with representation from each country led by the National Coordinator.

The Prioritised Programme of Actions presented in this document is based on the evaluation of the Transboundary Diagnostic Analysis (TDA) carried out by the SAP Planning Group. The TDA was based on the extensive scientific and managerial experience of lake issues brought by the Planning Group members and the many other individuals and institutions who participated in the planning and in the Special Studies programmes carried out by the project.

This Strategic Action Programme establishes a planning framework that can respond to the changing demands for the sustainable use of the natural resources of Lake Tanganyika and for the protection and conservation of its biological diversity. The SAP will be revised in future iterations in light of increased knowledge and in response to changes in opportunities from, and threats to lake resources.

In due course the management of the lake, and the implementation of this programme will be supported by a Convention, developed in parallel with the SAP.

The Strategic Action Programme for the Sustainable Management of Lake Tanganyika was adopted at the Steering Committee held in Nairobi July 2000.

Executive Summary

The development of the Strategic Action Programme (SAP) has been undertaken by the Technical Advisory Committee SAP Planning Group, mandated by the Regional Steering Committee of the Lake Tanganyika Biodiversity Project (Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika[1]).

The five-year project became effective in 1995 under a financing agreement between the United Nations Development Programme on behalf of the Global Environment Facility, and the four riparian countries of Burundi, the Democratic Republic of the Congo, Tanzania and Zambia. The objective of the project was to "demonstrate an effective regional approach to control pollution and to prevent the loss of the exceptional biodiversity of Lake Tanganyika's international waters.

The project had three key outputs:

- A Strategic Action Plan with priority regional and national actions
- A Convention providing a formal framework for the joint management of the lake
- A Special Studies programme, providing supporting scientific and technical reports

The rationale for the preparation of the Strategic Action Plan (SAP) is the common understanding that the lake is a shared resource. The activities of any one country on the lake or in the lake catchment can have transboundary implications on this shared resource.

The conservation and use of these resources requires a common set of objectives and shared responsibility for undertaking a programme of actions to counteract threats to these resources and make full use of opportunities offered by them.

The objective of the SAP is the protection and conservation of the biological diversity and the sustainable use of the natural resources of Lake Tanganyika.

Chapter 1 describes the lake environment and the need for action.

Chapter 2 records the process of consultation involved in preparing the SAP.

Chapter 3 proposes an interim management body for the SAP – until such a time as a permanent management body is established under a Convention.

Chapter 4 describes the methodological framework used to establish priority actions.

Chapter 5 proposes the programme of priority regional and national actions, addressing the four main issues of the development of a sustainable fisheries, pollution control, sediment management and habitat conservation.

[1] UNDP/GEF Project Document RAF/92/G32

The SAP and the Convention

The SAP defines regional and national priority actions and the regional institutional arrangements that will be needed to initiate and supervise these actions. As social and economic pressures on the environment change over time, these actions will also need to change.

This first SAP therefore establishes a framework within which future iterations of the SAP can be reviewed and updated to incorporate new actions as required.

The Convention will provide a legal framework for the future management of the lake, setting out the management principles, as well as specific obligations and procedures. The key mechanism to implementing the Convention is the SAP.

While the draft Convention defines a formal lake management body, the Lake Tanganyika Authority (ILTMB), this can not be established until the Convention is signed and ratified. The SAP therefore includes the establishment of an Interim Lake Tanganyika Management Body with responsibility for coordinating the implementation of the programme of priority actions within the SAP.

The Interim Lake Tanganyika Management Body

This body will remain responsible for the management of the SAP until the Convention is signed and a permanent management body is established.

The proposed structure of the interim body is a simple two-tier structure:

- The Interim Lake Tanganyika Management Committee (ILTMC) – with national delegations led by the Permanent Secretary of the relevant ministry or where this is not applicable a senior representative of the Minister.
- The Interim Lake Tanganyika Management Secretariat (ILTMS) – a full time planning and coordination group with a Director and Deputy Director appointed by the ILTMC, and with additional technical and administrative support staff as required.

The priority for the interim body is to:

- Promote the finalisation and signing of the Convention and supporte the creation of the permanent institutional structure defined in the convention
- Coordinate, support and prepare costed project proposals for the priority actions listed in the SAP.
- Act as the lead group to coordinate and leverage funding at national and regional levels in support of the SAP.
- Integrate national and regional actions in the proposed Framework Fisheries Management Plan developed under the LTR Project, within the SAP.

The Programme of Priority Actions

The lake is an international[2] water body, shared by the four riparian countries with their national boundaries passing through the lake. All actions, apart from the regional coordination of the programme, fall within national territories. The responsibility for implementing these actions remains with national governments and the SAP defines the priority national actions within a regional framework.

The proposed programme of priority interventions is based on an evaluation of threats to the biodiversity and sustainable use of the lake resources and groups these actions into similar sets of responses. While this approach points to sectoral solutions to sectoral problems, proposed actions are based on integrated development interventions addressing the underlying causes of these sectoral problems, taking a holistic approach.

The proposed programme is based on regional and national priority actions within the following framework:

- Reduce Impact of Fishing – Development of a Sustainable Fisheries
  - Excessive Fishing Effort in the Littoral Zone
  - Excessive Fishing Effort in the Pelagic Zone
  - Excessive or Uncontrolled Extraction of Ornamental Fish
- Pollution Control
  - Urban and Industrial Pollution
  - Harbour Pollution
  - Pollution from Future Mining Activities or Oil Exploitation
  - Risks of Major Marine Accidents
- Sediment Management
  - Promotion of Sustainable Farming Practices
  - Control of Deforestation
- Habitat Conservation
  - Threats to resources of National Parks
  - Conservation of Sensitive Coastal Habitats

Under this first SAP, the main regional action is the coordination of an integrated programme of national project sub-components. These national sub-components while directly addressing identified hot-spots and sources of transboundary problems, also include crosscutting themes such as environmental education and awareness creation and promotion of alternative livelihoods.

The Next Steps

The financing of the long-term programme defined by the SAP is expected to involve a large number of institutions at regional and country levels. It will include a

[2] It is not “international” in the marine sense, which refers to waters outside national territories.

substantial base-line funding element from the participating countries, bilateral support to national projects, investment through the regional facilities such as the ADB and private investment from commercial sources, as well as support from the GEF and other multilateral agencies.

As a regional exercise, the SAP can not go further into specific national project component details nor can it prepare budget proposals for national activities that will have to be negotiated between national institutions and donor agencies.

The next step must be to further develop national project sub-components to fully budgeted project proposals that can then be undertaken by the countries, with the additional support of donors as required.

The immediate task of the Interim Lake Tanganyika Management Body is to support this process of national project development and financing negotiation, while establishing appropriate regional coordination structures, and promoting the finalisation and signing of the draft Convention[3].

Updating the SAP

This is the first iteration of the SAP. It is the result of an extensive programme of stakeholder consultation and is based on "best knowledge" of resource users, managers and scientists.

Amendment of this document will be a regular process, and while minor changes can be expected every year, a major review may be necessary every five years.

Future iterations of the SAP and the detailed development of the proposed interventions will continue to expand to involve an ever-broader participation of stakeholder communities.

Future developments of the SAP will be the responsibility of the Lake Management Authority, to be established under the Convention. In the meantime, the Interim Lake Management Body will be empowered to amend the SAP as necessary in line with the principles embodied in this document.

[3] In order to initiate this process, a request has been drafted for a GEF Project Preparation and Development Facility (PDF) Block C Grant to support the activities of a Planning Support and Coordination Unit for a twelve month period. This unit would be a regional unit, but with the mandate and the resources to support national project proposal development as well as the further development of a central regional coordination and management programme.

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Abbreviations

CIFA Committee for Inland Fisheries of Africa

CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora

EIA Environmental Impact Assessment

FAO Food and Agricultural Organisation of the UN

FU Fishing Unit

GEF Global Environmental Facility

GIS Geographical Information System - a data base system for managing spatial information, linking maps to physical and socio-economic data

IAs Implementing agencies of the GEF: UNDP, UNEP and the World Bank

ILTMC Interim Lake Tanganyika Management Committee - of the ILTMB

ILTMS Interim Lake Tanganyika Management Secretariat - of the ILTMB

ILTMB Interim Lake Tanganyika Management Body proposed in this SAP

LTBP Lake Tanganyika Biodiversity Project – full title "Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika"

LTFFMP Lake Tanganyika Framework Fisheries Management Plan developed by LTR

LTFMP Lake Tanganyika Fisheries Monitoring Programme – part of the Lake Tanganyika Framework Fisheries Management Plan developed by LTR

LTR Lake Tanganyika Research Project **–** full title **"**Research for the Management of the Fisheries on Lake Tanganyika"

NWG National Working Groups of the LTBP

SADCC the Southern African Development Coordination Committee – now **SADC** the Southern African Development Community

SAP Strategic Action Programme

STAP Scientific and Technical Advisory Panel of the GEF

TAC Technical Advisory Committee of the LTBP

TDA Transboundary Diagnostic Analysis – a planning framework used in GEF international waters programmes

UNDP United Nations Development Programme

UNEP United Nations Environment Programme

National Institution Abbreviations

Burundi

BBN Bureau Burundais de Normalisation
BRB Banque de la République du Burundi
CCI Chambre du Commerce et de l'Industrie du Burundi
DG ATE Direction Générale de l'Aménagement du Territoire et de l'Environnement
ETP Ecole des Travaux Publics de Gitega
I**GEBU** Institut Géographique du Burundi
INECN Institut National pour l'Environnement et la Conservation de la Nature
MAE Ministère de l'Agriculture et de l'Elevage
MCIT Ministère du Commerce, de l'Industrie et du Tourisme
MDC Ministère du Développement Communal
MEM Ministère de l'Energie et des Mines
MINATE Ministère de l'Aménagement du Territoire et de l'Environnement
MSP Ministère de la Santé Publique
MTPE Ministère des Travaux Publics et de l'Equipement
ODEB Organisation pour la Défense de l'Environnement au Burundi
ONAPHA Office National Pharmaceutique
Regideso Régie de Distribution de l'Electricité et des Eaux
SETEMU Services Techniques Municipaux
UB Université du Burundi

Congo

AT Admimistration Territoriale
CADIC Centre d'Actions et de Développement et d'Initiatives Communautaires
CIC Conseil Interministériel de Consultation
CRH Centre de Recherches en Hydrologie
CRGM Centre de Recherches Géologiques et Minières
CRSN Centre de Recherche en Sciences Naturelles
ICCN Instititut Congolais pour la Conservation de la Nature
INERA Institut National d'Etudes et de Recherches Agronomiques
ISDR Institut Supérieur de Développement Rural
ISP Institut Supérieur Pédagogique
MINAGRI Ministère de l'Agriculture
NOPTA Nouvelles Orientations de la Pêche au Lac Tanganyika
SENADEP Service National de Développement de la Pêche
SNV Service National de Vulgarisation

Tanzania

JGI the Jane Goodall Institute
NEMC National Environmental Management Council
NLUPC National Land Use Planning Commission
PMO Prime Ministers Office
TACARE Tanganyika Catchment Reforestation
TAFIRI Tanzania Fisheries Research Institute
TANAPA Tanzania National Parks
TANESCO Tanzania Electrical Supply Company
TRC Tanzania Railways Corporation
UWWS & S Urban Water Supply and Sewerage
WCST Wildlife Conservation Society of Tanzania

Zambia

DOF Department of Fisheries
D-WASHE District Water Supply and Sanitation Education
ECZ Environmental Council of Zambia
MAFF Ministry of Agriculture, Food and Fisheries
ZAWA Zambia Wildlife Authority
ZRA Zambia Revenue Authority

Glossary of Terms

Agenda 21 United Nations Conference on Environment and Development (Earth Summit) agreement on action to be taken to protect the environment. It proposes integrating environmental protection and economic development.

Baseline Costs the reference point for calculating incremental costs. The GEF funds the difference between the cost of a project undertaken with global environmental objectives in mind and the costs of the same project without global environmental concerns. The baseline is the latter project that yields only national benefits.

Benthic the environment where organisms are attached to, or rest on, the substrate.

Biodiversity defined in the Convention on Biological Diversity: "Biological diversity" means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Co-funding or co-financing Since the GEF funds the incremental costs of projects, with few exceptions (e.g. for enabling activities) GEF projects require additional funding from other sources to cover the national benefits costs. This additional funding component is referred to as co-funding. The incremental cost can be co-financed as well.

Convention on Biological Diversity was opened for signature at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992. The principal objectives of the Convention on Biological Diversity are the conservation and sustainable use of biological diversity, and the fair and equitable sharing of benefits arising from its utilisation The Convention recognises that the key to maintaining biological diversity depends upon using it in a sustainable manner.

Convention The Convention for the Sustainable Management of Lake Tanganyika – a draft document prepared by LTBP.

Dublin Principles The Dublin Statement on Water and Sustainable Development, prepared at the International Conference on Water and the Environment (ICWE) in Dublin, Ireland, January 1992, calling for fundamental new approaches to the assessment, development and management of freshwater resources.

Eutrophication a process in which increasing nutrient load in rivers or lakes triggers algal blooms which in turn result in de-oxygenation and a change in species.

Gazetted (e.g. Gazetted Forest Reserve) a legally established protected area, with boundaries published in the Government Gazette or some other formal record of government procedures.

Global environmental benefits that accrue to the global community, as distinct from solely national benefits that accrue to the people of the country, in which a project is located.

Hot spot a local land area, stretch of surface water or specific aquifer which is subject to excessive pollution or other human induced pressure and which requires a specific action to prevent or reduce degradation.

Incremental cost the additional cost that the GEF funds between the cost of an alternative project that a country would have implemented in the absence of global environmental concerns and a project undertaken with global objectives in mind.

International waters One of the four focal areas that the GEF focuses on. Defined as the seas, shared river and lake basins and shared estuaries and wetlands and shared groundwater aquifers. The distinguishing feature is that more than one nation has access to or makes use of them.

Investment project A project where a significant part of the funding is used for the acquisition of capital equipment or the creation of infrastructural benefits.

Leveraging refers to the ability to secure, or "leverage" additional funds for GEF project implementation. GEF projects generally require such co-financing from host governments, the Implementing Agencies (UNDP, UNEP and the World Bank), multilateral development banks, bilateral agencies and/or other funding sources.

Littoral the near-shore environment (down to about 40m depth in Lake Tanganyika).

Pelagic the open water environment.

Point source, Non-point source a localised discharge of pollutants, (e.g. from an industrial plants; non-point source indicates diffuse pollution (e.g. agricultural run-off).

Protected area a geographical area or territory with legally defined boundaries, established to afford protection to certain natural characteristics of particular value or interest, in the case of Lake Tanganyika this is generally only used to refer to the formal network of National Parks or Natural Reserves.

Public involvement a basic operational principle for GEF project development and implementation is that the public be involved at all stages. Public involvement consists of information dissemination, consultation, and stakeholder participation. The GEF policy on public involvement is outlined in Public Involvement in GEF-Financed Projects, 1996.

Ramsar the Ramsar Convention – aims to protect wetlands sites of international importance.

Stakeholder the term applied to those potentially affected by a project, including recipient country governments, implementing agencies, project executing agencies, groups contracted to conduct project activities at various stages of the project , and other groups in the civil society which may have an interest in the project.s

1 Introduction

1.1 A Need for Joint Action - the Shared Resources of Lake Tanganyika

1.1.1 The Lake

Lake Tanganyika is exceptionally old. Its present basins have been water-filled for at least ten million years and some sediments date back twice this period. With a surface area of 33,000 km^2 and mean depth of 600 m, it is also very large. The lake is almost 1500 m at its deepest point and the total volume of water is some 19,000 km^3 – almost one sixth of the world's free freshwater. The lake is a unique environment.

More than 1,500 different species of plants and animals live in Lake Tanganyika and half of these are found nowhere else in the world. Like Lakes Victoria and Malawi/Niassa, Lake Tanganyika is famous for its species flocks[4] of cichlid fish, with over 260 species, but unlike these other African Great Lakes, Tanganyika also hosts species flocks of non-cichlid fish, decapod and ostracode crustaceans, gastropod and bivalve molluscs, among other groups.

The lake is valuable not only for the presence of these unique species, but also as a microcosm in which to study the processes of evolution that have led to this diversity.

The value of the lake to global biodiversity is beyond measure.

1.1.2 The People

Apart from the wider global environmental interest in the lake, there is also the lake's immediate value to lakeshore communities.

