

Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika

Strategic Action Plan

Zambia

Conclusions of the National Sectoral Problem Review - Guidelines
for the National Environmental Strategies and Priorities Review

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Summary

This report is intended to be used as a briefing document for all participants at the second Zambian workshop contributing to the development of the Lake Tanganyika Strategic Action Plan.

The first workshop, The National Sectoral Problem Review was held in Lusaka in June/July, with 24 participants from the provincial and local organisations in the lake area and from national centres in Lusaka.

The output of the first workshop is an Analytical Problem Matrix, which proposes a series of actions to counteract specific problems related to the general action areas of reducing the impact of fishing, and controlling pollution and sedimentation. The matrix identifies key agencies and notes the availability of human and material resources. The matrix is attached as an Annex.

The second workshop, the National Environmental Strategies and Priorities Review, will take place at the end of August 1998. These national meetings will be followed by Regional Meetings of the Lake Tanganyika Biodiversity Project TAC and Steering Committee, who will be responsible for developing the Strategic Action Plan.

The objectives of the second workshop are given, and an outline agenda is included. The second workshop has two objectives: to review relevant national policies, legislation and regulations and to see how they can support the proposed actions identified during the first workshop, and to prioritise those actions within the framework of national policies and strategies for environmental conservation and development.

The final part of the report provides instructions to the authors who are expected to prepare background materials for the second workshop. The authors are required to review specific policies, acts and regulations within the context of the proposed actions identified in the analytical matrix prepared during the first workshop. It is likely that there will be occasions where the revision of regulations may themselves become a proposed priority action.

Background - The Strategic Action Plan

The “Lake Tanganyika Biodiversity Project” - LTBP - is jointly owned by the four countries surrounding the Lake, Zambia, DR Congo, Burundi and Tanzania. The full title of the project is “Pollution Control and Other Measures to Protect Biodiversity in Lake Tanganyika”. This emphasis is reflected in the project document, which has as the first immediate objective “...*establish a regional long-term management plan for pollution control, conservation and maintenance of biodiversity in Lake Tanganyika.*”.

Since the project document was prepared, the planning ideas incorporated in this immediate objective have been encapsulated in the concept of a Strategic Action Plan - SAP. Fundamental to this is the recognition that 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 initial interventions based on present knowledge.

Proposed Development of the SAP

Following the decision of the Steering Committee in January 1998 to proceed with the formulation of a regional Strategic Action Plan, the Environmental Council of Zambia held a special National Working Group Planning Meeting, (Lusaka 27/28 April). The meeting fixed dates for the Zambian workshops, agreed on the scope of the discussions and proposed an expansion of the consultation process to include wider representation from the communities, from local government, from the private sector and from national and international organisations..

Zambian National Working Group Planning Meeting

(Completed April 1998)

Zambian National Sectoral Problem Review

(Completed June/July 1998)

Zambian National Environmental Priorities and Strategies Review

(August/September 1998)

Regional Technical Advisory Committee Planning Meeting for the SAP

(Proposed August 1998)

Regional Transboundary Diagnostic Analysis¹

(Proposed October 1998)

Regional Draft Strategic Action Plan

(Proposed January 1999)

Signed Strategic Action Plan

(Scheduled by the Steering Committee March 1999)

¹ The Project uses GEF terminology: a Transboundary Diagnostic Analysis, is a regional prioritisation focused on the management of threats to shared - i.e. *Transboundary* - resources.

National Sectoral Problem Review

The objectives of the first workshop, were broadly defined in advance of the workshop, and then refined during the workshop. They can be summarised as follows:

- To define the main biodiversity problems of the lake, identifying the sectoral causes of those problems in the management of the lake and catchment, and to review the management actions that Zambia can take to resolve those problems.
- As a preparatory exercise in advance of the Regional Transboundary Diagnostic Analysis, so that Zambia's interests, having been fully understood, can be adequately represented in the SAP.

The workshop was held at the Ndeke Hotel in Lusaka from June 29 to July 3 1998. The National Coordinator, James Phiri, chaired the workshop, and jointly in his absence the two workshop facilitators, Andy Menz and Nicholas Hodgson.

Representatives from Lusaka and from the Province and Lake area attended the workshop. Of the 24 participants, seven were based full time in the Province or in the immediate Lake area.

However some organisations that had been identified as possible participants during the preparatory meetings were not present. The ten additional organisations that did not attend the workshop, included, among others, Commercial Fisheries, IUCN, MAFF (Agriculture/Land Use), Private Tourist Sector and UNDP;

Background Materials

In order to ensure that all participants had some level of common understanding of the value of the lake biodiversity and fisheries resources and of the problems facing the management of the lake resources and the surrounding catchment areas, the preparatory meeting identified a number of specific topics on which background papers would be prepared in advance of the meeting.

As a starting point, authors could draw on the baseline reviews prepared for the Inception Workshop in September 1996. The papers provided an overview of the present situation, expanding on actual management problems rather than updating research conclusions.

The following topics were covered by background papers²:

Institutional Structures for Environmental Management; Mpulungu Port Pollution; Community Wildlife Management and Parks; River Water Quality; Pollution Problems; Settlement Patterns and Population Trends; Fisheries and Biodiversity; Mpulungu Council Environmental Issues; Cultural Heritage; Forest Management.

Following introductory proceedings, including an overview of the project and the Strategic Action Plan process, the authors presented their papers, with each one followed by a brief period for discussion.

Analytical Problem Matrix

As a key stage in the SAP process, it is clear that the methods used to assess and present information from the perspective of the four participating countries will have to be similar.

In effect, the Transboundary Diagnostic Analysis brings together the four National Sectoral Problem Reviews; there must therefore be consistency in the approach adopted by the four countries, and subsequently used in the TDA.

