

GEF PROGRAMME PREPARATION ZAMBIA

**A REVIEW OF
GLOBAL ENVIRONMENTAL CONVENTIONS
AND THE
NATIONAL ENVIRONMENT ACTION PLAN**

WITH COMMENTS ON POLICY, INSTITUTIONAL AND CAPACITY ISSUES

**IUCN Regional Office for Southern Africa
Harare, Zimbabwe
August 1995**

**IUCN
1995
032**

**IUCN Bibliothèque
CH - 1196 Gland**

Terms of Reference

In April, 1994, as Zambia neared the completion of its National Environment Action Plan, the World Bank and Zambia's Ministry of Environment and Natural Resources agreed that the strategic development of a funding plan for the NEAP would benefit from an examination of the potential for a Global Environmental Facility (GEF) component. The World Bank GEF programme agreed to make available a grant from the GEF Trust Funds it administers to Zambia to identify priorities for funding under the GEF. The Government of Zambia requested IUCN Zambia to undertake this task on its behalf, and IUCN was officially engaged by letter dated 25 April 1994 from the World Bank's Resident Representative in Lusaka.

Initially the terms of reference for the work focused on the identification of potential GEF projects and the development of the GEF component of the Environment Support Programme. By fax dated 9 May 1994, IUCN US informed IUCN Zambia that the GEF Secretariat requested a shift in emphasis to review the NEAP for the purpose of identifying those elements of the NEAP of global significance, which in principle would be eligible for funding under the GEF. This information would in turn be used in future project identification activities. The shift in emphasis was in recognition that the GEF Council had not yet issued guidelines for GEF II project priorities and eligibility criteria, and that such priorities would be, in part, directed by the first Conference of Parties to both the Convention on Biological Diversity and the Framework Convention on Climate Change.

The task then became one of assisting the Ministry of Environment and Natural Resources (MENR), Environment Council of Zambia (ECZ), and the NEAP Secretariat to develop Zambia's environment strategy in the areas of global warming and biodiversity conservation, and to identify the country's priority actions in these areas. It is anticipated that this study will provide decision makers with baseline information on global environmental priorities in Zambia that could potentially be addressed under the GEF.

Specifically, IUCN-The World Conservation Union, through its Regional Office for Southern Africa, was engaged to:

- briefly take stock of country actions and plans to comply with the Framework Convention on Climate Change (FCCC), the Convention on Biological Diversity (CBD) as well as participation in other global environmental conventions, eg. RAMSAR, CITES, and the World Heritage Convention;
- indicate gaps and deficiencies in national strategies and plans, and the required steps to fill them, including the role for the World Bank and other organizations;
- indicate policy issues, institutional issues and capacity issues, and summarize proposed actions in a policy matrix for achieving consistency between national and global environment actions, including convention driven obligations, indicating which organizations should provide what assistance;
- define investment priorities consistent with emerging biodiversity conservation and global warming strategies, and, wherever feasible, prepare project concept papers on the highest priority investments for Government review and endorsement.

Responsibility

Although this report was commissioned by the World Bank and the Government of Zambia, neither bears any responsibility for, and is not in any way committed to, the views and recommendations expressed herein.

The report was prepared by three local consultants: Charlotte Harland (Mano Consultancy Services Ltd), Dr. H.N. Chabwela (University of Zambia, Biology Department) and Prof. P.C. Jain (University of Zambia, Physics Department), with support from IUCN Zambia and IUCN ROSA under the leadership of Nils D. Christoffersen. The work benefitted greatly from two roundtable discussions held at the initiation of the study and following the completion of the preliminary research. Participants at these roundtable discussions included the following: Peter Mwamfuli, L.M. Aongola, Namukolo Mukutu, Julius Kanyembo, Lloyd Thole, Paul G. Wolf, Wilson Ndhlovu, Simuunza I Simuzingili, Kenneth Mwansa, Mike Bingham, John Wicks, Joseph Makumba, Mwape Sichilongo, Juliana Chileshe, Julius Chileshe, Gabriel Chipeta, Richard Jeffery, and Godwin Mkamanga. Numerous other individuals deserve thanks for their contributions and comments including R. S. Maya and N. Nziramasanga of the Southern Centre for Energy and Environment in Harare, Zimbabwe, and S. Mwangala of Zambia's Meteorological Department.

While emphasis has been placed on ensuring the final text reflects the views and opinions of the contributors, the text is in the end the responsibility of IUCN and none of the individuals or organizations who have contributed should be held accountable.