The lake is a source of fish for consumption and sale; it provides a key transport and communications link, supporting the economic and social development of lake-shore communities and it is a permanent source of water for industrial and agricultural development as well as for domestic use. Many recognise the lake as essential to their overall survival.

There are about one million people around the lake who depend on the fish resources. Fish is also transported to distant urban centres where it is part of the preferred diet.

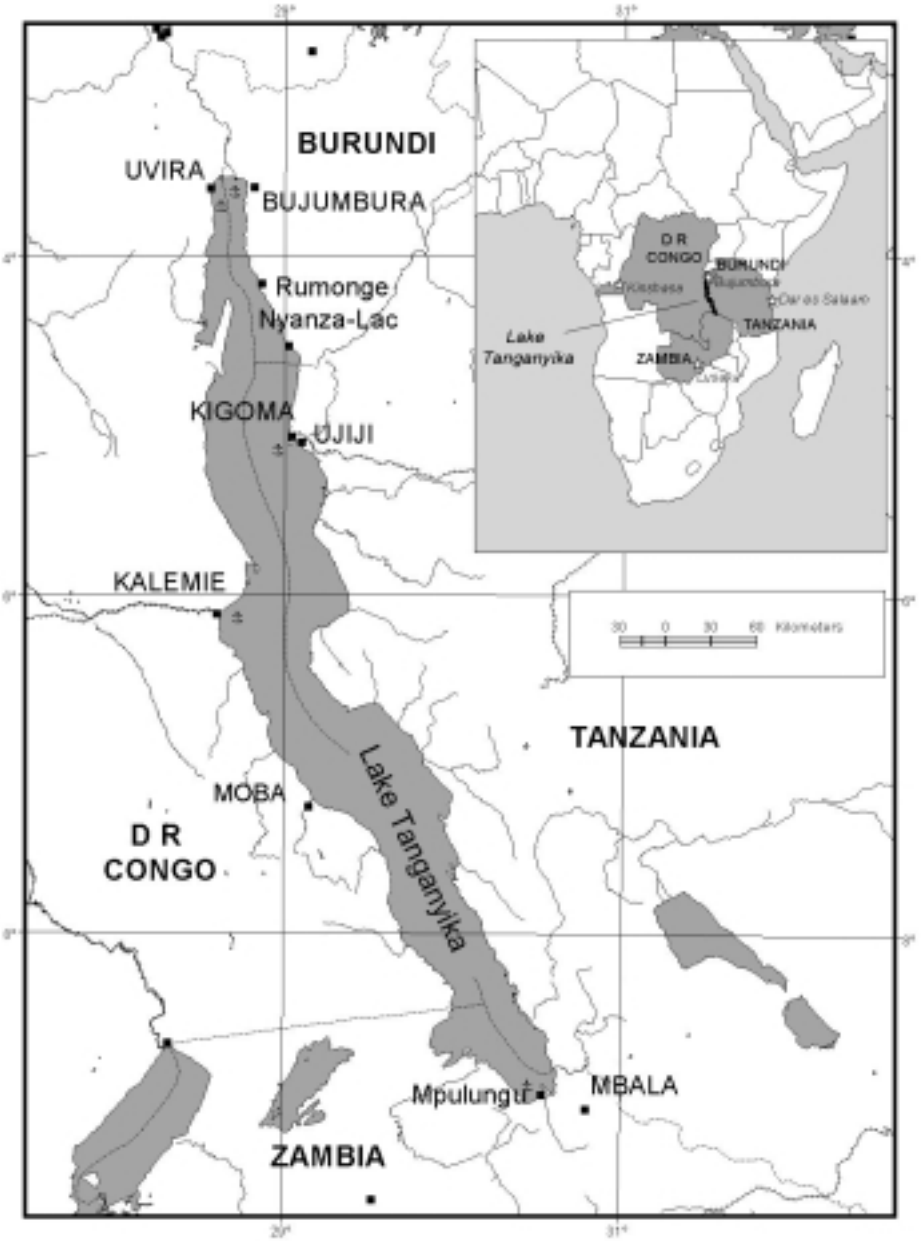
The sustainable use of lake resources clearly depends on the activities of lake adjacent communities, but also on those with little direct dependence on the lake, living in other parts of the catchment.

The population of the catchment area of Lake Tanganyika is estimated to be around 10 million and is growing rapidly. The majority of these people rely on small-scale agriculture for their food and income. Industrial activity and associated pollution in the catchment is localised and, with the specific exception of Bujumbura, still at a low level owing to the largely undeveloped nature of the basin.

[4] Species Flocks – Groups of closely related organisms rich in species and endemic to a particular location.

Unfortunately some impacts are cumulative and traditional attitudes and responses to land and water resource management as well as practices of waste disposal are beginning to threaten the lake ecosystem.

Map 1 Lake Tanganyika - National Boundaries, Main Towns and River Systems



1.1.3 The Problem

The main threats to the biological richness of the lake and the sustainable use of the lake resources result from the intensification of human activities. The accelerating rate of environmental change caused by human activities is now much faster than the fauna's adaptive capabilities and the absorptive capacity of the environment.

The increasing demand for fish for local consumption and for sale to distant markets has increased fishing pressure to the extent that the sustainability of the lake fisheries is threatened. These problems affect both the commercial off-shore fisheries and the artisanal activities of the near-shore fisheries.

Lake Tanganyika receives its waters from rivers draining a quarter of a million square kilometres of the surrounding countries. Many rivers enter the lake, but only one flows out, the Lukuga. The greatest loss of water is through evaporation. The large volume of the lake means that materials carried in from the land accumulate steadily and are removed only very slowly. The lake is a trap for sediment and pollutants.

While natural erosion has always occurred, the increase in demand for agricultural land for food production and other economic activities has greatly accelerated the erosion rate in recent years. Eroded sediments enter the lake changing habitats and disturbing the primary production on which many organisms depend.

Furthermore, this agricultural expansion has been accompanied by an increase in the use of agrochemicals, such as artificial fertilisers, pesticides and herbicides.

Urbanisation is another phenomenon that creates a different set of threats; household and industrial wastes find their way into water courses and ultimately into the lake. These unwanted pollutants are slowly distributed throughout the lake by wind-driven currents.

What begins as a problem for an individual area may eventually affect the lake waters of all the riparian countries.

1.1.4 The Lake Tanganyika Biodiversity Project

In recognition of Lake Tanganyika's extraordinary biodiversity and the burgeoning threats against it, scientists from the four riparian states and other countries, attended the First International Conference on the Conservation of the Biodiversity of Lake Tanganyika, held in Bujumbura in 1991, to draw international attention to these issues. Subsequently, steps were taken to attract the interest of international funding agencies to support a regional project to address the identified problems.

Funding was secured through the UNDP/ Global Environmental Facility (GEF) which was endorsed at the 1992 Rio Environmental Summit meeting as a mechanism for financing activities with global environmental benefits.

As a result, a project was developed – "Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika". The project became effective in 1995 following the signing of the Project Document. The project related to GEF interests in both biodiversity and international waters, giving greater emphasis to management objectives for sustainable development.

The aim of the project, generally referred to as the "Lake Tanganyika Biodiversity Project – LTBP" was to produce an effective system for protecting and conserving the biological diversity and promoting the sustainable use of the natural resources of Lake Tanganyika.

The project had three key outputs:

- a Strategic Action Programme (SAP),
- a Convention to provide the legal framework within which the four countries would formally agree to common management principles and procedures for cooperation
- a Special Studies programme, preparing a body of scientific and technical reports on the state of the lake.

The Special Studies programmes included Biodiversity, Fishing Practices, Pollution, Sedimentation and Socio-economics to provide the human context, within which conclusions could be discussed, developed and implemented. The project also completed a range of training and environmental education programmes.

1.1.5 The Lake Tanganyika Research Project

Preceding and subsequently running in parallel with the Lake Tanganyika Biodiversity Project, the Lake Tanganyika Research Project (LTR), funded by FAO and FINNIDA, has focussed on the pelagic fisheries. The LTR project developed from recommendations adopted at the 1st Session of the Committee for Inland Fisheries of Africa (CIFA), Sub-Committee for Lake Tanganyika, which was convened in 1988.

The Project "Research for the Management of the Fisheries on Lake Tanganyika" became operational in January 1992.

The objective of the project was to expand scientific understanding of fish production dynamics in Lake Tanganyika and to use this improved knowledge in formulating a coherent lake-wide fisheries management plan in order to maximise the sustainable exploitation of the important, but fluctuating pelagic fish stock.

The project was given the task of establishing a lake-wide scientific fisheries research programme with continuing exchange and utilisation of research results and experiences between the four participating States. The project was also required to facilitate the establishment and implementation of a mechanism enabling Governments of the four lacustrine States, to co-ordinate the management and exploitation of the pelagic fishery resources of the whole of Lake Tanganyika.

In 1997 the project brought together a team of LTR advisers to synthesise the research conclusions to support the development of regional pelagic fisheries management plan, and in June 1998 the team presented the report " Regional Framework Planning for Lake Tanganyika Fisheries Management".

The four member states have reviewed the framework management plan, and are seeking support to implement components of the plan. These proposals cover policy, planning and management, fisheries statistics, fisheries regulation and legislation, improved fishing practices and post harvest improvements.

1.1.6 Joint Commitments to Future Actions

The four countries (Burundi, DR Congo, Tanzania, and Zambia) have already demonstrated their commitment to cooperative actions for the sustainable management and conservation of the lake's resources through the implementation of

regional activities under the LTBP, which includes the preparation of this SAP and the Convention.

The four countries have also jointly implemented the LTR programme and have agreed on a framework to further develop a management plan for the pelagic fisheries. Both the LTBP and the LTR project come to the same fundamental conclusion; that the sustainable management of the lake will require a community based integrated approach, whether the objective is fisheries production or biodiversity conservation.

The four countries are committed to cooperating in the implementation of the actions described in this document, the Strategic Action Programme, both through undertaking joint regional initiatives and through prioritising national actions within this regional framework.

1.2 The Purpose of the Strategic Action Programme

The Strategic Action Programme provides a regional framework for a prioritised set of national and regional actions to achieve the objective agreed by the participating countries and stated in the draft Convention.

This objective can be summarised as:

> ***the protection and conservation of the biological diversity and the sustainable use of the natural resources of Lake Tanganyika.***

The Strategic Action Programme is a response to the need to plan and implement complex integrated natural resource and social development programmes that affect multiple sectors and in many cases with impacts that extend across national boundaries.

In 1996 the GEF published their Operational Strategy which describes the purpose of the SAP as follows:

> *"The SAP should establish clear priorities that are endorsed at the highest levels of government and widely disseminated. Priority transboundary concerns should be identified, as well as sectoral interventions (policy changes, programme development, regulatory reform, capacity-building investments, and so on) needed to resolve the transboundary problems as well as regional and national institutional mechanisms for implementing elements of the SAP."*

Fundamental to this is the recognition that because management plans have to be revised in response to changing circumstances, there can be no final plan. The SAP therefore establishes an agreed planning and management process and prioritises an initial programme of interventions based on present needs and knowledge.

1.3 The Geographical Scope of the SAP

As activities away from the lake can have adverse impacts on the lake, the proposed actions to ensure the sustainable management of the lake will be undertaken within the wider socio-economic and geographical catchment of the lake.

The focus of the SAP is the impact of activities that effect the coastal zone and the lake. Not all human activities in the catchment affect the lake.

Conversely, the impact of socio-economic activities outside the watershed can have significant impacts on the lake. The market demand for fish extends to urban centres a thousand kilometres from the lake.

Priority actions may need to be implemented within the wider socio-economic and geographical catchments of the participating countries.

1.4 The Need for Prioritisation

Throughout the region, government and private resources are stretched by existing demands for development. The resources that can be directed towards biodiversity conservation and sustainable development at the lake will always be limited by conflicting demands for national poverty alleviation, employment creation and food security. As a result it is necessary to establish priorities to direct limited resources (financial, material or human), to address the most critical problems and thus make the best use of available resources.

The prioritisation used in this SAP is based on the joint appraisal of the problems and opportunities presented by biodiversity conservation and the sustainable management of lake resources, within a regional framework. This prioritisation then guides national interventions, within the context of the accepted regional programme.

1.5 National Actions within a Regional Framework

The SAP addresses a shared regional concern, defines a regional framework for a programme of action, and includes some immediate regional actions to address constraints to conserving biodiversity and achieving sustainable use of lake resources.

The first regional action is the establishment of a lake management body, with responsibility for promoting and coordinating the implementation of priority activities that the participating countries have defined in the SAP.

As the problems and opportunities that this SAP addresses all relate to activities carried out within the national waters or national territories of the participating countries, the actual implementation of these actions will be a national responsibility and accepted as such through the preparation and endorsement of the SAP.

While the majority of actions are defined to the national level, they provide regional and global benefits, over and above the national benefits of promoting sustainable development. They therefore include the incremental costs of conserving the regional and global benefits of biodiversity and as such are also a priority for multilateral and bilateral and other forms of support.

1.6 Principles of Environmental Management and Social Development

The four countries share a common desire for the sustainable management of the natural resources and biodiversity of Lake Tanganyika for the benefit of present and

future generations and recognise their role in conserving the global value of the biodiversity resource.

The participating countries have agreed on a set of principles and values that underlie the proposed objectives and actions set out in this document. Many of these principles are embodied in existing Conventions to which the four countries are signatories, in particular the environmental and social principles that underlie the Convention on Biological Diversity, Agenda 21 and the Dublin Principles.

1.6.1 The Precautionary Principle

The precautionary principle states that preventive measures are to be taken when there are concerns that an actual or planned activity may bring about an adverse impact, even if there is no conclusive scientific evidence of a causal relationship between the activity and the adverse impact.

1.6.2 The Polluter Pays Principle,

The polluter pays principle and the related concept of user pays, states that the polluter or user of a natural resource should pay for the cost of maintaining the resource or repairing damage done to it.

1.6.3 The Principle of Preventive Action

This principle states that timely action shall be taken to address the actual or potential causes of the adverse impacts, before they occur. It is based on the fact that many adverse impacts are irreversible or if they can be reversed, the cost of remedial action is higher than the costs associated with prevention.

1.6.4 The Principle of Participation

All stakeholders, including communities, individuals and concerned organisations must be given the opportunity to participate, at the appropriate level, in decision-making and management processes that affect the lake.

This includes providing appropriate access to information concerning the environment that is held by public authorities and effective access to judicial and administrative proceedings to enable them to exercise their rights effectively. Co-management is an approach adopted by the SAP and considered to be essential for the promotion of many management interventions in the coastal zone.

1.6.5 The Principle of Equitable Benefit Sharing

The principle of equitable benefit sharing states that all stakeholders, especially primary stakeholders within the community, are entitled to share in the benefits derived from local natural resources. Primary stakeholders are both managers and consumers of natural resources and without their cooperation and participation in environmental management, the sustainable use of these resources is threatened.

1.6.6 The Principle of Gender Equity

The principle of Gender Equity stresses the importance of recognising the roles of both men and women in environmental management. As regards to men, their role is usually well recognised in institutional arrangements for the development and management of environmental resources. However, the key role of women as users and guardians of specific natural resources is often overlooked.

Acceptance and implementation of the support of women's central role in environmental management requires positive policies to address practical and strategic gender needs. Women in particular should be empowered and equipped to participate at all levels in the development of sustainable management strategies and environmental conservation programmes. This must include women's involvement in decision-making as well as implementation in ways determined by local communities themselves.

2 The Process of Consultation for the SAP

In January 1998, the Steering Committee endorsed a process of consultation which would be led at the national level by the National Working Groups (NWG), and at the regional level by the Technical Advisory Committee (TAC) expanded to include additional representation and expertise.

2.1 National Consultation

Following an initial planning meeting, two workshops were held in each country[5]: the National Sectoral Problem Review and the National Environmental Priorities and Strategies Review.

The purpose of this national consultation was to ensure that the national representatives responsible for developing the regional SAP were in a position to fully reflect national concerns as well as to bring national information into the regional planning process.

The first meetings of the national working groups agreed on the range of stakeholders to bring into the consultation process. These included representatives from lakeshore communities and town councils, commercial enterprises, national and international non-governmental organisations, research institutions and universities, and government ministries and parastatals. These meeting also assigned individuals to prepare technical and other briefing materials for the national workshops.

The first workshops, the National Sectoral Problem Reviews, brought together stakeholder representatives and to ensure a common understanding of the problems and issues, started with an overview provided by the specialists tasked with preparing the briefing materials. The workshop looked at the main biodiversity problems of the lake; identified the causal chain from the perceived problems to their societal root causes and reviewed possible management actions.