² The papers have been compiled and are available as a separate report from the Environmental Council of Zambia; *Lake Tanganyika Biodiversity Programme - Papers Presented at the National Sectoral Problem Review Workshop 29th June - 3rd July 1998, Ndeke Hotel, Lusaka.*

The workshop accepted the proposal to adopt a formal analytical matrix analysis that would be duplicated in all four countries, and subsequently in the regional TDA. The meeting adapted the original matrix to include an indication of the availability of human and material resources of the lead organisation to undertake each proposed action.

The complete matrix is given in Annex 2.

The matrix has three levels of analysis:

Level 1: Main Threat to Biodiversity; Transboundary Implications; Main Institutional Problems; General Action Areas.

Level 2 For Each Action Area: Specific Problems; Stakeholders; Uncertainties; Proposed Actions;

Level 3 Proposed Action: Timing; Key Agency; Availability of Human / Material Resources

Although clearly open to improvement in terms of both content and structure, the final matrix structure did allow for the development of a set of proposed actions to counteract specific problems raised in the background papers and by the participants at the workshop.

Level 1

The first matrix presents the main threats which were also those identified during the inception workshop, and are built into the project design; the *Main Threats to Biodiversity* are Unsustainable Fisheries; Increasing Pollution; Excessive Sedimentation; and Habitat Destruction (resulting predominantly from poor fishing practices and sediment deposition). No additional threats were identified by the workshop participants, that could not be related to one of these three aspects.

The *Transboundary Implications* highlights the rationale for a regional programme, addressing global biodiversity and international waters issues.

The *General Action Areas* address the identified problems and provide a focus for linked programmes.

However, the *Main Institutional Problems* are identified during the detailed appraisal of the specific problems and proposed actions addressed in levels two and three. The institutional problems relate to common themes such as inadequate institutional capacity or inappropriate legislation for local conditions.

Table 1 Analytical Problem Matrix Level 1

Main Threat to Biodiversity	Transboundary Implications	Main Institutional Problems	General Action Areas
Unsustainable Fisheries	Global Loss of Biodiversity	Lack of Resources	A) Reduce Impact of Fishing
Increasing Pollution	Loss of Shared Fisheries Resource	Poor Enforcement of Existing Regulations	B) Control Pollution
Excessive Sedimentation	Decline in Water Quality	Lack of Locally Specific Regulations	C) Control Sedimentation
Habitat Destruction			

Level 2

At the second level, *Stakeholders* includes all parties that will need to be involved in resolving management issues addressing each *Specific Problem* identified within each General Action Areas. *Uncertainties* highlights those areas where further information is required to improve management. On the basis of the Uncertainties column, a set of *Proposed Actions* which address a Specific Problem, can include proposals for further research and/or monitoring activities.

Level 3

At the third level, for each Proposed Action, the column *Timing* indicates whether an activity is “On going”, whether it could start “Now” - assuming resources were made available, or whether a Proposed Action has to be preceded by another Proposed Action (e.g. “Negotiate Boundaries of Additional Protected Areas” must be preceded by “Identify New Key Sites / Potential Protected Areas”).

Key Agency indicates the agency that would lead a particular Proposed Action; it will always be one of the Stakeholders from level 2. Finally the *Availability of Human / Material Resources* is an indication of whether the Key Agency could tackle the Proposed Activity with existing human and/or material resources. However this does not mean that these resources are already being directed to the action, merely that, given a priority by the agency, they could be made available now.

Conclusions of the National Sectoral Problem Review

The complete Analytical Problem Matrix is given in Annex 2. Level 1, the National/Transboundary overview is given below. It is worth noting that the Transboundary Implications extend into International Waters concerns as well as Global Biodiversity.

The matrix can only really be completed once policy regulations and legislation have been reviewed with respect to their capacity to support specific Proposed Actions. If the policy, legislation or regulation does not adequately support a Proposed Action, then a revision of that regulation itself may be required as a Proposed Action.

From Major Threats to Management Actions

The basic approach taken by the workshop was that at Level 2, the General Action Area is addressed through a number of Specific Problems, each one of which is a component of the Main Threats to Biodiversity. Subsequently the workshop proposed a sequence of related Proposed Actions addressing each Specific Problem.

In this way what appears to be an excessively ambitious and daunting objective such as Control of Pollution, can be broken into a series of manageable tasks, many of which can be done with available resources.

As an example, the general action area “Control of Pollution” includes the Specific Problem of Disposal of Waste Oil. This can be addressed through a series of Proposed Actions including a) raising awareness of the problem and b) promoting an existing and active recycling market, both for local use in treating timber and through the facilities offered by BP.

Following on from this ECZ could start an awareness campaign “Now” and have the Human and Material Resources (if this was agreed as a priority). Following on from this the Local Council have the Human Resources to promote the recycling exercise, but would require some minor support to pay for meetings, posters and a limited number of drums or other containers to act as temporary storage facilities.

The exercise has shown that it is possible for many of the actions needed to counteract the threats to the biodiversity resources of the lake to be initiated by local institutions using available resources.

However given the overall low level of resources available to most institutions, not all actions can be undertaken at once; hence the need to prioritise interventions, undertaking only as many as the available resources permit in any year.

If this rate of progress is unacceptable then the key agencies will have to look for additional support from the government and from donor agencies.

Capacity to Undertake Proposed Actions

The analysis reflects, to a large extent, the emphasis that has been put on managing the lake resources by existing projects, including LTBP and LTR.

The workshop formulated around 100 proposed actions covering the three proposed general action areas.

It is worth noting that there are ongoing actions by key agencies in all of the general Action Areas. In addition, the majority of actions could be undertaken by existing organisations with their existing resources, *if the institutions are prepared to make a particular action a priority and direct available resources towards it.*

Less than 30% of the proposed actions were felt to be constrained by lack of resources. However, where this was the case, the constraints were in all cases related to lack of material resources. Only ten percent of proposed actions were constrained by inadequate human resources as well as lack of material resources.

The conclusion must be that in most cases responsible institutions have adequate manpower with adequate training, but may be constrained by lack of equipment or operating funds.