Nils D. Christoffersen
Programme Coordinator - Southern Africa
IUCN Regional Office for Southern Africa
6 Lanark Road, Belgravia
Harare, Zimbabwe

LIST OF ACRONYMS USED - GEF PROGRAMME PREPARATION

ADMADE	Administrative Management Design for GMAs
ARPT	Adaptive Research Planning Team
ASIP	Agricultural Sector Investment Programme
CBD	Convention on Biodiversity
CBO	Community Based Organisation
CCD	Convention to Combat Desertification
CITES	Convention on International Trade in Endangered Species
CRU	Climatic Research Unit
DMC	Drought Monitoring Centre
DNPWS	Department of National Parks & Wildlife Service
DOE	Department of Energy
ECZ	Environmental Council of Zambia
EIA	Environmental Impact Assessment
FAO	Food & Agricultural Organisation
FCCC	Framework Convention on Climatic Change
GCM	General Circulation Model
GEF	Global Environmental Facility
GHG	Greenhouse gas
GMA	Game Management Area
IEE	Institute of Energy and Environment (proposed)
IUCN	The World Conservation Union
IMF	International Monetary Fund
INC	International Negotiating Committee
IPCC	Intergovernmental Panel on Climate Change
LIRDp	Luangwa Integrated Rural Development Project
MENR	Ministry of Environment & Natural Resources
MEWD	Ministry of Energy and Water Development
MHA	Ministry of Home Affairs
MTC	Ministry of Transport and Communications
NBS	National Biodiversity Strategy
NBG	National Biodiversity Group
NCS	National Conservation Strategy
NCSR	National Council for Scientific Research
NEAP	National Environmental Action Plan
NEF	National Environmental Fund
NGO	Non-Governmental Organisation
NRD	Natural Resources Department
OAU	Organisation of African Unity
PPM	Programme to Prevent Malnutrition
PTC	Post and Telecommunications Corporation
PSRP	Public Sector Reform Programme
SADC	Southern African Development Community
SCAFE	Soil Conservation & Agro-Forestry Extension Project
SPU	Species Protection Unit
UEA	University of East Anglia
UNFCCC	UN Framework Convention on Climate Change
UNEP	United Nations Environmental Programme
UNITAR	United Nations Institute for Training and Research
UNZA	University of Zambia
WB	World Bank
WCNH	Convention on World Cultural & Natural Heritage
WCSZ	Wildlife Conservation Society of Zambia
WWF	World Wide Fund for Nature
ZAREP	Zambia Agricultural Research & Extension Programme
ZESCO	Zambia Electricity Supply Corporation
ZCCM	Zambia Consolidated Copper Mines

EXECUTIVE SUMMARY

The Government of the Republic of Zambia (GRZ) asked the World Bank to finance a study into the interface between the findings of the National Environmental Action Plan (NEAP) and the obligations that Zambia has under the Convention on Biodiversity (CBD), the Framework Convention on Climate Change (FCCC), and other important environmental conventions and agreements. The study was conducted to provide the Government of Zambia with background information only, with an aim to facilitate the following:

- the identification of national priorities listed within the NEAP which might be eligible for GEF funding; and, thereafter, the preparation of a GEF Programme portfolio with direct reference to national planning priorities.

The GRZ requested IUCN-The World Conservation Union to assist in the implementation of the study which in turn commissioned Professor P.C. Jain, Ms. Charlotte Harland and Dr. Harry Chabwela to assist in the production of this report.

The study started with a multi-sectoral round table discussion with both government and non-government representatives to define the scope of the study and identify sources of information. This was followed by the study with a report and recommendations being presented to a second round table discussion on the findings. The final report has taken into account the comments made in the second round table discussions.

Priorities for GEF Support

Following the assessment of current action and plans detailed in the NEAP and other sectoral strategies, and taking into account the focal areas for the restructured GEF and preliminary indications on streams of GEF Phase II support, the following project priorities for funding under the GEF have been identified:

1. Biodiversity Country Study
2. National Systems Planning for Protected Areas
3. Household Electrification (grid extension and PV)
4. Institute of Environmental Studies, University of Zambia

Biodiversity Country Study:

The lack of existing and available information on the current status and trends of natural resources in Zambia was identified as a major constraint to the NEAP process. The NEAP itself identifies the lack of baseline information on land degradation, and calls for immediate assessment of water, forest, wildlife and fisheries resources and the associated environmental costs of depletion. The NEAP also identifies the need for improved capacity to carry out inventory and monitoring of the environment.