It was also at these workshops that the four countries adopted a common analytical approach, allowing their conclusions to be brought together into a coherent regional framework. This approach was based on the development of a three level matrix, with major sectoral problems that at first might appear to be insurmountable broken down into specific problems and discrete and sequential actions.

The second workshops, the National Environmental Priorities and Strategies Reviews, looked at the potential and limitations of existing institutional mechanisms to counteract threats and support actions identified in the previous workshop, and agreed on an overall priority for the sequence of proposed actions.

With this background the four countries then started on the regional consultation process.

[5] Owing to prevailing security conditions, DR Congo held these two workshops back to back in Arusha, Tanzania.

2.2 Regional Consultation

The TAC was given the role of developing the SAP by the Regional Steering Committee, adapting their composition for this exercise to reflect the new terms of reference.

Each country was represented in the SAP Planning Group by a team led by the National Coordinator with three or four additional experts identified by the national working groups on the advice of the national workshop participants. The team members were selected to provide a range of skills and knowledge of the lake and the lake management problems.

The drafting process was supervised by the Steering Committee, who amended and endorsed draft documents at the committee meetings held in May 1999 and May 2000.

With the support of the special studies and their additional regional perspective, the SAP Planning Group prepared a Transboundary Diagnostic Analysis, defining regional priorities for management interventions. It was this exercise which then defined the programme of priority actions described in this document.

2.3 The Transboundary Diagnostic Analysis

In support of the development of the SAP, and in line with the methodology recommended by the GEF, the Steering Committee adopted a process that included a formal assessment of problems and priorities, the Transboundary Diagnostic Analysis[6].

The purpose of the TDA is to define immediate management objectives within the overall aim of conserving the biodiversity of Lake Tanganyika, addressing global concerns and ensuring the sustainable use of these and other resources for local communities and other users into the foreseeable future.

The SAP Planning Group with the support of the special studies teams carried out the TDA. The evaluation started with a review of the major threats, and defined the specific problems or sub-problems that together make up the threat and then proposed a sequence of management interventions to counteract each specific problem. The evaluation used the same matrix approach that had been developed in the national consultation exercises.

The value of this approach is that what appeared to be an excessively ambitious and daunting management objective such as the Control of Pollution, was split into a series of manageable objectives addressing specific problems, many of which could be initiated by local institutions and implemented with available resources.

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[6] "The centrepiece of the GEF strategy... is the concept of "strategic joint fact finding" as a means of arriving at a consensus on what actions are needed to address threats... collaborating states establish technical teams that work to establish a common baseline of facts and analysis of the problem in the form of a transboundary diagnostic analysis (TDA), which is then used to set (national) priorities for actions to address threats to international waters in the form of the SAP."

2.4 The Convention

In parallel with the development of the SAP, the participating countries have prepared a draft Convention – The Convention on the Sustainable Management of Lake Tanganyika.

The Convention is intended to provide a legal framework for the future management of the Lake that sets out both relevant principles of general application and, where appropriate specific obligations and procedures. The Convention is there to support the SAP.

The Convention must be broad enough to encompass the present and future management requirements of the lake, and as such has been based on the management requirements identified through the process of developing the SAP, and in particular the implementation of the TDA.

Although the Convention has been designed specifically for the particular circumstances of the Lake, it also incorporates concepts and approaches adapted from a wide range of international agreements, which some or all of the participating countries have already consented to.

The SAP in turn draws upon the draft Convention. The environmental and social principles outlined in the draft Convention also underlie the objectives of the SAP. In particular, the principles in the draft Convention reflect:

- the 1992 Convention on Biological Diversity which emphasises global concerns on sustainable development and the conservation of biodiversity;
- the 1995 SADCC Protocol on Shared Watercourse Systems in the Southern African Development Community as a regional example of the management of shared water resources; and
- the 1997 Convention on the Law of the Non-navigational Uses of International Watercourses which, although not yet in force and consequently not binding, provides a basis for developing specific rules for Lake Tanganyika.

While the Convention will remain a draft document until formally signed and subsequently ratified by the governments of the participating countries, the SAP can be initiated and implemented under the interim management arrangement defined in this document, in advance of the ratification of the Convention.

2.5 The Future Evolution of the SAP

This document is the outcome of a process of consultation and negotiation between the participating countries, initiated with the signing of the Project Document (RAF/92/G32) and the start of the UNDP/GEF supported project activities in August 1995.

The proposals in this document are based on “best available knowledge”, drawing on the considerable experience of those using and managing the lake resources, as well as the published results of one hundred years of research and the special studies supported by the project.

However, even as the actions described in this document are undertaken, the situation will continue to change.

New activities within the lake and its catchment may require new responses to protect and conserve lake resources. New opportunities may be developed to make better use of lake resources. New research may allow proposed actions to be refined and may define the need for further interventions.

The SAP therefore defines a planning framework and a management body that will have the capacity to update the SAP in response to changes in threats and opportunities, and in response to the changing needs and aspirations of lake-shore communities and overall regional development.

This is the first iteration of the SAP. Amendment of this document will be a regular process, and a major review should be carried out at least every five years.

Future iterations of the SAP and the detailed development of the proposed interventions will continue to expand to involve an ever broader participation of stakeholder communities.

Future developments of the SAP will be the responsibility of the Lake Management Authority, to be established under the Convention. In the meantime, the Interim Lake Management Body will be empowered to amend the SAP as necessary in line with the principles embodied in this document.

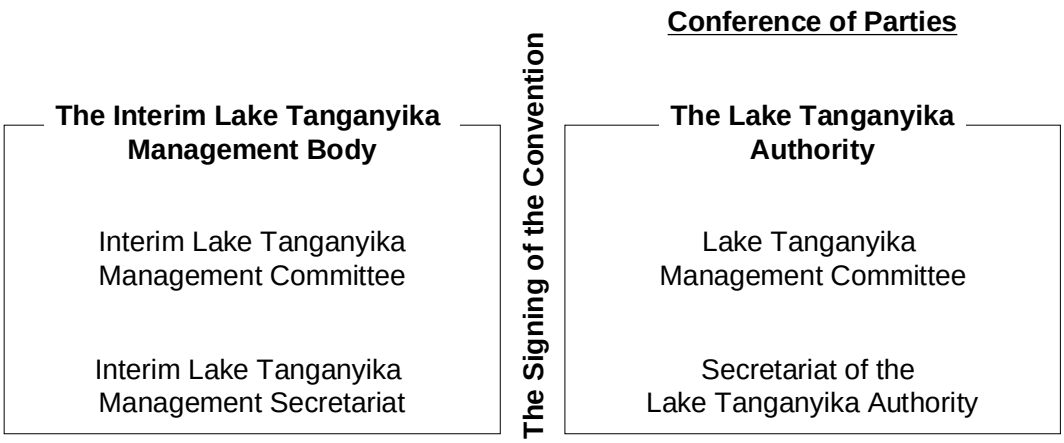
3 A Lake Tanganyika Management Body

This document proposes an interim management body, which could evolve into the permanent management authority proposed in the draft Convention following the signing/ratification of the Convention.

The role of the final authority established under the Convention will be directed by legal commitments made in the Convention and subject to international law and arbitration. The Lake Tanganyika Management Authority will coordinate the implementation of the Convention by the Contracting States and advance and represent the common interests of the Contracting States in matters concerning the management of Lake Tanganyika and its environment. This incorporates the management of the SAP and future iterations of the SAP.

The Interim Lake Tanganyika Management Body has a narrower set of objectives and tasks; those that can be envisaged as a priority for the next two or three years. The establishment of the interim body will be a voluntary regional commitment, and the interim body can undertake further tasks as necessary. The interim body will be responsible for the detailed development and initiation of the priority actions in the first SAP, the promotion of the signing of the Convention and the maintenance of an information resource.

Figure 1 The Development of a Lake Management Body



3.1 The Lake Tanganyika Authority and the Convention

The Convention incorporates an institutional management structure to implement the Convention and the SAP. However, until the Convention is signed and ratified, this management structure can have no formal status.

The final responsibility for ensuring that the Convention is implemented will lie with the Conference of Parties. Each signatory country will be represented at the Conference of Parties by a delegation led by a Minister. The Conference of Parties will meet at least once every year, rotating between the signatory countries. The Conference will be chaired by the Head of the delegation of the host country.

The Conference of the Parties will have the following duties:

- Evaluate and implement the Convention;
- Consider and adopt protocols and additional annexes and amendments to the Convention;
- Establish subsidiary bodies necessary for the effective implementation of the Convention;

As the Convention specifically includes the agreement to prepare and implement the SAP, the final responsibility for implementing and revising the SAP will also fall under the Conference of Parties.

However, the regular management functions of implementing the SAP will be the responsibility of the Lake Tanganyika Authority, which reports to the Conference of Parties. Underlying this proposal is the shared concern that the institutional structure be kept as small and tight as possible – particularly as the long term assumption is that the signatory countries will contribute equally to and take full responsibility for the budget of the Authority.

The Authority will be a legal entity, comprising a Management Committee and a Secretariat. The Executive Director of the Secretariat will be the Chief Executive Officer of the Authority, representing the Authority.

3.1.1 Lake Tanganyika Management Committee

The Lake Tanganyika Management Committee will consist of three members appointed by each Contracting State. The Executive Director of the Secretariat will serve as the secretary of the Management Committee. The Management Committee will meet at least once a year.

The Management Committee will:

- Implement the policies and decisions of the Conference of the Parties and undertake tasks assigned to it by the Conference of the Parties;
- Provide scientific and technical advice to the Conference of the Parties;
- Review and revise the strategic action programme and propose any new or amended programme for approval by the Conference of the Parties;
- Coordinate and supervise the implementation of any strategic action programme approved by the Conference of the Parties; and
- Supervise the activities of the Secretariat including assigning tasks to it, approving annual work programmes and monitoring the execution of that programme and the budget of the Secretariat.

It is envisaged that the Management Committee will be assisted by a number of Technical Sub-committees, dealing with specialist subjects[7]. Each sub-committee will have one representative from each signatory country.

3.1.2 Secretariat of The Lake Tanganyika Authority

The Secretariat of the Lake Tanganyika Authority will have an Executive Director, and Deputy Executive Director and any other staff that may be required for its operation. These will be appointed by the Conference of Parties.

The Executive Director, with the approval of the Management Committee will appoint other support staff on the basis of technical competence but with due regard to the need to appoint, as far as possible, equal numbers of technical professional staff from each of the Contracting States.

The functions of the Secretariat are:

- To provide technical and scientific services and advice required by the Management Committee and the Conference of the Parties;
- To prepare plans, projects, assessments, and reports as required by the Management Committee;
- To regularly obtain and update information relevant to the implementation of the Convention and the SAP and ensure that it is disseminated;
- To maintain databases of information and to facilitate the exchange of information;
- To arrange and support meetings of the Conference of the Parties and of the Management Committee;
- To formulate annual work programmes and budgets for the Authority;
- To perform the financial and other administrative, services required for the proper and efficient operation of the Conference of the Parties, the Management Committee and the Secretariat;

3.2 The Interim Lake Tanganyika Management Body

The formal institutional structure proposed in the draft Convention can not be implemented until a Convention has been signed and ratified.

In the meantime, it is essential to establish an Interim Lake Tanganyika Management Body – ILTMB – to initiate the implementation of the SAP and promote the signing of the Convention that will establish the permanent management authority.

The immediate objectives of the Interim Lake Tanganyika Management Body are to:

- Ensure that urgent actions identified in the SAP are implemented

[7] The draft Convention has proposed the following sub-committees: Socio-economics; Fisheries Management; and Biological Diversity. Additional ones may be required, notably Water Quality.

- Promote the signing of the Convention and the establishment of functioning management bodies required in the Convention
- Maintain an Information Resource

The proposed structure for the ILTMB, adapted from the convention structure is as follows:

1. The Interim Lake Tanganyika Management Committee - ILTMC
2. The Interim Lake Tanganyika Management Secretariat - ILTMS

3.2.1 The Interim Lake Tanganyika Management Committee

The Chair for the ILTMC will be selected at the first ILTMC meeting.

Each participating country will be represented on the committee by the Permanent Secretary of the relevant ministry or where this is not applicable a senior representative of the Minister, supported by three other appointed members.

The selection of the supporting committee members will be the decision of the participating country. However, it is expected that they will have considerable expertise relevant to the sustainable management of the lake, include senior representatives of relevant lakeshore institutions and those able to ensure that adequate attention is paid to community participation in planning and implementation of management actions.

Once he/she has been appointed, the Director of the Secretariat will act as the Secretary for the ILTMC.

The ILTMC will:

- Supervise activities detailed in the SAP;
- Direct the activities of the ILTMS;
- Approve and support project proposals developed by the ILTMS;
- Approve and finalise funding agreements developed by the ILTMS;
- Approve the procedures for the Conference of Parties developed by the ILTMS
- Meet at least once per year;
- Agree rules of procedure for itself, the secretariat and any subsidiary bodies;
- Recruit and appoint the Director and Deputy Director of the Secretariat;
- Approve the recruitment and appointment of other senior staff considered to be necessary to the functioning of the secretariat, and approve the recruitment of consultants thought necessary to assist the secretariat.

3.2.2 The Interim Lake Tanganyika Management Secretariat

The ILTMS will be a full time body, with a Director and Deputy Director recruited and appointed by the ILTMC.

The Duties

The ILTMS will:

- Coordinate, support and prepare costed project proposals for the priority actions listed in the SAP;
- act as the lead group to coordinate and leverage funding at national and regional levels in support of the SAP – negotiating finance for regional projects and assisting national agencies in negotiating finance for national projects;
- coordinate lake management interventions implemented by national institutions within the framework of the SAP;
- coordinate national and regional actions to integrate within the SAP, the proposed Framework Fisheries Management Plan developed under the LTR Project and endorsed by the CIFA Subcommittee for Lake Tanganyika;
- coordinate a Lake Monitoring Programme;
- establish and maintain an Information Centre incorporating a central database, a GIS support unit and lake website, as well as holding copies of printed reports and papers.
- facilitate the finalisation of the draft Convention;
- invite the participating countries to sign the Convention and promote the ratification of the convention;
- prepare draft procedures for the consideration of the First Conference of Parties and carry out any additional activities necessary to facilitate the implementation of the convention;
- prepare annual reports for the ILTMC on the implementation of the SAP and any additional new activities within the basin that may affect the management of the lake;
- arrange and support meetings for the ILTMC;
- prepare annual budgets for the functioning of the ILTMB.

The Staff

Given the nature of the tasks assigned to the secretariat, the Director and Deputy Director need to have between them considerable expertise in sustainable development, law and economics.

In addition, given the need to operate in Francophone and Anglophone countries, both the Director and Deputy Director will be capable of working effectively in both French and English and will be appointed from nationals of the participating countries. The selection procedure will ensure that these two positions are filled with one national from the Francophone countries and one national from the Anglophone countries.

The Director and Deputy Director will be responsible for recruiting additional technical and administrative staff and for defining their terms of reference, including

the level at which they will have to be able to operate in both French and English[8]. However, their appointment will be subject to the approval of the ILTMC. Recruitment will be limited to nationals of the participating countries. Language training will be provided if necessary.

The Office

The ILTMS headquarters will be established in a country identified as appropriate at the first ILTMC meeting. This will be subject to regular review by the ILTMC, but remain the permanent home of the ILTMS until otherwise instructed by the ILTMC.

3.3 Financing the Interim Lake Tanganyika Management Body

The future financing of the Lake Management Authority that will be established under the Convention is detailed in the draft Convention.

The immediate requirement for funding in this interim period is to support the function of the Interim Lake Tanganyika Management Body – the ILTMC and the ILTMS and the costs of maintaining a baseline lake monitoring system. These costs will include running the ILTMC meetings, which are expected to occur at least once every year, and running the fulltime ILTMS.

Although secondment of staff to the Secretariat would be desirable, it was noted that secondment regulations operating in the participating countries require the recipient organisation to pay salaries and other emoluments

Therefore the participating countries agree to the principle that they contribute equally to the running of the ILTMB. However, their budgetary systems are unlikely to be able to incorporate any substantial new budget lines until the 2001 financial year

In order to ensure that there is continuity in the process of developing the SAP there is a need to source external funds.