	Reduce Impact of Fishing	Control Pollution	Control Sediment
Key Agencies	Fisheries (Parks)	Maritime (ECZ, Local Councils)	Forestry (Field Services, Water Affairs, ECZ, Local Government)
On-Going	~ 10, many supported by LTBP	2 with ECZ supported by LTBP, Harbours raising awareness of correct handling procedures	~5, mainly assessment of scale of problem and promotion of reduced fuel consumption stoves
Adequate Resources, but not Undertaken	~15, indicating the need to prioritise interventions	~ 15, Maritime and ECZ generally have both human and material resources to initiate actions	~ 20, Forestry Department has the resources to initiate the majority of the proposed actions
Need Additional Resources	~ 5, including need for resources to enforce regulations	~ 10, limited capacity of Local Councils, and hence local management	~ 10, a major problem for Field Services and Local Government

Clearly the results of the first workshop lead directly into the second workshop, where the first task is to review the National Priorities and Strategies (Policies, Acts and Regulations) to see how these support the proposed actions. In some cases the review and/or revision of regulations is already a proposed action in itself. The matrix may then be revised and further proposed actions may relating to institutional development and policy and legislation may be included.

The second task of the workshop is to then prioritise the proposed actions, to focus available resources to a sequence of priority actions and to direct additional resources to support priority actions where resources are limiting.

National Environmental Priorities and Strategies Review

Based on the outcome of the first workshop, the objectives of the second workshop can be stated as:

- To define the potential and limitations of existing institutional mechanisms to counteract national priority threats and support priority actions to counteract them, with existing regulations and legislation, and existing environmental and sectoral policies.
- To agree on the priority of the proposed actions and to determine a sequence of proposed actions that can be undertaken by the responsible institutions in Zambia.

On the basis of the prioritisation, Zambia will be in a position to propose a strategic programme based on the use of available resources to undertake a sequence of proposed actions. In parallel, the programme will direct additional (donor) resources to management interventions that can not at present be undertaken due to human or material resource constraints, or if supported could be undertaken in a more timely fashion.

The two workshops together are a preparatory exercise undertaken in advance of the Regional Strategic Action Plan, so that Zambia's institutional capacity to support the programme and requirements for support can be incorporated into the SAP.

Workshop Attendance

The National Working Group preparatory meeting held in Lusaka in April identified a range of individuals and organisations that they felt should be incorporated into the consultation and planning process. The idea was that the majority would be present throughout the internal consultation process, to ensure continuity.

Invitations should be sent to those individuals present at the first meeting and hence expected at the second meeting, with a formal reminder sent to them and through their organisation in the middle of August.

In the end some ten institutions were not represented in the first meeting. Despite this it is recommended that invitations are again sent to these organisations with reminders in advance of the meeting.

Proposed Workshop Agenda

Effectively the workshop has two tasks. The first is to incorporate an analysis of institutional constraints in the analytical matrix. This will include an assessment of where institutional tools, such as policy, legislation and regulation will need to be reviewed with respect to particular local requirements.

The second task is to prioritise the proposed actions. This will take account of both the support and constraints to proposed actions that result from problems with implementing existing policies, legislation and regulations, and how these proposed actions fit within the overall national priorities relating environment and development set out in government policies.

Review of Policies, Acts and Regulations

The workshop will be presented with a series of background papers which will review the relevance of national Policies, Acts and Regulations, designed to be generally applicable to the wider management of Zambia's resources, to specific proposed actions dealing with local situations with unique local problems or environments.

Further reviews, revisions or the creation of local by-laws may then be included in the analytical matrix, and themselves become the subject of the next stage, the prioritisation of proposed actions.

Prioritisation of Proposed Actions

The purpose of the Strategic Action Plan, and the national inputs to the SAP, is to provide a prioritised framework for action.

The concept can be best presented by posing the following questions:

Using only existing resources, what would be the first action that Zambia would carry out to protect the biodiversity value of the lake?

And then what would the second action be?...

However, one of the recognised functions of the SAP is to “leverage” additional funding for actions supporting the biodiversity conventions and the management of international waters.

It is expected that in general funding will go to national agencies, implementing national programmes, within and supporting the regional framework of the SAP.

In recognition of this the prioritisation exercise should also pose the following questions:

If a donor agency offers Zambia additional funding and resources to carry out just one action to protect the biodiversity value of the lake, what would it be?

And then what would the second action be?...

By posing these questions, it can be seen that the prioritisation is of management interventions, which may not be the same as the prioritisation of threats.

The priority of the management intervention is a combination of the scale of the threat and the ability to counteract that threat. If there is no management intervention that can counteract the threat, then it is clearly not a priority for action.

Proposed Timetable

The following proposed timetable is based on the assumption that the workshop will be based in Lusaka, and held over the five day period from August 31 to September 4 1998.

Day 1

1. Registration
2. Chairperson Introductory Remarks
3. Introduction to the Project
4. Introduction to the Strategic Action Plan
5. Conclusions of the first workshop – National Sectoral Problems Review
6. Presentation of background papers

Day 2

7. Continuation of presentation of background papers
8. Identification of main policy, legislation and regulation issues.
9. Incorporation of policy, legislation and regulation into proposed actions of the analytical matrix
10. Identification of Time Frame, Key Actors, and Availability of Resources

Day 3

11. Review main institutional problems
12. Finalise analytical matrix
13. Review key agencies responsibilities for proposed actions
14. Propose priorities for each key agency, within each general action area.

Day 4

15. Continue assessment of priorities for key agencies
16. Finalise priorities by agency and by general action area

Day 5

17. Propose overall priority for activities that can be undertaken with available resources
18. Propose overall priority for activities that need additional resources and donor support
19. Identify additional key issues to be brought to the attention of the regional tac at the subsequent Regional Meetings of the TBDA and Draft SAP.

Preparation of Background Materials - Notes for Authors

Policies, Acts and Regulations

One of the background papers for the National Sectoral Problems Review workshop³, identified a number of relevant Government Policies, Acts and Regulations that guide or support the “Proposed Actions” listed in Problem Matrix. Additional regulations were identified by participants during the workshop.