However, as the functioning of the ILTMB is clearly an incremental cost associated with adopting a regional approach to concerted action to address global biodiversity and international waters issues, it falls within the remit of the GEF. The GEF may be expected to support part of the costs until the countries are able to finance the regional body directly or through co-financing.

[8] The following skills may be required to complement the expertise of the Director and Deputy Director: socio-economics; project planning and costing; environment and natural resources planning; project administration, including budgetary control for the ILTMB; and information management to support planning requirements. In addition, it is likely that there will be a requirement for a full time translator, to ensure that all external documentation is made available in English and French, as well as secretarial and administrative support.

4 The Framework for the SAP

The SAP defines a programme of priority actions based on a formal evaluation of the problems and opportunities of managing the lake resources.

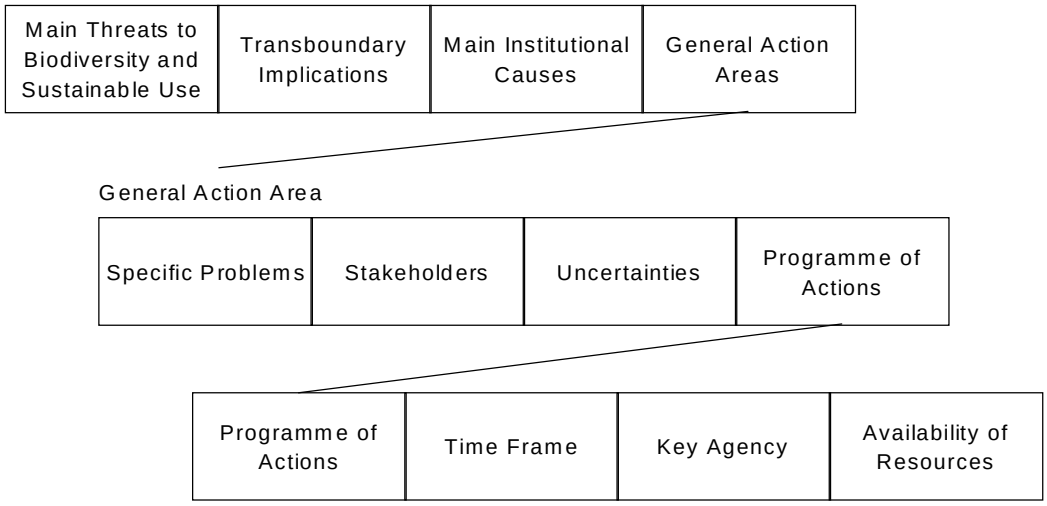
This process of evaluation involved a Transboundary Diagnostic Analysis carried out by the SAP Planning Group with the support of the project's special studies. The preliminary TDA took place in November 1998 and the final and revised TDA on which this document is based was carried out in March 2000. The TDA defines priority management objectives within the overall aim of conserving biodiversity and promoting sustainable use of the lake resources.

4.1 The Analytical Framework

The SAP Planning team adopted a three level analytical approach that was developed during the national consultation processes.

- Main Threats and General Action Areas
- Specific Problems and Proposed Actions
- Proposed Actions and Key Agencies

Figure 2 The Analytical Framework



4.1.1 Main Threats and General Action Areas

The first level describes the main threats to biodiversity and the sustainable use of lake resources, and identifies general action areas to counteract these threats.

The main threats are described as Unsustainable Fisheries, Increasing Pollution, Excessive Sedimentation, and Habitat Destruction. These identified threats reflect the concerns raised at the first international lake conference held in 1991, and subsequently built into the project structure in terms of the special studies. The special studies have confirmed the significance of these threats, and the relevance of the proposed general action areas.

Table 1 Main Threats and General Action Areas

Main Threat to Biodiversity and Sustainable Use	Cross-Cutting Transboundary Implications	Cross-Cutting Institutional Problems	General Action Areas
Unsustainable Fisheries Increasing Pollution Excessive Sedimentation Habitat Destruction	Global Loss of Biodiversity Loss of Shared Fisheries Resource Decline in Water Quality	Lack of Resources Poor Enforcement of Existing Regulations Lack of Appropriate Regulations for Lake Tanganyika Lack of Institutional Coordination	Reduce Impact of Fishing Control Pollution Control Sedimentation Habitat Conservation

4.1.2 Specific Problems within Each General Action Area

The second level identifies and groups specific problems within each general action area, and then proposes a programme of actions to counteract each problem. Each specific problem is defined in terms of site and impact. Level two also identifies the stakeholders that need to be involved in the consultation process and lists "uncertainties" – where further research and/or monitoring are required to define the need for action or to develop solutions.

It is at this second level that prioritisation takes place. Each group of interventions is prioritised and the sequence of actions needed to counteract the specific problem within this group, then becomes a prioritised programme of actions.

4.1.3 Proposed Programme of Actions to address Specific Problems

The third level takes the proposed actions for each specific problem and assigns a time frame – ***on-going***, could start ***now*** given adequate resources, or needs to take place ***after*** (some) ***previous*** action has been completed. The key agency is also listed. This is the agency that would be responsible for leading the intervention and in some cases for the further development of detailed project proposals.

The final component is a review of human and material resources available to carry out, or initiate the intervention. This does not imply that they are available and directed towards this particular programme of actions, but that they could be made available if given a high national priority.

4.2 The Basis for Prioritisation

The evaluation used in the TDA to establish priorities is based on three criteria. The first two are related directly to the objective of biodiversity conservation and the sustainable use of lake resources. The third one is related to indirect benefits that can be associated with these actions.

The three criteria are:

1. The severity of the problem threatening biodiversity or sustainable use of lake resources;
2. The feasibility of the solution;
3. Additional benefits to local communities.

4.2.1 Severity of Problem

The first stage is to assess what benefits could be expected from addressing a particular problem, in terms of both conserving biodiversity and promoting sustainable use of lake resources. This judgement is based as far as possible on a scientific diagnosis of the impact of the problems, supported by the special studies.

However, given the complexity of many of the issues being addressed, there will often not be conclusive information available as to the scale of the problem or the precise needs to address it, and the Precautionary Principle may then come into play.

The assessment of the severity of a problem is a combination of scientific diagnosis (where the information is available) and from more subjective and intuitive assessments, based on an empirical knowledge of the lake. It is here that national consultation and the wide experience of the TDA SAP Planning Group plays a crucial role.

4.2.2 Feasibility of the Solution

The second consideration in setting priorities is the feasibility of the solution; there is little point in addressing management or research concerns to problems that have no practicable management solutions.

The assessment of the feasibility of the solution comes after the identification of actions needed to address the problem. In some cases the problems may be beyond local management control. This evaluation again relies largely on the experience of environmental management in the region, reflecting the direct experience of the TDA SAP Planning Group and the background of national interventions addressing problems of land use, pollution and fisheries management, supported by the conclusions of the special studies.

4.2.3 Additional Benefits

The primary objective of the Strategic Action Programme is defined as the protection and conservation of the biological diversity and the sustainable use of the natural resources of Lake Tanganyika. On the other hand the benefits of these interventions can have wider implications in terms of the promotion of sustainable livelihoods and development within the wider catchment of the participating countries.

The conservation of lake biodiversity and the promotion of the sustainable use of lake resources has benefits at both global and local levels, however the costs of biodiversity conservation, in terms of constraints on natural resource exploitation within the wider catchment, are met by local communities.

Identified actions should therefore strengthen sustainable livelihoods and development as a specific objective.

4.2.4 Priority Interventions

Only the high priority interventions are listed in the SAP, however the TDA reviewed all specific problems and classified them as having high, medium or low priority.

Subsequent iterations of the SAP may include medium or even low priority interventions, should resources become available to extend a programme of actions beyond the immediate demands of the high priority problems.

The process of prioritisation has been kept simple to ensure transparency. The TDA SAP Planning Group, with the support of the Special Studies, reviewed all identified specific problems against the three criteria described above: severity of problem; feasibility of solution and additional benefits.

A score of 1, 2 or 3 was then allocated to each of these criteria, with a high score allocated to addressing serious problems, a high score to readily implemented management interventions with a high probability of counteracting the threat, and a high score to high additional benefits to wider sustainable development. The final prioritisation is based on a simple addition of the three scores. High Priority was given to those that scored eight or nine, Medium Priority six or seven, while Low Priority was given to those that scored five or less.

4.3 National Actions within a Regional Framework

The rationale for the preparation of this regional document is the common understanding that the lake is a shared resource. The activities of any one country on the lake or in the lake catchment can have transboundary implications on this shared resource. In addition the countries sharing the lake recognise their responsibility as guardians of a global resource – the unique biodiversity of the lake and the immense reservoir of clean fresh water.

The conservation and use of these resources requires a common set of objectives and shared responsibility for undertaking a programme of actions to counteract threats to these resources and make full use of opportunities offered by them. However, virtually all actions, apart from the regional coordination of the programme, are site specific and fall within national territories. The responsibility for implementing these actions thus remains the responsibility of national governments.

The SAP therefore defines national priorities within a regional framework. The signatory countries accept this regional prioritisation of national interventions, but as there are incremental benefits to shared international water resources and global biodiversity, these national programmes remain within the regional framework, and become a priority for multilateral and bilateral support.

5 A Programme of Priority Actions

The following sections give details of the high priority actions defined in the TDA and adopted as the immediate focus of attention for the SAP.

5.1 Integrated Development

For ease of discussion, the proposed actions have been organised under four general action areas:

- Reducing the Impact of Fishing - Development of a Sustainable Fisheries
- Pollution Control
- Sediment Management
- Habitat Conservation

However this sectoral classification is a convenience; while the main thrust of a proposed action may be to reduce the impact of fishing pressure, the identified actions may include the promotion of improved agriculture as a means of diversifying livelihoods and reducing pressure on fish stocks.

Underlying all actions is the recognition of the need for an integrated approach to counteract what at first sight appear to be single sector problems.

In addition, while the potential geographical scope of these interventions includes the watershed and the wider economic catchment, the focus of attention is on actions that impact on the lake. Priority is given to those activities with the greatest impact on the lake and on lakeshore communities, and indeed the majority of activities will be directed at improved and integrated management of the coastal zone.

5.2 Crosscutting Themes

Crosscutting themes are sets of activities that are common to many of the proposed national actions. As such it is possible that components that are common to different proposed actions could be combined into a project that deals with these as a common theme.

This will have the added benefits of helping to identify synergies between activities, promoting the exchange of information between countries and ensuring consistency with other sectoral policies.

In many cases cross-cutting projects will function at the national level and be developed in conjunction with the detailed project planning.

5.2.1 Information Management

The effective management of the lake will depend on the timely provision of key information to planners and decision makers. Many of the proposed interventions include further research and monitoring as an action to support management decisions, however, much of this information will have wider relevance and should be used to support other interventions. There is therefore a clear need to continue to

provide resources to a central information service, responsible for maintaining the existing GIS database, the literature reference system and other shared data sources.

5.2.2 Socio-economic Development

There is invariably a need for socio-economic development as a component of sustainable development initiatives.

As a result, many of the proposed actions include common socio-economic inputs such as the review of alternative livelihoods, cultural opportunities, patterns of resource use, gender issues and participatory approaches to management, leading to proposals for appropriate interventions.

Where a decision has been made that a number of separate national or regional actions will be undertaken simultaneously, these recurring socio-economic components could be managed as a single supporting project.

5.2.3 Environmental policy

Integration of the proposed actions into the framework of environmental policy (including biodiversity strategies) is another important crosscutting issue. Tools of environmental policies include law and environmental education as well as economic instruments and support to local initiatives.

5.2.4 Institutional Reform and Capacity Building

The over-riding institutional problems are identified in the first level of the TDA: lack of resources; poor enforcement of regulations; lack of appropriate regulations; and lack of institutional coordination. In the interim period this last component will be directly addressed by the ILTMB.

More generally, this cross-cutting theme could combine aspects of different actions that relate to training and physical infrastructural development, as well as aspects such as legal review and revision.

5.2.5 Environmental Education

Many of the proposed activities will depend for their success on awareness creation both at the community level and at administrative and political levels. Environmental education is seen as a key component of many separate activities, but could be combined in a cross-cutting project managed in support of a number of regional and national actions.

5.3 Baseline Monitoring

Biodiversity monitoring is a relatively new field, unlike fisheries monitoring, which often has decades worth of statistical data from which to analyse trends in fish stocks. Monitoring biodiversity in Lake Tanganyika has entailed establishing a new discipline that did not previously exist in the lakeside national institutions of the riparian countries. Many of the methodologies used by the LTBP Biodiversity Special Study teams for surveying fauna were developed, tested and modified specifically for

conditions in Lake Tanganyika. Biodiversity survey and monitoring capacity has been established in each of the four countries and national teams have collected up to two years of qualitative and quantitative data on biodiversity levels of fish and molluscs. In order to manage the biodiversity and sustainable resources of Lake Tanganyika into the future, it is necessary to continue to monitor biodiversity and the threats against it, so that changes in biodiversity as a function of environmental parameters may be assessed[9].

The recommended monitoring programme takes a two-tiered approach: a biodiversity monitoring programme and a threat-based monitoring programme. The biodiversity monitoring programme would monitor four sites in each country on a minimum of a quarterly basis. Sites would include one relatively pristine control site and sites impacted by pollution, sedimentation and fishing (these sites have been identified in collaboration with their respective special studies teams). Threat-based monitoring would cover pollution, erosion and sedimentation and fishing at these sites to allow for analyses of biodiversity as a function of the different threats.

In addition to collaborating with the biodiversity teams, it is recommended that the threat-based special studies continue their own monitoring programmes of pollution, sedimentation and fishing so that the magnitude of these environmental threats may be assessed in each country. This entails the pollution teams monitoring water quality at selected sites, the sedimentation teams continuing their river-gauging programme and the fisheries departments continuing their catch assessment programmes.

This monitoring will be supplemented by additional monitoring and research considered necessary to guide and evaluate the impact of activities implemented by the SAP, incorporated as a specific project sub-component.

The lake management body would ensure that the monitoring system is a management support tool and responds to management needs. This will require a regular flow of information between the field and the management body and would include the timely identification of new threats and changes in the scale of threats so that preventive measures can be put in place.

5.4 Development of a Sustainable Fisheries

There are two distinct but overlapping fisheries in the lake, the near-shore fisheries and the offshore fisheries – the littoral zone and the pelagic zone. The overlap is both ecological and economic, and both fisheries are linked to shore communities and interrelate with their other economic activities.

While the focus of the LTBP was on coastal activities and other activities within the watershed that impact on the littoral zone, the LTR Project (Research for the

[9] The GEF Scientific and Technical Advisory Panel (STAP) convened a meeting in January 2000 in Malawi to assess the progress of GEF interventions in the three African Great Lakes. The meeting recognised that major breakthroughs in science are often the result of analysing years to decades worth of data on the state, pressures and responses of systems. To this end one of the principle needs identified in the meeting was the implementation and reinforcement of basic monitoring research across a variety of sub-disciplines in each of the African Great Lakes.

Management of the Fisheries on Lake Tanganyika) focussed on the pelagic zone. The conclusions of the projects are fundamentally the same. The management of both inshore and offshore fisheries, and the management of activities affecting the coastal zone, has to take place within an integrated planning framework that takes accounts of the physical, social and economic links between shore based activities and the lake resources[10].

While the biodiversity focus is on the rich littoral zone, interventions need to address fisheries issues in both zones. If the pelagic fisheries collapse, then this will place additional pressure on the littoral fisheries.

Within any lake shore community, there are likely to be groups who concentrate their fishing activities in the offshore zone, at the same time as other groups focus on the littoral zone for both subsistence and commercial activities. Meanwhile, other family members and the men themselves are usually also engaged in farming. The balance between these activities depends on the season, the fluctuation in fish stocks, labour availability and changes in markets.