However, given that national Policies, Acts and Regulations are designed to be generally applicable to the wider management of Zambia’s resources, there will be local situations with unique local problems or environments where existing government policy and legislation may provide inadequate support, or even be contradictory to local requirements.

The Review of Policies, Acts and Regulations - Relevance to Proposed Actions

Authors must therefore review the relevance of these documents within the context of the particular Policy, Act or Regulation supporting a specific “Proposed Action” or set of actions within the matrix.

Clearly there will be many instances where these national regulations are entirely appropriate and strong enough to support one of the required actions, however equally clearly there will be cases where regulations are inappropriate for the specific requirements of protecting the biodiversity of the lake. In addition there may be cases where policies are contradictory.

Authors should therefore note how specific clauses in these national documents are relevant to a proposed action, either supporting the action strongly, relatively ineffective, or actually contradicting a proposed action.

Authors should also seek to identify contradictory policies or regulations between sectors.

Authors should also keep in mind that a regulation may seem to provide adequate control, but if unenforceable under present circumstances is not an appropriate regulation, and may need to be reviewed or supported by alternative regulations.

A Hypothetical Example

The following example may help authors in their review of the relevance and appropriateness of existing national policies, acts and regulations. The example is based on a specific concern raised at the National Problem Workshop, and on hypothetical contradictions in policies.

1. Main Threat to Biodiversity in Lake Tanganyika	Increasing Pollution
2. General Action Area	Control of Pollution
3. Specific Problem	Increasing Use Agrochemicals in the Catchment
4. Proposed Actions	a) Assess Scale of Problem and Impact on Biodiversity b) Promote Alternative Low Input Farming Systems c) Draw Up Local Guidelines for Use of Agrochemicals

³ *Institutional Structures in Environmental Management relating to Lake Tanganyika*; G K Chilukusha, MENR.

	d) Raise Awareness of Issues and Alternatives
5. Relevant Policy Documents	Agricultural Policy National Environmental Action Plan
6. Agricultural Policy	<i>Is likely to include the goal of increased productivity through the use “improved farming technology”, such as the promotion of hybrid maize or rice varieties that require higher levels of fertiliser and pesticide inputs. This may be contradictory to the proposed action of drawing up local guidelines for the use of agrochemicals which could include restricting their use in particularly sensitive areas such as lake adjacent wetlands.</i>
7. National Environmental Action Plan	<i>Might include a policy statement proposing restrictions on the use of agrochemicals, or indeed farming in sensitive wetland areas, in support of the RAMSAR Convention. This Environmental Policy could therefore support the proposed actions of drawing up local guidelines restricting the use of agrochemicals, but be contradictory to the broader policy guidelines in the Agricultural Policy.</i>

Authors, Timing and Preliminary Meetings

The date of the National Environmental Priorities and Strategies Review is 31 August 1998. All background materials should be prepared at least 2 weeks in advance to allow for duplication.

Following the confirmation of the list of authors and background materials below, and following an initial review of the materials by the authors it is recommended that ECZ arrange for a preliminary meeting for all authors to review the cross linkages between different policies, acts and regulations. This could take place at the beginning of August.

Policy, Act, Regulation or Convention	Author
National Environmental Action Plan	Mr Chilukusha, MENR
Natural Resources Conservation Act	
Energy Policy	
Forestry Policy	
Forest Act	
Timber Export Regulation	
Water Policy	Mr Kimena, Water Affairs
Water Act	
Land Policy	Mrs Siame, PPU
Land Act	
Agricultural Policy	Ms Chisala, MAFF
Tourism Policy	Mr Zulu, Parks
Wildlife Policy	
Wildlife Act	
Environmental Pollution and Control Act	Mr Nsongela, ECZ
EIA Regulation	
Solid Wastes Management Regulations	
Fisheries Act	Mr Mwape, Fisheries Department
Fishing Regulations	
Public Health Act	Mr Chisanga, Ministry of Health
Inland Waters Shipping Act	Mr Kabeleka, Maritime Department
Local Government Act	Mr Mwiliwa, Local Council
Water Pollution Control Regulations	Mr Kashinga, ECZ
Pesticides and Toxic Substances Regulations	
CITES Convention	Mr Akashambatwa, WESZ
Basle Convention	
Ramsar Convention	

Although many authors have been allocated more than one policy or regulation, there should be only a single background report from each author.

The background report should then be divided into sections dealing with each policy or regulation separately, but with an additional overview of the linkages or contradictions of sectoral policies, acts and regulations.

Annex 1

Participants and Invitees to the National Sectoral Problem Review Workshop

Participants present at the National Sectoral Problem Review Workshop

Individual	Organisation	Based in:
R Sinyinza	Fisheries	Mpulungu
L Mwape		
G Zulu	Parks and Wildlife	Kasama
E Bwalya	District Council	Mpulungu
J Mwilwa		
C Kabumbu	UNZA	Lusaka
W Malambo		
B Lukama	Forestry	Kasama
K Siame	PPU	Kasama
J Phiri	ECZ	Lusaka
S Nsongela		
C Kabumbu	(Secretariat)	
W Malambo		
P Kimena	Water Affairs	Lusaka
G Chikwama	Harbour Authority	Mpulungu
G Chilukusha	MENR	Lusaka
G Mudenda	Museums	Mbala
C Akashambatwa	Wildlife and Environmental Conservation Society	Lusaka
S Chisamga	Ministry of Health	Lusaka
A Mphande	Food and Drugs	Lusaka
A Kabeleka	Maritime Services	Lusaka
A Menz	LTBP	Tanzania
N Hodgson		UK
M Nsomi	NCSR	Lusaka

Organisations Identified as Potential Participants - Not Present at the Workshop

In addition, at the preparatory meeting, the following organisation were identified as possible participants at the meeting, however no representatives were present: Mines; Chiefs Reps.; Commercial Fisheries; District Dev Planning; IUCN; MAFF (Agriculture/Land Use); MoLA; Policy & Advisory Commission; Private Tourist Sector; UNDP; ZEEP;

ANNEX 2

Analytical Problem Matrix

Level 1

Main Threat to Biodiversity	Transboundary Implications	Main 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 Locally Specific Regulations	A) Reduce Impact of Fishing B) Control Pollution C) Control Sedimentation

Level 2**A) Reduce Impact of Fishing**

Specific Problem	Stakeholders	Uncertainties	Proposed Actions
1) Use of Inappropriate Gill Nets	Artisanal Fishers; Commercial Fishers; Communities and Local Leaders; Fisheries Department; Museums	Optimal Net Size	1.1. Establish Optimal Net Size 1.2. Negotiate Acceptable Interim Gill Net Mesh Size 1.3. Establish Local Regulations on Net Size and Materials 1.4. Enforces Local Regulations
2) Excessive Industrial Fishing	Commercial Fishers; Local Authorities; Fisheries Department; Boat Licensing Commission	Optimal Fishing Levels Present Total Fleet Size - Legal and Illegal	2.1) Raise National and Local Political Awareness 2.2) Negotiate Acceptable Interim Fleet and Means of Reducing Fleet 2.3) Establish Optimal Fleet Composition 2.4) Review Licensing Procedures 2.5) Strengthen Local Capacity to Monitor and Enforce Regulations
3) Uncontrolled Extraction of Ornamental Fish	Commercial Fishers; Local Authorities; Fisheries Department; Parks; Museums; Communities and Local Leaders; Revenue Authority	Scale / Impact of Extraction	3.1) Ascertain Scale and Impact 3.2) Raise Public Awareness - Establish Aquarium 3.3) Define Acceptable Levels of Extraction 3.4) Review License / Export Fees 3.5) Establish Local Regulations 3.6) Evaluate Potential for Captive Breeding
4) Illegal Fishing in Nsumbu National Park	Parks ; Communities and Local Leaders; Tour Operators; Museums; Fisheries Department	Impact of Present Fishing Levels Acceptable Levels	4.1) Establish Acceptable Levels, Methods, Areas for Fishing 4.2) Implement Public Awareness Campaign 4.3) Negotiate Access and Levels of Extraction with Communities and Tour Operators 4.4) Incorporate into Park Plan
5) Inadequate Protection of Sensitive Areas - Spawning and Nursery Sites, Biodiversity Hot Spots	Communities and Local Leaders; Fisheries Department; Local Authorities; Heritage Commission; Parks; Tour Operators; Museums	Critical Sites Optimal Size of Protected Area Community Acceptability	5.1) Identify New Key Sites / Potential Protected Areas 5.2) Identify Conflicts with Communities, Propose

			<p>Mitigation</p> <p>5.3) Implement Public Awareness Campaign</p> <p>5.4) Negotiate Boundaries of Additional Protected Areas</p>
6) Use of Beach Seines	Communities and Local Leaders; Fisheries Department; Local Authorities	Consequence of Ban on Community Livelihoods	<p>6.1) Identify with Communities Acceptable Fishing Practices and Alternative Income Generating Activities</p> <p>6.2) Negotiate Means of Introducing Total Removal of Existing Gear</p> <p>6.3) Introduce Local Regulations</p>
7) Dependence of Local Communities on Fishing	Communities and Local Leaders; Fisheries Department; Local Authorities; Agriculture Department	Availability and Acceptability of Alternative Livelihoods	<p>7.1) Identify Range of Appropriate Livelihood Options</p> <p>7.2) Promote Introduction of Alternative Livelihoods</p>
8) High Market Demand for Fish	Consumers; Traders; Transporters; Fisheries Department; Local Authorities; Alternative Suppliers	Potential and Acceptability of Alternative Sources	<p>8.1) Review Market Structure and Demand</p> <p>8.2) Identify Options for Alternative Sources and Species</p>
9) Introduction of Exotic Species through Fish Farming	Local Communities; Fisheries Department; Private Companies		9.1) Enforce Existing Regulations

Level 2

B) Control Pollution

Specific Problem	Stakeholders	Uncertainties	Proposed Actions
1) Inappropriate Handling of Hazardous Cargo by Small Transporters	Small Boat Owners; Maritime Department; Harbours Authority; Police; Traders; Fisheries Department; Local Authorities; ZRA; ECZ	Scale of Problem and Cumulative Impact	1.1) Review Type and Quantity of Cargo, Handling and Regulations 1.2) Assess Impact on Biodiversity 1.3) Identify Alternative Handling, Potential Centralised Facility 1.4) Raise Awareness and Promote Better Handling 1.5) Improve Enforcement
2) Major Marine Accident	Large Transporters; Passengers; Maritime Department; Harbours Authority; Insurance Companies; Fisheries Department; Local Authorities; ZRA; Police; Defence; Disaster Management Unit; Parks; ECZ	Impact on Biodiversity of Different Cargoes and Scenarios	2.1) Carry Out Risk Assessment 2.2) Review Potential Impacts on Biodiversity 2.3) Identify Possible Emergency Procedures 2.4) Review Marine Design Criteria
3) Major Accident from Handling and Storage of Oil and Cargo at the Harbour	Mpulungu Population; Water Affairs; Maritime Department; Harbours Authority; Barge Owners; ; Fisheries Department; Local Authorities; Police; Defence; ECZ; Disaster Management Unit;	Impact on Biodiversity of Different Cargoes and Scenarios	3.1) Carry Out Risk Assessment 3.2) Review Potential Impact on Biodiversity 3.3) Raise Awareness of Correct Handling Procedures
4) Disposal of Waste Oil	Fishing Companies; Water Affairs; Boat Operators; Maritime Department; Harbours Authority; Fisheries Department; Local Population; BP; ECZ	Scale of Problem and Impact on Biodiversity	4.1) Assess Scale of Problem and Impact on Biodiversity 4.2) Raise Awareness of Proper Disposal and Recycling Procedures 4.3) Promote Local Marketing of Waste Oil and Sale for Recycling to BP
5) Disposal of Sewage and Solid Waste from Boats	Fishing Companies; Local Authority; Water Affairs; Boat Operators; Maritime Department; Harbours Authority; Fisheries Department; Local Communities; District Health Management Team; ECZ	Scale of Problem and Impact on Biodiversity	5.1) Assess Scale of Problem and Impact on Biodiversity 5.2) Develop Guidelines and Procedures for Disposal 5.3) Raise Awareness of Issues 5.4) Enforce Regulations
6) Dumping Waste in Lake and Catchment; including Damaged	Transporters; Fishing Companies; Local Authority; Water Affairs;	Scale of Problem and Impact on Biodiversity	6.1) Assess Scale of Problem and Impact on Biodiversity