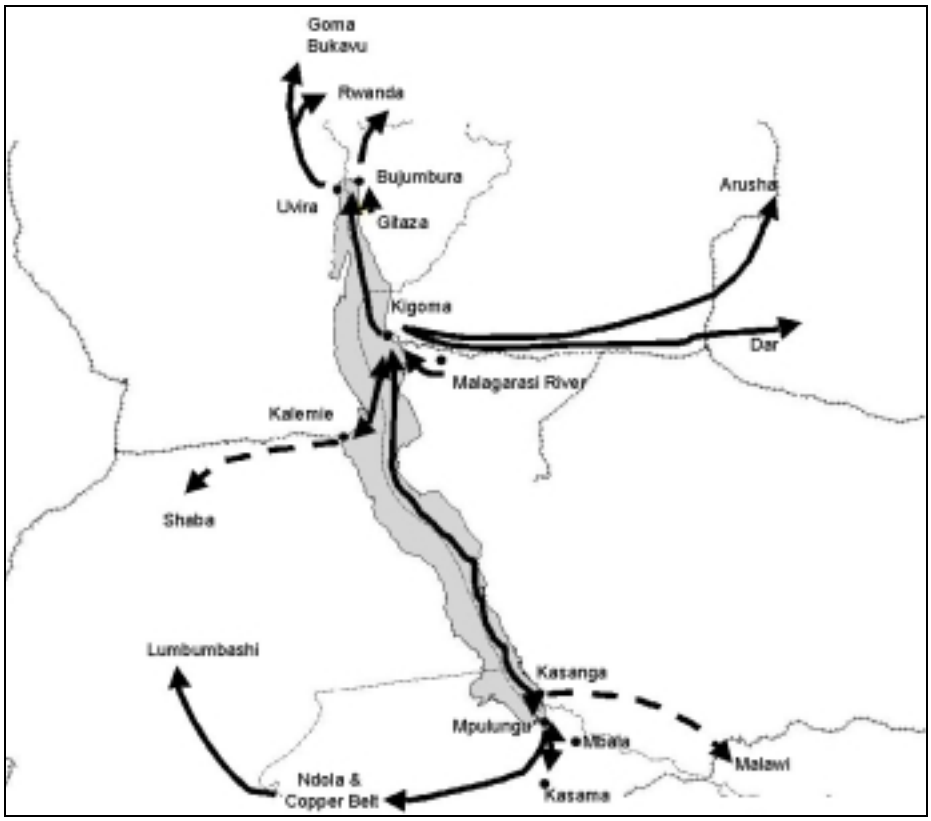
Over 50 different fishing gears were recorded during surveys of the lake fisheries. Of these, twelve are considered to be of key significance, and there is some overlap between the pelagic gear and the littoral gear. The problem is not only one particular type of fishing gear but of the cumulative fishing pressure of all gears combined. This is the case for both the littoral and the pelagic fisheries.

The development of sustainable fisheries addresses both pelagic and littoral fisheries, and the activities of those communities dependent on them. The LTR proposals for the future development of the pelagic fisheries also acknowledge these issues. However, the LTR proposals are, at present, still focussed on the development of policy and management and planning capacity and the improvement of fisheries monitoring systems. The LTR proposals include a pilot programme for fleet restructuring and a pilot programme aimed at improving post harvest practices and trade.

The LTR proposals are complimentary to the fisheries actions defined in the SAP, and where appropriate should be managed as a single enterprise under one programme.

[10] The LTR Fisheries Policy, Planning and Management proposal specifically identifies the need for the "…use of integrated development strategies and coastal area management models in order to accommodate interplay and possible conflicts between fishing and non-fishing activities and to reduce pressure on the fishery resource base through economic diversification".

Map 2 Main Fish Trade Routes



5.4.1 Excessive Fishing Effort in the Littoral Zone

The littoral fisheries are complex. They are multi-species, multi-gear, and involve both artisanal and subsistence fishermen. Many of the inshore fishing grounds (0-40m depth) adjacent to areas of high population settlement are already under heavy pressure from a range of gears and there are indications of reduced catch, changing catch composition and in some areas collapse.

Previous management interventions to control these fisheries have depended on state legislation limiting fishing effort through licensing or banning a particular gear. This approach has not been successful, partly as a result of lack of enforcement capacity and partly as a result of fishermen switching gear without reducing overall effort.

An alternative approach, increasingly adopted in the management of fisheries world-wide is to look toward partnership arrangements, or co-management amongst groups of people with a stake in the fishery (e.g. fisher communities, NGO's and governments). This approach will require a major change in perspective towards increasing participation of local stakeholders and a changing role for the institutions formally charged with fisheries management.

Table 2 National Actions in Response to Excessive Fishing Pressure in the Littoral Zone

Specific Problem	Proposed Actions and Key Agency
Burundi: Excessive fishing pressure **Stakeholders**: Fisheries administration (including MAE–Fisheries Dept and Territorial Admin.); Fishermen; Owners of fishing units; MINATE (INECN); NGOs; Local associations and communities; UB **Uncertainties**: Potential of resources	Ascertain potential, fishing standards and acceptable licensing quotas – MAE Support other income generating activities or those that supply animal proteins – MDC Strengthen capacities for Fisheries Dep. to control and supervise – MAE Raise awareness and train (fishermen, boat owners, administration) – MAE Update and issue draft law and by–laws, as well as ordinances – MAE Translation in Kirundi and extension – MAE
Congo: Excessive fishing pressure in the northern part of the lake **Stakeholders**: Min Env; Fishermen and associations of fishermen; Local authorities; CRH; Fish sellers; NGOs and local communities; MINAGRI **Uncertainties**: Maximal exploitable production	Strengthen regulations : introduce licence system (according to type of FU) with recording of existing fishermen; regional harmonisation – Min of Env Strengthen control – Min of Env Improvement of statistics – CRH Assessment of potential (maximal exploitable production) both in Northern and Southern zones – CRH Feasibility study of tax raising system aiming to regulate fishing effort (feeding at the same time a lake management fund) – CRH Identify reasons for catches increase in the South – CRH Identify actions to develop fish farming – CRH Raise awareness – information – Min of Env Research aiming at establishing how better fish conservation could decrease pressure on stock and favour transfer of demand towards bigger fish – CRH
Tanzania: Lack of quota on fishing licences **Stakeholders**: Fisheries; Communities; Local Authorities; TAFIRI **Uncertainties**: Optimal quota; Available Stock; Impact on Biodiversity	Review LTR conclusions – TAFIRI Assess relevance to fish biodiversity issues – TAFIRI Assess trend in expansion of licensing – Fisheries Dept. Review licensing procedures – Fisheries Dept.
Zambia: Excessive coastal fishing **Stakeholders**: Artisanal Fishermen; Subsistence Fishermen; Dep. Of Fisheries; Local Leaders; Community Based Organisations **Uncertainties**: Optimal level of extraction; Impact of fishing gear on fisheries and biodiversity	Promotion of alternative livelihoods – Community Development Assess impact of fishing gear – Dep. of Fisheries Raise awareness – Dep. of Fisheries Strengthen capacity to implement activities – Dep. of Fisheries Negotiate co–management with identified communities in specific fishing zones – Dep. of Fisheries

5.4.2 Excessive Fishing Effort in the Pelagic Zone

Although the pelagic zone is less rich in biodiversity than the littoral zone, any collapse in the pelagic fisheries will have a dramatic knock-on effect on the littoral zone, both through increased fishing pressure in the diverse littoral zone and indirectly through intensified farming practices. The improved management of the pelagic fisheries is essential for the economic well-being of the region.

The pelagic fishery supports large numbers of fishermen throughout the lake. The most 'visible' practices are the purse seine fleet, the light assisted beach seines and the lift net fleet. However, the pelagic species fishery is also an important livelihood option for many smaller scale artisanal fishermen who paddle some distance from the shore and use jigged lines to target the Perch *Lates stappersi*.

It is important to note that fishing pressure is not the only factor influencing the status of the commercial stocks. Environmental changes such as temperature are thought to contribute to the relative abundance of clupeids and perch species. These environmental changes and their effect on the fish stocks are not fully understood. Thus management of the fishery has to be undertaken within some uncertainty and be guided by the precautionary principle.

The LTR project has supported research on the pelagic fisheries since 1992 and drawn up a "Framework Fisheries Management Plan", which has been endorsed by the CIFA Subcommittee for Lake Tanganyika. This plan identifies five critical components requiring further investment to develop a sustainable fisheries.

1. Fisheries Policy, Planning, and Management
2. Fisheries Statistics and Information Systems
3. Monitoring, Control, and Surveillance
4. Promotion of Responsible Fishing Operations and Fishing Fleet Restructuring
5. Post Harvest Practices and Trade

Underlying this are a number of principles that are common to the SAP, including:

- Partnerships with local stakeholder groups in management decision-making and in fashioning modalities of enforcement and compliance;
- Allocation of access and fishing rights at local community levels; and
- Use of integrated development strategies and coastal area management models in order to accommodate interplay and possible conflicts between fishing and non-fishing activities and to reduce pressure on the fishery resource base through economic diversification.

The LTR proposals include implementing a number of pilot projects, aimed primarily at fleet and gear management and post harvest practices. These have not been specifically included under the SAP, but will integrated with future iterations.

Table 3 National Actions in Response to Excessive Fishing Pressure in the Pelagic Zone

Specific Problem	Proposed Actions and Key Agencies
Burundi: Excessive offshore fishing **Stakeholders**: Fisheries administration (including MAE–Fisheries Dept and Territorial Admin.); Fishermen; Owners of fishing units; MINATE (INECN); NGOs; Local associations and communities; UB **Uncertainties**: Acceptable catch	Establish standards and quotas for acceptable fishing practices – MAE Put in place a sufficient capacity to control lake fisheries – MAE Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – MAE Incorporate additional activities into national programmes within the framework of the SAP – MAE
Congo: Uncontrolled offshore fisheries **Stakeholders**: Min. of Env; Fishermen; Local Authorities; Fish traders; Net manufacturers; CRH; NGOs; Local Communities **Uncertainties**: Optimal mesh size and net type; Impact on biodiversity	Research into best mesh sizes and fishing methods – CRH Studies on secondary species – CRH Legislation distinguishing three levels of activity, banning excessively fine nets, limited permits for appropriate net types and banning destructive fishing practices – Min of Env Support to control capacity – Min of Env Education and awareness raising – Min of Env Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Min of Env Incorporate additional activities into national programmes within the framework of the SAP – Min of Env
Tanzania: Inadequate control of offshore fisheries **Stakeholders**: Fisheries Division; TAFIRI; Ministry of Regional Administration and Local Govt.; Fisheries investors; Communities; NGOs **Uncertainties**: scale of problem	Build district statistics capacity– Fisheries Division Establish the existing fishing pressure (vessels, gear, fishermen…), differentiate between industrial and artisanal – Fisheries Division Establish optimal fishing pressure– Fisheries Division Set up appropriate monitoring, control and surveillance – Fisheries Division Implement education and awareness programmes for fishing communities – Fisheries Division Enforce regulations – Fisheries Division Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Fisheries Division Incorporate additional activities into national programmes within the framework of the SAP – Fisheries Division

(continued)

Table 3 (continued) National Actions in Response to Excessive Fishing Pressure in the Pelagic Zone

Specific Problem	Proposed Actions and Key Agencies
Zambia: Excessive Industrial and Artisanal Fishing **Stakeholders**: Commercial Fisheries; Artisanal Fishermen; Local Authority; Dep. of Fisheries; Community Based Organisations; Local Leaders; Licensing Committee **Uncertainties**: Optimal fishing levels; Market Distribution	Raise national and Local Political Awareness – Dep of Fisheries Negotiate interim acceptable fleet and means of reducing fleet – Dep of Fisheries Establish optimal fleet composition – Dep of Fisheries Review licensing procedures – Dep of Fisheries Strengthen local capacity to monitor and enforce regulations – Dep of Fisheries Review national and regional components of the Framework Fisheries Management Plan within the context of the SAP – Dep of Fisheries Incorporate additional activities into national programmes within the framework of the SAP – Dep of Fisheries

5.4.3 Excessive or Uncontrolled Extraction of Ornamental Fish

The aquarium trade is focused primarily on the capture of cichlid fish for export to overseas markets, although there are a few non-cichlids that are also of interest. While there is little precise information available, the trade is inherently threatening to biodiversity as the targeted species are endemic, rare, localised and hence vulnerable. Information from the trade does reflect these concerns, with certain export species disappearing from preferred collection sites.

Although there are licensing systems in place, these are rarely enforced and have not been updated to reflect market values. Nevertheless, the export is a specialised trade and could also be monitored from the end market. In addition there are relatively few individuals within the countries who control the collection and marketing, making monitoring less onerous.

The potential for improved management is quite high, and licensing for export could pay for the enforcement of legislation. Meanwhile the export of these species continues to draw attention to the lake biodiversity value, and can help direct donor attention to the lake management problems.

There is the potential for promoting community involvement in the industry and hence promoting livelihood alternatives. Environmental education, and possibly the management of a few aquaria have been proposed as means of raising awareness.

Table 4 National Actions to Control the Ornamental Fish Trade

Specific Problem	Proposed Actions and Key Agencies
Burundi: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: MINATE (INECN); MAE (Fisheries dep.); Exporters; Sellers; Customs; BRB; NGOs; Local associations and communities **Uncertainties**: Scale of problem and impact	Prepare list of threatened species and proposal of inclusion in CITES lists – MINATE (INECN) Regulations, control, monitoring– MINATE (INECN) Encourage fish farming of those species – MAE Raise awareness– MINATE (INECN) Set up protected areas (demarcation, eco – tourism development, management plans) – MINATE (INECN)
Congo: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Local authorities; CRH; Customs; Exporters; Min Environ; ICCN **Uncertainties**: Vulnerability of all the species potential per species and per site	Improvement and strengthening of licence delivery (authorised species, quantities, extraction sites) – Min of Env Strengthen extraction and exporting control– Min of Env Establish natural reserves : Luhanga, Pemba, Kalamba, Kiriza(Ubwari) and Bangwe – ICCN Additional prospecting in order to expand the network of protected areas – CRH Inscription of lake Cichlides on CITES list, except fish identified as capable to support extraction – Min of Env
Tanzania: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Licensed Traders; Fisheries; TAFIRI; Foreign Affairs; Home Affairs; Customs **Uncertainties**: Endangered species; Extent of threat	Identify threatened species – TAFIRI Regional agreement on exportable species by country of origin – Fisheries Dep. Monitor numbers and species exported – Fisheries Dep / Customs Raise senior level awareness of problems – Fisheries Dep Establish species quotas – TAFIRI Review number of licensees – Fisheries Dep Examine possibility of inclusion in CITES list – Fisheries Dep
Zambia: Excessive or uncontrolled extraction of ornamental fish **Stakeholders**: Commercial Fishers; Local Authorities; Fisheries Dept; ZAWA; Museums; Communities and Local Leaders; Revenue Authority **Uncertainties**: Scale / Impact of Extraction	Ascertain Scale and Impact – Fisheries Dep Raise Public Awareness – Establish Aquarium – Fisheries Dep Define Levels of Extraction – Fisheries Dep Review License / Export Fees – Fisheries Dep Establish Local Regulations – Fisheries Dep Evaluate Potential for Captive Breeding – Fisheries Dep Review Inclusion of Species in CITES – ZAWA

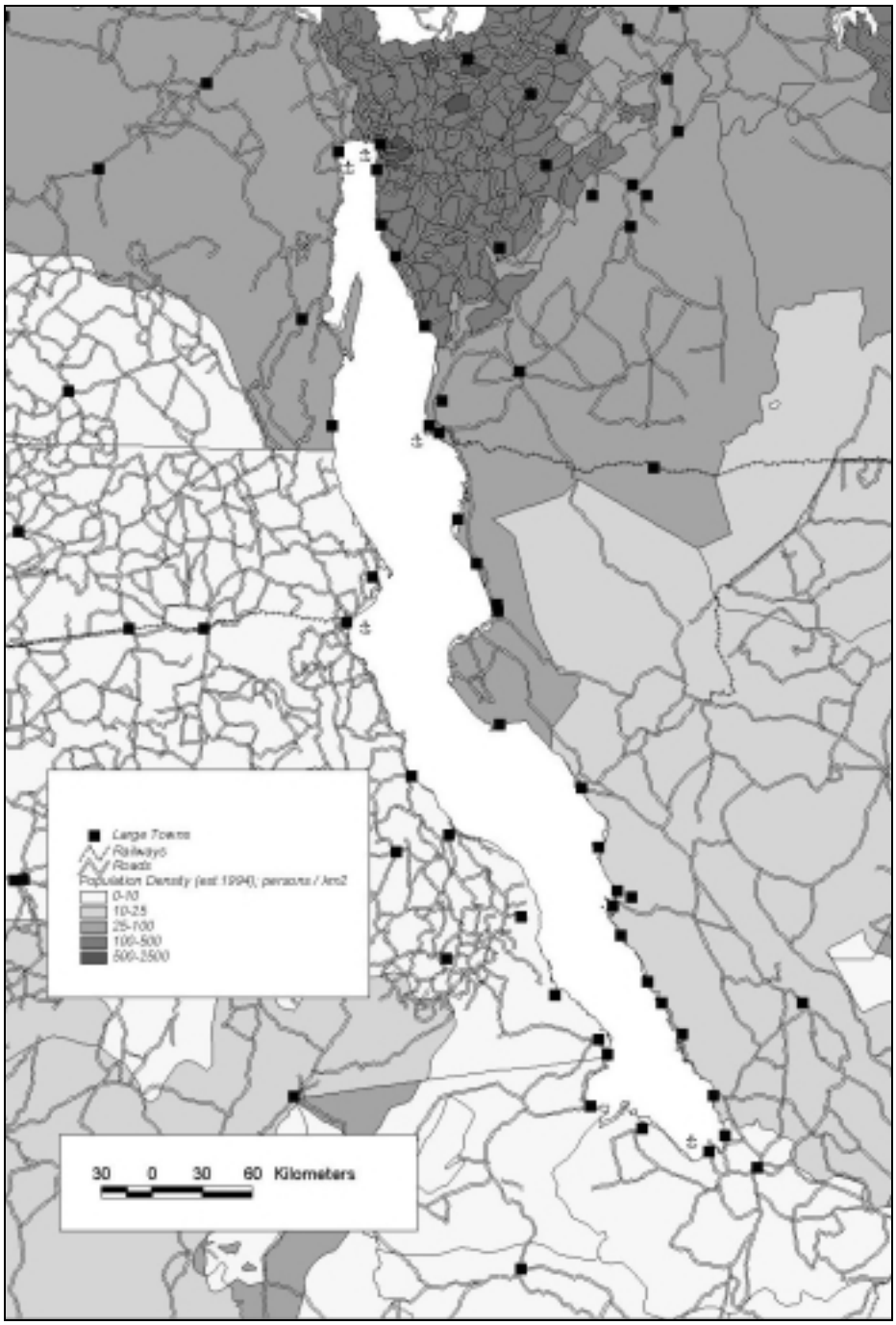
5.5 Pollution Control

The potential impact of pollution on the lake is a major concern, and was given due weight in the full title of the LTBP – Pollution control and other measures to protect biodiversity in Lake Tanganyika.