Cargo, Fish Processing Waste	Zambia Revenue Authority; Fisheries Department; Local Communities; District Health Management Team; ECZ		6.2) Raise Awareness of Issues 6.3) Enforce Regulations
7) Disposal of Land Based Sewage from Mpulungu and Other Lake Shore Settlements	Local Authority; Water Affairs; Fisheries Department; Local Communities; District Health Management Team; D-WASHE; ECZ	Scale of Problem and Impact on Biodiversity	7.1) Assess Scale of Problem and Impact on Biodiversity (note Available Data) 7.2) Review Design of Existing Systems, Potential for Alternatives 7.3) Link with Existing D-WASHE Programme 7.4) Raise Awareness of Issues
8) Use of Agrochemicals in Catchment	Farming Communities; Ministry of Agriculture - Field Services; Suppliers; Water Affairs; Fisheries Department; ECZ	Scale of Problem and Impact on Biodiversity	8.1) Assess Scale of Problem and Impact on Biodiversity 8.2) Promote Alternative Low Input Farming Systems 8.3) Draw Up Local Guidelines for Use of Agrochemicals 8.4) Raise Awareness of Issues and Alternatives

Level 2

C) Control Sedimentation

Specific Problem	Stakeholders	Uncertainties	Proposed Actions
1) Slash and Burn Cultivation	Farming Communities; Forestry Department; Ministry of Agriculture - Field Services ; Water Affairs; Local Chiefs; Chongololo Club; Local Authorities	Scale of Problem and Trend; Cultural and Economic Viability of Alternative Farming Systems	1.1) Assess Scale, Trend and Impact 1.2) Review Viability of Alternative Farming Practices 1.3) Promote Alternative Low Input Farming Practices
2) Stream Bank Cultivation	Farming Communities; Forestry Department; Ministry of Agriculture - Field Services; Water Affairs; Local Chiefs; Chongololo Club; Local Authorities; Churches	Scale of Problem and Trend; Risks of Stream Bank Cultivation to Farmers; Cultural and Economic Viability of Alternative Farming Systems	2.1) Assess Scale, Impact and Risks 2.2) Review Alternative Practices including Irrigation 2.3) Review Relevance of Existing Regulations 2.4) Promote Appropriate Farming Systems 2.5) Identify Critical Erosion Sites and Remedial Measures
3) Encroachment and Deforestation of Protected Areas (National Parks and Forest Reserves)	Local Communities; Forestry Department; Parks; Water Affairs; Local Chiefs; Chongololo Clubs; Politicians	Scale of Impact on Sediment Load	3.1) Assess Impact on Sediment Load 3.2) Negotiate Solution to Current Encroachment 3.3) Enable Enforcement of Current Regulations 3.4) Raise Awareness of Issues, particularly at the Political Level
4) Unsustainable Commercial Extraction of Charcoal and Fuelwood	Local Communities; Forestry Department; Parks; Water Affairs; Local Authorities; Traders; Consumers; Transporters; CARE; Police; ZRA; National Council of Scientific Research	Scale of Impact on Sediment Load	4.1) Enable Enforcement of Ban on International Export of Charcoal 4.2) Assess Legal and Illegal Extraction 4.3) Review Licensing System 4.4) Raise Awareness of Issues 4.5) Promote Improved Stoves, Sustainable Harvesting, Fuelwood Planting
5) Sand Extraction from Sensitive Areas	Transporters; Construction Companies; Local Authority; Water Affairs; Ministry of Lands; Department of Mines; Forestry	Scale of Problem, Trends, Alternative Sites, Impact on Sediment Load	5.1) Assess Impacts and Trends 5.2) Land Reclamation in Critical Areas 5.3) Review Licensing Procedures

	Departmentt		5.4) Locate Less Sensitive Sites 5.5) Assess Sources of Conflict
6) Existing Roads and New Road Construction	Ministry of Transport; Construction Companies; Water Affairs; Forestry Department; Ministry of Works and Supply - Department of Roads; Local Authority; National Roads Board; ECZ	Scale of Problem and Site Specific Impact on Sediment Load	6.1) Implement EIA of Existing and Proposed Roads 6.2) Agree Remedial Measures with Department of Roads. 6.3) Agree Design Specifications with Department of Roads for New Roads 6.4) Implement remedial Measures in Critical Areas
1) Unplanned Rural Settlement	Communities; Local Chiefs; Local Authorities; Ministry of Lands; Field Services; Forestry Department; Water Affairs; Department of Resettlement; Parks	Scale and Impact on Sediment Load of Settlement Pattern Change	7.1) Assess Scale, Impact and Trends, Critical Sites 7.2) Raise Awareness of Chiefs and Communities 7.3) Support Chiefs in Planning Environmentally Sound Settlements 7.4) Support Chiefs in Preventing Unauthorised Settlement
1) Uncontrolled Bush Burning - Late Burning	Local Communities; Forestry Department; Local Authorities; Chiefs; Chongololo Clubs; Parks; Field Services	Scale of Problem and Impact on Sediment Load	8.5) Assess Scale, Causes and Impacts 8.6) Promote Application of Current Policy on Bush Burning 8.7) Review Effectiveness of Current Policy