Pollution is the result of human activities within the catchment and is predominantly linked to settlements, ranging from villages to towns to capital cities. These settlements are scattered throughout the catchment and are centres for a variety of potentially polluting industries and activities. Possible sources of damaging pollution

include: domestic waste; farming with fertilisers and pesticides; ports, harbours and marine traffic; industrial factories and small-scale registered and unregistered industries; petroleum products depots and power stations; commercial fishing industries and slaughterhouses; mines and quarries.

Map 3 Main Urban Settlements and Population Density



5.5.1 Urban and Industrial Pollution

Urban and industrial pollution are closely linked. Urban centres attract industries and form major market and transport hubs, which in turn attract more settlement. Urban population growth in all the riparian countries greatly exceeds rural population growth.

The largest city on the lake is Bujumbura with an urban and peri-urban population of around 600,000. With the other coastal towns in Burundi, and with Uvira in DR Congo, with a population of around 300,000, the northern part of the lake is the major concentration of urban settlement on the lakeshore. In Tanzania, Kigoma with a population of 135,000, is the major settlement and port facility, and to the south of the lake, Mpulungu in Zambia with a population of 70,000 is also a major port.

Bujumbura has two major industries, brewing and textiles, that discharge significant quantities of waste water that passes untreated into the lake. There are, in addition, many other potentially polluting industries. These include the production of batteries, paints, soap, pharmaceuticals, slaughterhouses, oil depots and garages. In Uvira, the main concerns are petroleum products, cotton processing and sugar production.

In addition, the increasing volume of domestic waste and effluents linked to growing urban settlements is an issue in all countries around the lake. Even where the settlements were originally planned to incorporate sewage and solid waste management, their growth has outstripped the planned capacity of their waste disposal systems.

In Kigoma bay, where water circulation is restricted, there are already signs of eutrophication. The water intake for the town is located very close to the discharge points for untreated sewage from a number of institutions and the waste entering the lake from the town's power station.

While the problem is technically easy to solve and fairly localised, it requires the commitment of local government and the communities involved, as well as major financial investments. The benefits to public health are immediate and direct, with improved water quality benefiting many direct users. The long-term benefits to fisheries and biodiversity relate to a reduction in excess nutrient load and the reduction in harmful leachates from poorly sited or managed solid waste disposal sites.

Table 5 National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Burundi: Pollution from urban waste Particularly from Bujumbura and Rumonge **Stakeholders**: MINATE (DG ATE ; INECN); Mairie (SETEMU); MCIT; CCIB; Regideso; MTPE; MSP; BBN; NGOs; Local associations and communities **Uncertainties:** Nature and quantity of effluents; Impact of pollutants on biodiversity	Expansion of treatment capacities – Mairie (SETEMU) Set up controlled site disposal and collect waste – Mairie (SETEMU) Raise awareness and train – MCIT Regulations for marketing of dangerous products for environment (notably batteries) – MINATE (DG ATE) Develop standards for enforcement of legislation relating to waste – MINATE (DG ATE) Implement land use plans in the framework of planning schemes – MTPE Strengthen capacities for INECN to monitor and control – MINATE (INECN) Support development of secondary urban centres – MTPE Surveying pollution and impact levels, monitor and follow up – MINATE (INECN)
Burundi – Industrial Pollution from Bujumbura town (with particular concern to the paint industries, tanneries, soap industry, food industries, textiles and chemicals) **Stakeholders**: MINATE (DG ATE ; INECN); Mairie (SETEMU); MCIT; Industrial Enterprises – the paint industries, tanneries, soap industry, food industries, textiles and chemicals; CCIB; Regideso; MTPE; MSP; BBN; NGOs; Local associations and communities **Uncertainties**: Scale of pollution, pollutant discharges and impact on biodiversity; Acceptable standards	Pre–treatment of industrial sewage and put to work the water treatment plant – Mairie (SETEMU) Expansion of the treatment capacities – Mairie (SETEMU) Set up controlled site disposal and collect waste – Mairie (SETEMU) Treatment, recycling and transformation of waste – Mairie (SETEMU) Improve industrial procedures – MCIT Raise awareness and train – MINATE (INECN) Regulations for facilities likely to pollute (Prior EIA technical specifications) – MINATE (DG ATE) Regulations for marketing of dangerous products for environment – MINATE (DG ATE) Develop standards for enforcement of legislation relating to waste – MINATE (DG ATE) Implement land use plans in the framework of planning schemes – MTPE Strengthen capacities for INECN to monitor and control Surveying pollution and impact levels, monitor and follow up – MINATE (INECN) EIA prior to industrial development – MINATE (INECN)

(continued)

Table 5 (continued) National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Congo: Pollution by domestic effluents and waste **Stakeholders**: Ministry of Environment; Local Authorities; Population; NGOs and Local communities; Urban services; INERA; Ministry of Energy **Uncertainties:** Nature and quantity of pollutants and impact on the Lake biodiversity	Identification of pollutants, evaluation of impact – CRH Sanitation (construction of latrines, installation of controlled disposal sites and waste collecting, setting up waste and sewage network connected to a treatment plant) : Uvira, Mboko, Kalemie, Moba, Baraka – Min of Env Health education – Health Services Research – focused on recycling through agricultural and energy – INERA Develop appropriate legislation and support enforcement capacity – Min of Env
Congo – Industrial Pollution Kiliba Sugar Factory **Stakeholders**: Kiliba sugar factory; CRH; CRSN; INERA; ISDR; NGOs and Local Communities; Min. of Energy; Ministry of Environment **Uncertainties**: Impact of pesticides / lime on biodiversity; Alternatives	Recycling of by – products (bagasse, treacle, lime) – Min of Env Assessment of the impact of herbicides on the Lake waters and the biodiversity – CRH Research for more appropriate fertilising modalities – INERA Update legislation – Min of Env Control – Min of Env
Congo – Pollution from Kabimba cement factory **Stakeholders**: Ciment–lac; CRH; CRSN; INERA; ISDR; NGOs and local Communities; Ministry of Environment **Uncertainties**: Impact of ashes; dusts and smokes on lake biodiversity	Assessment of the impact and identification of the measures to be taken – CRH Feasibility study of agricultural recovering of ashes – INERA Implement recommendations – Min of Env Update legislation – Min of Env Control – Min of Env
Tanzania: Discharge of untreated domestic waste, Kigoma Town **Stakeholders**: Local Council; Regional Authority; Min of Water; Min of Health; Min of Lands **Uncertainties:** Impact on biodiversity; Quantity and type of effluents	Review existing town development plans – Min of Lands Incorporate proposals for sewage, waste water control measures and water supply – Min of Water Propose developments & promote awareness to counteract existing situation of open drains etc. – Min of Lands Monitor effluents – Min of Water
Tanzania: Discharge of untreated waste from institutions (Police, Prisons, Railway Station, Docks) Kigoma Town **Stakeholders**: Police; Prisons; TRC; Local Council; Min of Water; Min of Health; Min of Transport; Regional Authorities **Uncertainties:** Impact on biodiversity; Quantity and type of effluents	Enforce regulations – Min of Water Identify reasons for non–compliance – UWS&S Dept Promote Senior level awareness – Local Authorities Identify and propose practical treatment works and disposal sites – Min of Water Implement proposals and regulations – Min of water Monitor effluents – Min of Water

(continued)

Table 5 (continued) National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Tanzania: Inappropriately sited solid waste dumps Kigoma Town **Stakeholders**: Local Council; Regional Authority; Min of Water; Min of Health; Min of Lands; Communities **Uncertainties:** Impact on biodiversity; quantity and quality of leachates	Identify appropriate dump sites – Town Council Review present collection and disposal procedures – Town Council Check existing and introduce appropriate local regulations; Develop appropriate landfills – Town Council Monitor quantity and quality of leachates – Min of Water
Tanzania – Industrial Pollution Kigoma TANESCO Power Station **Stakeholders**: TANESCO; Local Council; Min of Water; Min of Energy; **Uncertainties**: Extent of Pollution	Implement appropriate management practices and structures – Energy Department Implement both short and long term remedial measures – Energy Department Review TANESCO plans for rehabilitation, including funding – Energy Department
Zambia: Discharge of untreated domestic effluent, Mpulungu and Shoreline Settlements **Stakeholders**: Local Authority; Water Affairs; Fisheries Dept; Local Communities; District Health Management Team; D–WASHE; ECZ **Uncertainties:** Scale of problem and impact on biodiversity	Assess scale of problem and impact on biodiversity– ECZ Review design of existing sewerage systems, assess potential for alternatives – Local Council Link with existing D–WASHE programme– Local Council Implement alternatives– Local Council Monitor effluent disposal – ECZ Raise awareness of issues – ECZ
Zambia: Uncontrolled Waste Dumping in and around Mpulungu **Stakeholders**: Transporters; Fishing Companies; Local Authority; Water Affairs; Zambia Revenue Authority; Fisheries Dept; Local Communities; District Health Management Team; ECZ **Uncertainties:** Scale of problem and impact on biodiversity	Assess scale of problem and impact on biodiversity – ECZ Raise awareness of issues – ECZ Monitor disposal – ECZ Enforce regulations – Local Council
Zambia – Transboundary movement of industrial pollution **Stakeholders**: Communities; Min of Energy & Water Depart.; Dept. of Fisheries; Local Authorities; Min of Environment; NISIR; ECZ; Maritime **Uncertainties**: Types of pollutants, distribution and buildup	Identify sites for monitoring – ECZ Establish a functioning monitoring programme – ECZ Training in monitoring lake pollution – ECZ

5.5.2 Harbour Pollution

Harbours are a significant source of pollution, through accidental contamination from spillage during transfer of cargo, through waste dumped from boats and in some cases, waste dumped from shoreline factories.

Harbour management systems are designed to avoid accidental pollution but the majority of harbour facilities are designed for low volumes of marine traffic and become over-stretched by high traffic volumes. While dumping waste from boats may be acceptable at low levels, with increasing traffic pollution problems will occur.

The impact of political instability in the region has been to reduce the level of some marine traffic such as the transport of oil and agrochemicals, while increasing others such as bulk food transport. With increasing stability the volume of potentially hazardous goods and the potential for spillage in harbours will increase.

The benefits of addressing harbour pollution are again immediate, with direct public health impacts as well as more general benefits to fisheries and biodiversity.

Table 6 National Actions to Control Harbour Pollution

Specific Problem	Proposed Actions and Key Agencies
Burundi: Pollution in harbours **Stakeholders**: MTPET (Lake transport), Ship owners, EPB, INECN – MINATE (INECN), MCIT, Lake Guard **Uncertainties:** Scale of threats	Promulgation of Lake Traffic Act, and extension – MTPET Control enforcement of Act, and continue technical checking of ships – MTPET Monitor and evaluate scale of the problem of lake pollution – MINATE (INECN) Harmonise regulations and supervising activities and control with the other riparian states – MTPET Establish a shipyard for maintenance of ships – MTPET
Congo: Harbour Pollution (Kalemie,Kabimba, Kalundu, Moba) **Stakeholders**: Ministry of Environment; Transport and Communication; CRH; Ship owners **Uncertainties:** Nature and quality of pollutants and impact on biodiversity	Raise awareness – Min of Env Update regulations (eco tax combined system dissuading from legal pollution and penalising illicit pollution) – Min of Env Strengthen control – Min of Env Installation of controlled land disposal sites– Min of Env Identification of pollutants and assessment of their impact on the lake biodiversity – CRH
Tanzania: Pollution in harbours (particular concern over storage and handling of oil) **Stakeholders**: TRC; Min of Water; Ship Owners / Operators; Local Council; Oil Companies; Shipping Department; NEMC; Min of Transport **Uncertainties:** No information on specific handling problems; Impact on biodiversity	Identify specific causes of leaks and spillage – Min of Water Check and review regulations and recommended procedures – Min of Water Review reasons for non–enforcement of regulations – Min of Water Implement short term and long term remedial actions – Min of Water

(continued)

Table 6 (continued) National Actions to Control Urban and Industrial Pollution

Specific Problem	Proposed Actions and Key Agencies
Zambia: Pollution in harbours (particular concern over storage and handling of oil and other cargoes) **Stakeholders**: Communities; Water Affairs; Maritime Department; Harbours Authorities; Barge Owners; Fisheries Dept; Local Authorities; Police Service; Defence; ECZ; Disaster Management Unit **Uncertainties:** Impact on Biodiversity of Different Cargoes and Scenarios	Carry Out Risk Assessment – Maritime Review Potential Impact on Biodiversity – Fisheries Mitigate impacts and put in place emergency response capacity – Harbours Authorities

5.5.3 Pollution from Future Mining Activities or Oil Exploitation

At present there is relatively little mineral exploitation in the catchment. However, the mineral potential of the basin has not been fully explored and there are indications that there may be economically viable oil fields as well as gold and other minerals.

"Smallholder" gold mining is carried out in the upper catchment of the Malagarasi in Tanzania, and involves the use of mercury in processing and there are companies that have looked into commercial operations in the same area.

There is also already a signed agreement for the exploitation of a nickel resource in the Burundi part of the Malagarasi basin. The processing factory will constitute a potential source of pollution for the lake.

The level of control on industrial mineral exploitation varies from country to country, although all have some legislation that could be used to support sound industrial development and to a lesser degree smallholder mining operations. In practice there is little control of smallholder systems and little experience of environmentally sound management of major industrial operations.

These limitations are recognised but if appropriate actions are taken now, there is the potential to implement preventive measures and avoid future problems associated with any significant expansion of mining or oil exploitation.

Table 7 National Actions to Manage Future Mining Operations

Specific Problem	Proposed Actions and Key Agency
Burundi: Potential pollution from future mining and oil exploitation activities **Stakeholders**: MEM (DMC); MINATE; mining companies; oil companies **Uncertainties:** Scale of pollution and effects on lake	EIA prior to start mining – MINATE (INECN) Review Oil and Mines Act in order to take into account environmental impacts – MEM Negotiate agreements with other riparian countries – MEM Support the existing chemical and biological laboratories – MINATE (INECN)
Congo: Potential pollution from future mining and oil exploitation activities **Stakeholders**: Min Environment; CRH; CRGM; Min. of Oil; Ministry of Energy **Uncertainties:** Probability and site of works	Studies of impact on the environment – CRH/Min of Env Environment follow up of activities – Min of Env
Tanzania: Discharge of toxic substances from mine workings **Stakeholders**: "Smallholder miners"; Min of Energy and Mines; Min of Water; Regional / Local Authorities; NLUPC; NEMC; Min of Health **Uncertainties:** Scale of problem	Quantify scale and processes used different mining areas – Energy and Minerals Promote appropriate technology – Energy and Minerals Enforce existing regulations – Energy and Minerals Review the status of EIA legislation – Energy and Minerals

5.5.4 Risks of Major Marine Accidents

So far there have been no major environmentally damaging marine accidents recorded on the lake. However there are hazardous cargoes transported regularly across the lake with little control of storage or handling. The volume of traffic is variable and at present depressed as a result of the continued political disturbances. However, oil continues to be one of the main potentially hazardous cargoes and is transported in towed barges.

As the riparian countries continue to develop their industrial potential, the volume of traffic will increase as will the range of cargoes. Again there is existing legislation in all countries that deals both with design of vessels and cargo handling, but this needs to be reviewed in the light of increasing traffic and range of hazardous cargoes.

Table 8 National Actions in Response to Major Marine Accidents

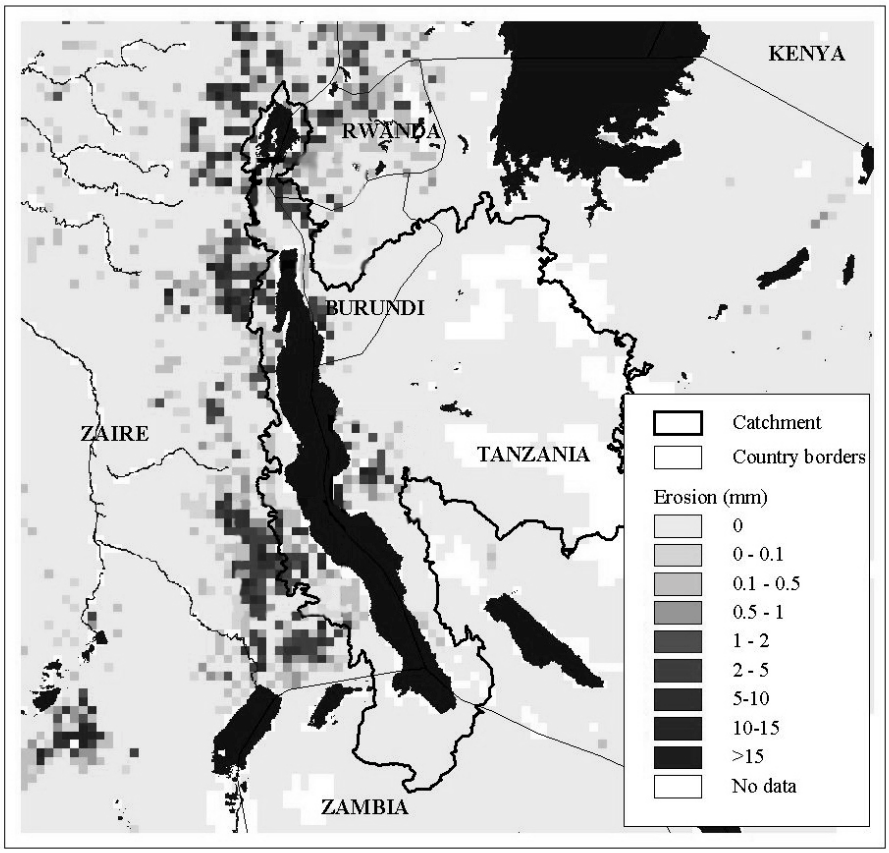
Specific Problem	Proposed Actions and Key Agencies
Burundi: Pollution from major marine accidents **Stakeholders**: MTPET (Lake transport), Ship owners, EPB; MINATE (INECN), MCIT, Lake Guard; MAE (Fisheries) **Uncertainties:** Scale of threats	Promulgation of Lake Traffic Act, and extension – MTPET Control enforcement of Act, and continue technical checking of ships – MTPET Monitor and evaluate scale of the problem of lake pollution – MINATE (INECN) Harmonise regulations and supervising activities in riparian states – MTPET
Congo: Pollution from major marine accident **Stakeholders**: Min. of Environment; Transport and Communication service; CRH; Ship owners; CRSN; External Commerce; Congolese Office for Control **Uncertainties:** Nature and quantities of pollutants and impact on lake biodiversity	Raise awareness (ship operators and other stakeholders) – Min of Env / Transp. and Comms. Review regulations (navigation rules; pollution and security standards, transport of hazardous cargo) – Min of Env Strengthen control – Min of Env Technical control of ships (with anti–pollution and security standards) – Trans. and Comms. Pollution monitoring – CRSN Evaluate impact (scale of problem, frequency of discharge, risks, harmfulness of pollutants) – CRH
Tanzania: Pollution from major marine accident **Stakeholders**: Ship Owners / Barge Operators; Regional Authorities; Shipping Department; NEMC; Min of Transport; Min of Water; NEMC; Insurance Companies; TAFIRI **Uncertainties:** Level of Risk	Risk analysis – NEMC Develop contingency plan – NEMC
Zambia: Pollution from major marine accident **Stakeholders**: Large Transporters; Passengers; Maritime Department; Harbours Authorities; Insurance Companies; Fisheries Dept; Local Authorities; ZRA; Police Service; Defence; Disaster Management Unit; ZAWA; ECZ **Uncertainties:** Impact on Biodiversity of Different Cargoes and Scenarios	Carry out risk assessment – Maritime Department Review potential impacts on biodiversity – Fisheries Department Put in place emergency response capacity – Maritime Review a need for a regional response and emergencies disaster management unit – ECZ

5.6 Sediment Management

The impact of sedimentation on lake biodiversity has two components. The first relates to the physical changes to habitats either through the attenuation of light by sediments suspended in the water column or the deposition of a sediment blanket over other substrata; the second impact relates to the nutrient load associated with sediments.

Over the last 50 years or so, there have been major increases in sediment movement from the catchment to the lake, related to changing land use patterns within the catchment. The expansion of agriculture is the principal cause of this and follows deforestation, as farmers move into areas where tree cover has been reduced through felling for timber or fuelwood. However, while linked, these two aspects can be considered separately as they often fall under different institutional mandates, with agricultural expansion the responsibility of departments of agriculture and classified or demarcated forest areas the direct responsibility of the forest departments.

Map 4 Erosion Hazard and Sediment Source Areas



The increased rate of transfer of sediments and nutrients to the lake equates to increased loss of soil and soil fertility in the catchment. The key management intervention is to promote sustainable agricultural practices within the catchment, that

maintain soil structure and soil fertility and support increased agricultural and forestry production.

Deforestation and inappropriate farming practices are of major concern in the coastal zone, as elsewhere in the catchment. However, inflow from smaller catchments (<50 km²) tends not to be transported far enough to cause extensive impacts, but may result in significant local changes in littoral habitats.

Erosion from larger catchments (>4000 km²) where large wetlands areas or extensive deltas have already developed tends to be less critical for the lake.

It is the medium size catchments (50-4000 km²) where erosion is of most concern. The sediment load from these areas is generally discharged into the lake without the mitigating effects of major wetlands. The movement of sediments, transported by currents within the lake, can then affect areas up to 10 km from the mouth of the rivers.

5.6.1 Promotion of Sustainable Farming Practices

Sustainable farming is a major objective in all of the riparian countries. Interventions in support of this goal include the promotion of physical conservation structures and improved methods of maintaining soil fertility. In addition there is the potential for promoting alternative crops or adding value to production and hence intensifying the value of production, limiting the need for farming expansion.

While effective soil and water conservation techniques are well established in some areas, in other parts of the catchment, adoption of these approaches has been disappointing. Adoption is not just a function of knowledge but also of available capital and labour. The adoption of specific soil conservation initiatives generally comes as a part of a wider range of improved farming practices, often linked to new opportunities for crops and markets.

As critical sediment sources can be related to identified sites on the coast or within the middle sized catchments, the focus of the proposed national interventions is not one of a general extension programme but a targeted programme aimed at specific communities.

Around much of the lakeshore flat land suitable for farming is limited often to no more than a few hundred metres wide at the base of the steep slopes of the rift valley escarpment and is predominantly limited to a narrow range of subsistence crops. Where there is flat fertile land e.g., in the Rusizi floodplain, or at the mouth of the Lufubu, agriculture is much more diverse.

Where fishing has declined the importance of agriculture has increased. This, coupled with population growth, has resulted in land shortages in the immediate lakeshore area with farmers forced to clear steep slopes to farm. In some areas fields are unusable after only two or three harvests, and new, even steeper slopes are cleared.

Both men and women are involved in farming[11] and in coastal areas farming is more important to poorer families. A lack of appropriate hill farming traditions and a perception that farming is still not as important as fishing, particularly to the wealthier or more influential members of many communities, has meant that there have been few efforts to improve it. Poor access to markets also limits people's attempts to increase or diversify production.

Nevertheless, in some areas the arrival of new practices such as the use of animal manure or ox-drawn ploughs has had some impact. Tree planting programmes are also a common response, providing additional benefits including sustainable wood supply (mainly for firewood and building materials), shade, fruit production and the use of leguminous tree species that can act as an alternative to fertilisers.

Table 9 National Actions to Promote Sustainable Agriculture

Specific Problem	Proposed Actions and Key Agencies
Burundi: Erosion from agricultural practices **Stakeholders**: MAE, MINATE (DG ATE), Territ. Admin., Farmers, Research Institutes, MTPE, NGOs, Local associations and communities **Uncertainties**: Impact on biodiversity, scale of sedimentation, relation between erosion and fragile areas receiving sediments at lake level	Evaluate impact of problem, study the extent of sedimentation in the lake and identify high risk erosion areas – MINATE (IGEBU) Plan catchment (agro–forestry, anti–erosive practices), raise awareness and promote participative approach – MINATE (DG ATE) Research – development and extension of suitable techniques – MAE Planning focused on sediment deposits in the valleys, traps for sediments – MINATE (DG ATE) Define special standards and prioritise interventions to identified areas – MINATE (DG ATE)
Congo: Inappropriate farming practices and extensive agriculture **Stakeholders**: Minagri (SNV); Ministry Environ; INERA; NGOs and local communities; CRH; Local authorities; AT; ISDR **Uncertainties**: Sensitive zones	Education and awareness – MINAGRI/SNV Identification of sensitive erosion zones – INERA Regulation of soil use in these zones – Min of Env Implementing demonstrations (anti erosive techniques, agrozootechnical, agroforestry integration) – INERA Extension and support to enforcement capacity – MINAGRI/SNV
Tanzania: Erosion from agricultural land (particular concern on steep slopes and cultivating down slope) **Stakeholders**: Min of Agriculture; Communities; NLUPC; Local Authorities; JGI/TACARE **Uncertainties**:	Identify with communities, sensitive areas – NLUPC Demarcate hazardous areas and reforest – NLUPC Raise awareness of critical issues – Min of Ag Promote soil conservation measures – Min of Ag Check/review by–laws – Local Authority Assist villages in preparing land use plans – NLUPC

(continued)

[11] While there is generally a role differentiation in carrying out agricultural tasks, in coastal communities fishing is generally carried out by men, while farming is predominantly the responsibility of women. Interventions need to take account of these gender and wealth differentiations and address particular sections of the communities.

Table 9 (continued) National Actions to Promote Sustainable Agriculture

Specific Problem	Proposed Actions and Key Agencies
Zambia: Erosion from agricultural practices (particular concern slash and burn and stream bank cultivation) **Stakeholders**: Farming Communities; Forestry Department; Ministry of Agriculture; Water Affairs; Local Chiefs; Chongololo Club; Local Authorities; Churches **Uncertainties**: Scale of problem and trend; Scale and impact on the lake; Cultural and economic viability of alternative farming practices	Assess Scale, Impact and Risks – MAFF Evaluate impact on the lake – Water Affairs Review Alternative Practices including Irrigation – MAFF Research Review Relevance of Existing Regulations – Water Affairs Promote Appropriate Farming Practices – Field Services MAFF Identify Critical Erosion Sites and Remedial Measures – MAFF Monitor enforcement of regulations – Water Affairs Monitor current practices – Water Affairs

5.6.2 Control of Deforestation

Deforestation characterises much of the catchment. While a general problem related to agricultural expansion and the demand for wood energy, it is an issue in its own right where it affects forests which have a high catchment protection value. In these areas encroachment is seen as being the fundamental problem as opposed to poor agricultural practices.

As a result of clearing woodland for agriculture and demands for fuelwood for domestic use, smoking fish, processing palm oil, curing tobacco and producing traditional beer, there are fuelwood shortages in many lakeshore villages.

Trade in fuelwood and charcoal occurs both within lakeshore villages and between lakeshore and inland villages, and in some cases is a cross-lake trade.

The immediate response by many forestry authorities is to try to enforce control in gazetted areas, however, the management of gazetted forests has broken down as a result of decreasing central government support and often in the face of political pressure to release land for settlement

While clearly there remains a need for managed forest areas, particularly those gazetted to protect critical catchments, the emphasis has to be on reducing pressure through the provision of alternatives and managed access, rather than exclusion.

Many of these interventions will be related and/or complimentary to, farming and alternative livelihood interventions and should be geared towards improving the diets and/or income levels of the farming households involved.

Table 10 National Actions to Counteract Deforestation

Specific Problem	Proposed Actions and Key Agencies
Burundi: Deforestation **Stakeholders**: MINATE, MAE; NGOs, Local associations and communities **Uncertainties**: Scale and distribution of clearings; State of resource	Inventory of forests and evaluate damage – MINATE (DG ATE) Strengthen legal basis for Protected Areas – MINATE (INECN) Expansion of network of Protected Areas to cover all natural forests – MINATE (INECN) Demarcate PAs and national forests boundaries – MINATE (INECN) Rehabilitation of destroyed parts of PAs and Forests Environmental education – MINATE (INECN) Prepare participative management plans for woods and PAs and identify alternative resources – MINATE Promote agroforestry and private woods – MINATE (DG ATE) Compensate people expelled from PAs – MINATE Reinforce the capacity to supervise and control PAs and forests and INECN capacities – MINATE
Congo: Deforestation **Stakeholders**: Ministry of Environment ; ICCN; Local authorities; NGOs (CADIC) and local communities; Population; Ministry of Energy; MINAGRI; CRH **Uncertainties**: Scale and distribution of clearings; State of resource	Education and awareness (including authorities) – Min of Env. Promotion of private woods and agro forestry (extension, demonstration) – Min of Env. Protection and restoring of public forests along rivers – ICCN Identification of forestry areas to be protected – ICCN Establish protected forest areas – Min of Env. Update legislation – Min of Env. Strengthen environmental services capacities – Min of Env. Creation of micro hydropower plants in order to supply substitution energy to protect the catchment – Min of Env. Action towards improved stoves, improved process for smoking of fish and alternative energy (biogas, solar etc..) – Min of Env.
Tanzania: Deforestation **Stakeholders**: Local / Regional Authorities; Communities; Forestry Department; NLUPC; Min of Lands: TACARE; Min of Local Gov't. **Uncertainties**: Current scale and rate of deforestation	Identify critical encroachment and critical threatened zones – Forestry Dep Create political awareness of problems – Local Government Negotiate with communities to gazette sensitive areas – Local Authority Negotiate means of resettlement from sensitive areas – Local Authority Promote community forest management and access rights – Forestry Department Enforce bye–laws – Local Authority

(continued)

Table 10 (continued) National Actions to Counteract Deforestation

Specific Problem	Proposed Actions and Key Agencies
Zambia: Deforestation **Stakeholders**: Local Communities; MENR; ZAWA; Water Affairs; Local Chiefs; Chongololo Clubs; Politicians **Uncertainties**: Scale of Impact on Sediment Load	Assess Impact on Sediment Load – Water Affairs Negotiate Solution to Current Encroachment – MENR Rehabilitate sensitive areas – MENR Enable Enforcement of Current Regulations – MENR Raise Awareness of Issues, particularly at the Political Level – ECZ Promote afforestation – MENR Raise local awareness – MENR Promote sustainable forest management, agroforestry and promote alternative energy – MENR

5.7 Habitat Conservation

While all proposed actions fall within the framework of protecting the biodiversity of the lake and promoting the sustainable use of lake resources, there are some actions that address the need for protection directly, through lake/wetlands habitat conservation.

There are two aspects that come within habitat conservation: the first is the protection of areas of high or representative biodiversity; the second deals with the protection of key spawning or nursery grounds essential for the productivity of the lake fisheries.