Level 3

A) Reduce Impact of Fishing - Use of Inappropriate Gill Nets

Proposed Actions	Timing	Key Agency	Human	Material
1.1.Establish Optimal Net Size	On Going	Fisheries Department	Yes	No
1.2.Negotiate Acceptable Interim Gill Net Mesh Size	On Going	Fisheries Department	Yes	Yes
1.3.Establish Local Regulations on Net Size and Materials	1.1	Fisheries Department	Yes	Yes
1.4.Enforces Local Regulations	1.3	Fisheries Department	No	No
A) Reduce Impact of Fishing - Excessive Industrial Fishing				
2.1.Raise National and Local Political Awareness	On Going	Fisheries (LTBP)	Yes	Yes
2.2.Negotiate Acceptable Interim Fleet and Means of Reducing Fleet	Now	Fisheries Department	Yes	Yes
2.3.Establish Optimal Fleet Composition	Now	Fisheries Department	Yes	Yes
2.4.Review Licensing Procedures	2.1	Fisheries Department	Yes	Yes
2.5.Strengthen Local Capacity to Monitor and Enforce Regulations	2.4	Fisheries Department	No	No
A) Reduce Impact of Fishing - Uncontrolled Extraction of Ornamental Fish				
3.1) Ascertain Scale and Impact	On Going	Fisheries (LTBP)	Yes	Yes
3.2) Raise Public Awareness - Establish Aquarium	Now	Fisheries (LTBP)	Yes	Yes
3.3) Define Acceptable Levels of Extraction	Now	Fisheries (LTBP)	Yes	Yes
3.4) Review License / Export Fees	Now	Fisheries Department	Yes	Yes
3.5) Establish Local Regulations	3.3	Fisheries Department	Yes	Yes
3.6) Evaluate Potential for Captive Breeding	Now	Fisheries Department	No	No
A) Reduce Impact of Fishing - Illegal Fishing in Nsumbu National Park				
4.1) Establish Acceptable Levels, Methods, Areas for Fishing	On Going	Parks (LTBP)	Yes	Yes
4.2) Implement Public Awareness Campaign	On Going	Parks (LTBP)	Yes	Yes
4.3) Negotiate Access and Levels of Extraction with Communities and Tour Operators	4.1	Parks	Yes	Yes
4.4) Incorporate into Park Plan	4.1/4.2	Parks	Yes	Yes
A) Reduce Impact of Fishing - Inadequate Protection of Sensitive Areas				
5.1) Identify New Key Sites / Potential Protected Areas	On Going	Fisheries (LTBP)	Yes	Yes
5.2) Identify Conflicts with	On Going	Fisheries (LTBP)	Yes	Yes

Communities, Propose Mitigation				
5.3) Implement Public Awareness Campaign	On Going	Fisheries (LTBP)	Yes	Yes
5.4) Negotiate Boundaries of Additional Protected Areas	5.1/5.2	Fisheries (LTBP)	Yes	Yes
A) Reduce Impact of Fishing - Use of Beach Seines				
6.1) Identify with Communities Acceptable Fishing Practices and Alternative Income Generating Activities	On Going	Fisheries (LTBP)	Yes	Yes
6.2) Negotiate Means of Introducing Total Removal of Existing Gear	Now	Fisheries (LTBP)	Yes	Yes
6.3) Introduce Local Regulations	6.2	Fisheries Department	Yes	Yes
A) Reduce Impact of Fishing - Dependence of Local Communities on Fishing				
7.1) Identify Range of Appropriate Livelihood Options	On Going	ECZ (LTBP)	Yes	Yes
7.2) Promote Introduction of Alternative Livelihoods	7.1	Community Development	No	No
A) Reduce Impact of Fishing - High Market Demand for Fish				
8.1) Review Market Structure and Demand	Now	Fisheries (LTBP)	Yes	Yes
8.2) Identify Options for Alternative Sources and Species	8.1	Fisheries (LTBP)	Yes	Yes
A) Reduce Impact of Fishing - Introduction of Exotic Species through Fish Farming				
9.1) Enforce Existing Regulations	Now	Fisheries Department	Yes	Yes

Level 3

B) Control Pollution - Inappropriate Handling of Hazardous Cargo by Small Transporters

Proposed Actions	Timing	Key Agency	Human	Material
1.1) Review Type and Quantity of Cargo, Handling and Regulations	Now	Maritime (LTBP?)	Yes	Yes
1.2) Assess Impact on Biodiversity	1.1	Fisheries (LTBP?)	Yes	No
1.3) Identify Alternative Handling, Potential Centralised Facility	1.1	Maritime	Yes	Yes
1.4) Raise Awareness and Promote Better Handling	1.3	Maritime	Yes	No
1.5) Improve Enforcement	1.3	Maritime	Yes	No
B) Control Pollution - Major Marine Accident				
2.1) Carry Out Risk Assessment	Now	Maritime (LTBP?)	Yes	No
2.2) Review Potential Impacts on Biodiversity	On Going	ECZ (LTBP)	Yes	Yes
2.3) Identify Possible Emergency Procedures	2.1	Maritime	Yes	Yes
2.4) Review Marine Design Criteria	Now	Maritime	Yes	Yes
B) Control Pollution - Major Accident Handling and Storage of Oil and Cargo at the Harbour				
3.1) Carry Out Risk Assessment	Now	Maritime (LTBP?)	Yes	Yes
3.2) Review Potential Impact on Biodiversity	3.1	Fisheries (LTBP)	Yes	Yes
3.3) Raise Awareness of Correct Handling Procedures	On Going	Harbour Authority	Yes	Yes
B) Control Pollution - Disposal of Waste Oil				
4.1) Assess Scale of Problem and Impact on Biodiversity	Now	ECZ (LTBP)	Yes	Yes
4.2) Raise Awareness of Proper Disposal and Recycling Procedures	Now	ECZ (LTBP)	Yes	Yes
4.3) Promote Local Marketing of Waste Oil and Sale for Recycling to BP	4.2	Local Council	Yes	No
B) Control Pollution - Disposal of Sewage and Solid Waste from Boats				
5.1) Assess Scale of Problem and Impact on Biodiversity	Now	ECZ (LTBP?)	Yes	Yes
5.2) Develop Guidelines and Procedures for Disposal	Now	ECZ	Yes	Yes
5.3) Raise Awareness of Issues	5.2	Local Council	Yes	No
5.4) Enforce Regulations	5.2	Maritime	No	No

B) Control Pollution - Dumping Waste in Lake and Catchment

6.1) Assess Scale of Problem and Impact on Biodiversity	Now	ECZ (LTBP?)	Yes	Yes
6.2) Raise Awareness of Issues	Now	Local Councils	Yes	No
6.3) Enforce Regulations	Now	Local Councils	Yes	Yes
B) Control Pollution - Disposal of Sewage from Mpulungu and Other Lake Shore Settlements				
7.1) Assess Scale of Problem and Impact on Biodiversity (note Available Data)	Now	ECZ (LTBP?)	Yes	Yes
7.2) Review Design of Existing Systems, Potential for Alternatives	7.1	Local Council	Yes	No
7.3) Link with Existing D-WASHE Programme	Now	Local Council	Yes	Yes
7.4) Raise Awareness of Issues	On Going	ECZ (LTBP?)	Yes	No
B) Control Pollution - Use of Agrochemicals in Catchment				
8.1) Assess Scale of Problem and Impact on Biodiversity	On Going	ECZ (LTBP)	Yes	Yes
8.2) Promote Alternative Low Input Farming Systems	Now	Field Services	No	No
8.3) Draw Up Local Guidelines for Use of Agrochemicals	8.1	ECZ (LTBP?)	Yes	Yes
8.4) Raise Awareness of Issues and Alternatives	Now	Field Services	No	No

Level 3

C) Control Sedimentation - Slash and Burn Cultivation

Proposed Actions	Timing	Key Agency	Human	Material
1.1) Assess Scale, Trend and Impact	Now	Forestry (LTBP?)	Yes	Yes
1.2) Review Viability of Alternative Farming Practices	Now	Forestry (LTBP?)	Yes	Yes
1.3) Promote Alternative Low Input Farming Practices	1.2	Field Services	No	No
C) Control Sedimentation - Stream Bank Cultivation				
2.1) Assess Scale, Impact and Risks	On Going	Water (LTBP?)	Yes	Yes
2.2) Review Alternative Practices including Irrigation	Now	MAFF Research	Yes	Yes
2.3) Review Relevance of Existing Regulations	2.1/2.2	Water Affairs	Yes	Yes
2.4) Promote Appropriate Farming Systems	2.3	Field Services	No	No
2.5) Identify Critical Erosion Sites and Remedial Measures	2.1	Water Affairs	Yes	Yes
C) Control Sedimentation - Encroachment and Deforestation of Protected Areas				
3.1) Assess Impact on Sediment Load	On Going	Water (LTBP?)	Yes	Yes
3.2) Negotiate Solution to Current Encroachment	Now	Forestry, Parks	Yes	Yes
3.3) Enable Enforcement of Current Regulations	Now	Forestry, Parks	Yes	No
3.4) Raise Awareness of Issues, particularly at the Political Level	Now	ECZ	Yes	Yes
C) Control Sedimentation - Unsustainable Commercial Extraction of Charcoal and Fuelwood				
4.1) Enable Enforcement of Ban on International Export of Charcoal	Now	Forestry Department	Yes	Yes
4.2) Assess Legal and Illegal Extraction	On Going	Forestry Department	Yes	Yes
4.3) Review Licensing System	4.2	Forestry Department	Yes	Yes
4.4) Raise Awareness of Issues	Now	Forestry Department	No	No
4.5) Promote Improved Stoves, Sustainable Harvesting, Fuelwood Planting	On Going	NISIR	Yes	Yes
C) Control Sedimentation - Sand Extraction from Sensitive Areas				
5.1) Assess Impacts and Trends	Now	Water (LTBP?)	Yes	Yes
5.2) Land Reclamation in Critical Areas	5.1	Water Affairs	Yes	No
5.3) Review Licensing Procedures	Now	Local Council	Yes	Yes

5.4) Locate Less Sensitive Sites	5.1	Water (LTBP?)	Yes	Yes
5.5) Assess Sources of Conflict	Now	Local Council	Yes	Yes
C) Control Sedimentation - Existing Roads and New Road Construction				
6.1) Implement EIA of Existing and Proposed Roads	Now	ECZ (LTBP?)	Yes	Yes
6.2) Agree Remedial Measures with Department of Roads.	6.1	ECZ	Yes	Yes
6.3) Agree Design Specifications with Department of Roads for New Roads	6.1	ECZ	Yes	Yes
6.4) Implement remedial Measures in Critical Areas	6.2	Roads Department	Yes	No
C) Control Sedimentation - Unplanned Rural Settlement				
7.1) Assess Scale, Impact and Trends, Critical Sites	Now	PPU (LTBP?)	Yes	Yes
7.2) Raise Awareness of Chiefs and Communities	Now	Local Council	Yes	No
7.3) Support Chiefs in Planning Environmentally Sound Settlements	Now	PLGO	Yes	No
7.4) Support Chiefs in Preventing Unauthorised Settlement	Now	PLGO	Yes	No
C) Control Sedimentation - Uncontrolled Bush Burning				
8.1) Assess Scale, Causes and Impacts	Now	Forestry (LTBP?)	Yes	Yes
8.2) Promote Application of Current Policy on Bush Burning	Now	Forestry Department	Yes	Yes
8.3) Review Effectiveness of Current Policy	8.1	Forestry Department	Yes	Yes