The highest biodiversity, in terms of number of species, is situated in the littoral zone (down to 40 m). This biodiversity is found throughout the lakes perimeter although many organisms have limited geographic ranges. The net affect is that species assemblages typically change over distances of tens of kilometres along the coastline.

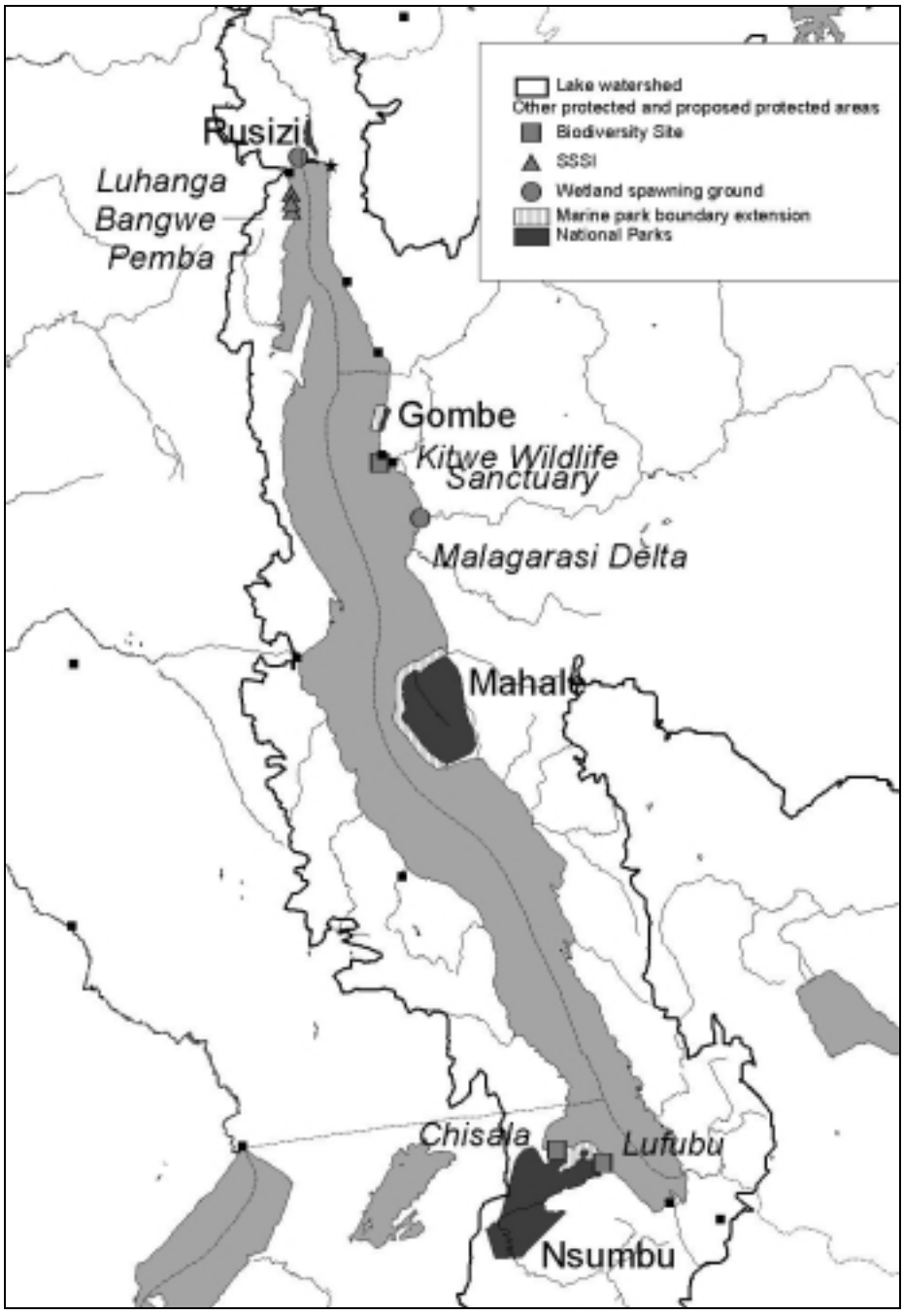
This littoral zone is most threatened by poorly managed coastal development, leading to a loss of terrestrial vegetation and increased siltation. At present, over much of the lakeshore, this effect is relatively localised around fishing villages and major towns. It is more widespread around the north basin and along the Tanzanian coast.

There are three National Parks around the lake, Nsumbu in Zambia, Mahale Mountains and Gombe Stream in Tanzania and the Natural Reserve of Rusizi in Burundi. These formal "protected areas[12]" have provided a focus for conservation activities around the lake. Although 73% of known fish species have been found in waters in and around these park areas, they can not protect all species, nor do these parks and reserves protect all key habitats for the spawning and early development of the economic species.

[12] The term "protected areas" is used here to denote the formally designated parks or reserves, as opposed to areas that may be protected under other management arrangements.

There is, therefore, a need for a broader approach to protection ranging from parks to seasonally closed and restricted areas, where land and water based activities are limited to acceptable practices defined and agreed with the lake shore communities.

Map 5 National Parks and Sites of High Conservation Interest



5.7.1 Threats to Resources of National Parks

Simply maintaining and extending existing terrestrial parks into adjacent waters, can protect a representative sample of the majority of littoral habitats in the lake.

Associating an aquatic zone with an existing terrestrial park is the most effective strategy as it minimises resources required for park management, reduces disruption to lake shore communities, and serves to ensure that the aquatic habitats are protected from developments in the adjacent coastal zone.

Increasing land pressure adjacent to national parks and the lack of alternative livelihood options is resulting in resource conflicts between parks and neighbouring communities. The problem is compounded by a decline in the resources available to parks from central government as part of policies promoting decentralised management.

Parks management is now adapting to changes in social and economic pressures and negotiating access rights and compensatory mechanisms with local communities.

The waters adjacent to three of the existing terrestrial national parks (Mahale Mountains, Gombe, Nsumbu) include relatively unimpacted sandy, rocky and mixed sand/rock/ habitats. The species assemblages associated with these habitats are representative, in terms of overall diversity and ecosystem structure, of communities in similar habitats elsewhere in the lake.

More specialised habitats, such as shell-beds, emergent macrophyte stands and stromatolite[13] reefs are also represented in the areas adjacent to Lake-shore national parks. Shell beds are found in both Mahale Mountains (southern part) and Nsumbu (north-western part). Stromatolite reefs are also found in the northern part of Mahale Mountains National Park. The species associated with these habitats, including unique assemblages of shell-dwelling cichlids therefore benefit from a measure of protection from land-based threats and, in the case of Nsumbu and Mahale Mountains, from aquatic protection.

Rusizi Natural Reserve provides an area adjacent to a major river delta, that includes emergent macrophyte stands, muddy substrates and the turbid, nutrient-rich waters associated with river-mouths. The major threats to its current diversity originate in the wider Rusizi basin, and are unlikely to be mitigated by protecting a small area of the delta, however, the reed-bed areas provide important nursery grounds for fish of commercial importance, as well as trapping some sediment. Extending protection into the lake, to manage fishing and reed-cutting activities, is therefore desirable.

[13] Emergent macrophyte: aquatic plants rooted in the substratum with their vegetative shoots emerging above the water surface. Stromatolite Reef: medium to larger underwater rock like limestone structures formed by the action of micro-organisms

Table 11 National Actions to Support Parks Management

Specific Problem	Proposed Actions and Key Agencies
Burundi: Encroachment in the Rusizi Natural Reserve **Stakeholders**: MAE (incl. Fishing dep.); MINATE (INECN); Territ. Adm.; Farmers; NGOs; Local associations and communities **Uncertainties**:	Compensation for expulsion from sensitive zones – MINATE (INECN) Extend the reserve into the littoral zone to 1000 metres offshore of the 774 metre contour – MINATE (INECN) Plant hedge to demarcate the reserve in the Rusizi delta – MINATE (INECN)
Congo: Lack of protection of the Congolese side of the Ruzizi delta **Stakeholders**: ICCN; CRH; CRSN; NGOs, Local Communities **Uncertainties**	Establish a "protected area" in the Ruzizi delta, adjacent to the Burundi Natural Reserve – ICCN
Tanzania: Exploitation of fisheries within parks **Stakeholders**: TANAPA; Fisheries Department; Local Communities **Uncertainties**: Compliance of local communities	Raise awareness of parks issues – TANAPA Involve local communities in parks management – TANAPA
Zambia: Community pressure on Nsumbu National Park **Stakeholders**: ZAWA; Lodge Operators; Local Communities; Fisheries **Uncertainties**: Support from Local Communities	Involve communities in Parks Management – ZAWA Training in Aquatic Parks Management – ZAWA Define and mark aquatic parks boundary – ZAWA

5.7.2 Conservation of Sensitive Coastal Habitats

The following proposals deal with the protection of areas outside the formal protection systems of national parks or reserves. The areas under consideration include sites with high biodiversity interest, and critical spawning and nursery grounds for the major economic species.

At present these areas have not been protected under existing formal or informal agreements, and suffer from the same management constraints as other littoral areas. Management proposals will therefore have to take direct account of community interests and will rely on a process of negotiation to reach agreements on limited access and possible mitigatory or compensatory mechanisms.

In the long term, these negotiations may not be that different from those required for the wider management of the shore zone, and could be used to develop a framework applicable for many other lake shore areas and communities. However, it does provide a clearly defined focus on a few communities or sites to start this process of negotiation.

Previous surveys indicate that the Congolese territory hosts very high aquatic biodiversity. Three sites have been identified as key habitats meriting some protection status, these are Pemba, Luhanga and Bangwe. These sites are still relatively unaffected by human activities and have high biodiversity value. They are close to Uvira, and hence provide a valuable research/study area for the Centre de Recherché en Hydrobiologie. Currently, the major threat to their biodiversity is from sedimentation due to deforestation and farming of the slopes above them.

Additional key protected habitats could include a number of rocky sites in the area of Gitaza in Burundi, the waters next to the Kitwe Wildlife Sanctuary and south of Kigoma in Tanzania.

From the perspective of fisheries and biodiversity protection, it is essential that some protection status be given to the coastal wetlands and the nursery and spawning grounds for economically important fish species. Key areas include the unprotected parts of the Rusizi, the Malagarasi delta, the Lukuga effluent, and the Lufubu/Chisala river mouths, and Chituba Bay.

Table 12 National Actions to Conserve Sensitive Coastal Habitats

Specific Problem	Proposed Actions
Burundi – Degradation of sensitive coastal areas **Stakeholders**: MAE (incl. Fishing dep.); MINATE (INECN); Territ. Adm.; Farmers; NGOs; Local associations and communities **Uncertainties**: Extent of lake shore activities and impact on biodiversity	Mapping supra littoral area and cultivated area – MINATE (INECN) Raise awareness – MINATE (INECN) Participative management and restoration of natural resources – MINATE (INECN) Declare sensitive areas as protected areas (Murembwe, Nyengwe, Rwaba) - MINATE (INECN) Control lake shore vegetation exploitation – MINATE (INECN) Protect the rocky coastline through tree planting between Gitara and Flugara – MINATE (INECN)
Congo – Risk of degradation of coastal zone; lack of protection of specific key zones (Rusizi, Lukuga, Luhanga, Pemba, Kalamba, Kiriza, Kazimia, Burton Bay) **Stakeholders**: ICCN; CRH; CRSN; NGOs, Local Communities **Uncertainties**:	Establish a protected area – Lukuga – ICCN Establish a protected area – Rusizi – ICCN Establish protection forsites of special scientific interest – Luhanga, Pemba, Kalamba, Kiriza, Kazimia, Burton Bay – ICCN Participative preparation of a management plans – ICCN Hydrologic monitoring (Lukuga, Mutambala and Ruzizi) – CRH

(continued)

Table 12 (continued) National Actions to Conserve Sensitive Coastal Habitats

Specific Problem	Proposed Actions
Tanzania – Degradation of wetland areas – in particular the Malagarasi **Stakeholders**: Communities; Fisheries Dept; TAFIRI; Local Government; Tourism and Natural Resources **Uncertainties:** Impact on Biodiversity; Optimal size of protected areas; Community Compliance	Negotiate access with communities – Min of Agric Gazette areas – Min of Agric Raise Awareness – Fisheries Ban destructive fishing practices – Fisheries Evaluate stock – TAFIRI Conduct hydrological and limnological monitoring – TAFIRI
Zambia – Damage to Sensitive Habitats Lufubu and Chituba Bay and Chisala River Mouth **Stakeholders**: Min. of Agriculture; Min. of Env.; Min of Tourism; Local Authorities; Local Communities; Traditional Leaders **Uncertainties:** Extent of degradation and impact on biodiversity	Evaluate destructive fishing practices – Fisheries Ban specific destructive practices (poison, explosives…) – Fisheries Negotiate designation of Chituba and Lufubu bays and Chisala river mouth as conservation areas – Fisheries Negotiate with communities acceptable management practices – Community Dev Develop procedures for capital empowerment of communities to alleviate impact of zone designation – Community Dev Negotiate designation of Lufuba mouth as Ramsar site ECZ Monitor stock levels – Fisheries

Key Project Documents

Baseline Reviews – Executive Summaries

Biodiversity Special Study Advice to the Strategic Action Programme

Burundi – Conclusions de la consultation nationale préalable à l'ADT : Analyse Diagnostique Nationale, Examen des Politiques et Stratégies Nationales pour l'Environnement.

Congo – Conclusions de la consultation nationale prélable à l'ADT : Analyse Diagnostique Nationale - Examen des Politiques et Stratégies Nationales

Fishing Practices Special Study Advice to the Strategic Action Programme

Special Study on Sediment Discharge and its Consequences – Summary of Findings for the Strategic Action Programme

Tanzania – Conclusions of the National Consultation Process for the Regional Strategic Action Plan

The Convention on the Sustainable Management of Lake Tanganyika

The SESS Summary and Recommendations for the Strategic Action Programme

The State of Biodiversity in Lake Tanganyika – A Literature Review

The Transboundary Diagnostic Analysis

Zambia – Conclusions of the National Consultation Process for the Regional Strategic Action Plan

In addition the LTR following report is an essential parallel study input.

Lake Tanganyika FFMP Implementation Programme and Component Project Profiles. Research for the Management of the Fisheries on Lake Tanganyika LTR 1999

List of National Institutions Involved in the Consultation Process

Burundi

Dép. Génie Rural
Dép. Pêches, Pisciculture, Eau
Dép. Transport Lacustre
MDC
ETP Gitega
Géologie et Mines
IGEBU
INECN
Legal Affairs and Settlement of Disputes
MINATE
ODEB
ONAPHA
Planification urbaine
PNUD
Ressources hydrauliques
SETEMU
Université du Burundi

DR Congo

Affaires Etrangères
CADIC
CIC
CRH Centre de Recherche Hydrobiologique
CRSN
ICCN
ISDR
ISP-Gombé
Min. Environnement
Project Pêche/Lac Kivu
SENADEP
Service National de Reboisement
Univ. Kinshasa

Tanzania

Attorney General Chamber
AWF
CARITAS Tanzania
Diocese of Western Tanganyika
District Council
Division of Environment
Fisheries Division
Forestry Division
JET
Maji-Ubungo
Marine parks and Reserves Unit
Ministry of Agriculture
Ministry of Communication and Transport
Ministry of Energy and Minerals
Ministry of Justice and Constitutional Affairs
Ministry of Lands and Human Settlements
Ministry of Water
Ministry of Natural Resources and Tourism
NEMC
NLUPC
Ornamental Fish Trade Companies
Planning Commission
PMO
Regional Office
TAFIRI
TANAPA
TANESCO
Tanzania Railways Corporation
The Jane Goodall Institute
University of Dar es Salaam
WCST

Zambia

Central Board of Health
Department of Energy
Department of Fisheries
Department of Maritime Services
Department of Water Affairs
Environmental Council of Zambia (ECZ)
Food and Drugs Laboratory
Forestry Department
Lake Tanganyika Biodiversity Project
Ministry of Agriculture, Food and Fisheries
Ministry of Environment and Natural Resources
Ministry of Health
Motomoto Museum
Mpulungu District Council
Mpulungu Harbours Authorities
National Institute for Industrial and Scientific Research (NISIR)
Provincial Planning Unit Northern Province
University of Zambia
Wildlife and Environmental Conservation Society of Zambia
World Wide Fund for Nature – Zambia Education Project (WWF ZEP)
Zambia Wildlife Authority (ZAWA)