A Biodiversity Country Study is an assessment of biological diversity, its importance to the national economy, and the range of factors which threaten it. Such a study can provide an important start for a national biodiversity strategy, as well as for plans and programmes developed from the strategy. The tasks include:

- identifying the components of biodiversity important for conservation and

- sustainable use;
- collecting and evaluating data needed to effectively monitor the components of biological diversity;
- identifying the processes and activities which threaten biological diversity;
- evaluating the potential economic implications of conserving and sustainably using biological resources;
- determining the economic values of biological and genetic resources; and,
- suggesting priority actions for conserving and sustainably using biological diversity.

It is recognized that a national inventory of biological resources and assessment of their conservation status is an enormous task. Initial country studies should concentrate on readily available data, and then focus resources on the gaps. It should not seek to achieve comprehensive coverage through a one-off programme of new research. The country study should be seen as an evolving process. The initial work should identify and establish a framework for on-going inventory and monitoring, and should include recommendations for storage, maintenance and use of data.

National Systems Plan for Protected Areas:

Zambia has 19 national parks (NP) covering 6.4 million ha (8.4% of land area) and four bird sanctuaries. 11 of these national parks are greater than 100,000 ha in size; one is over 1 million ha. Game management areas (GMA) cover an additional 16.6 million ha (22% of land area). Zambia also has extensive forest reserves; some of which are designated for watershed protection, but all of which allow some form of harvesting.

The NEAP calls for a review of the national protected area system, and for the immediate development and implementation of management plans for protected areas which are threatened by human encroachment. The lack of existing management plans for many protected areas and for fisheries is identified as a problem.

The development of national systems plans for protected areas is an important element in developing a national biodiversity strategy and responding to the Biodiversity Convention.

Zambia would benefit from an assessment of how well its protected area system is able to meet its objectives. A first step in promoting more effective management is to conduct such a review, including all categories of protected areas, both private and public, terrestrial, wetland, and marine; the systems plan should also establish linkages with areas used for production of biological resources, such as forestry, and with *ex-situ* activities which contribute to the conservation of biological diversity (botanic gardens, zoos, aquaria, game ranches, seed collections, and gene banks). An essential part of the planning process is "gap analysis", which requires the identification of species or ecosystems not represented. The planning process should also define roles and responsibilities for government, private sector, NGO's and local communities.

Household Electrification (grid extension and PV):

Mitigation measures form the backbone of the Convention because these measures ensure a decrease in the rate of onset of climate change. However, Zambia is a developing country; its developmental goals must not be compromised in developing an abatement

strategy.

Carbon dioxide is the principal greenhouse gas which contributes to about 65% of the global warming. NEAP has identified the principal sources of CO₂ emission in Zambia as the burning of fossil fuels, mainly petroleum, and woodfuel. Mitigating policies should therefore center around the following two themes:

- (i) minimising the use of fossil fuels, and
- (ii) arresting deforestation

There are a number of renewable energy technological options which can be considered to replace the use of fossil fuels and woodfuel in some areas. With an annual solar insolation level of 7.1 GJ/m², Zambia is among the nations most suited for the exploitation of solar energy. In spite of the current high costs, Photovoltaic (PV) power remains a promising option because it is modular, reliable, and omnipresent. Future costs should come down significantly. PV should remain in the national strategy, at least in the long-term, as one of the possible options for supplying electricity to remote areas where the cost of electric grid extension is very high.

Hydropower can provide a viable substitute for woodfuel and fossil fuel burning in urban households where the cost of grid extension is relatively cheap. In the townships around the cities, extension of electricity is a feasible proposition. In fact, urban electrification is among the priority programs of ZESCO in view of its role in national development. Electrification of these townships will result in decreasing use of woodfuel, paraffin and diesel. Availability of funds has been the main inhibiting factor to grid extension.

Institute of Environmental Studies, University of Zambia:

Effective implementation of international conventions in Zambia is hindered by an inadequate scientific and technical infrastructure, reflected by the relatively few number of scientists and trained experts focused on broad multi-disciplinary environmental work and inadequate technical facilities to train / re-train local experts. These limitations restrict Zambia's ability to meet the requirements of the conventions, design and implement cost-effective projects, conduct the necessary assessments for national decision-making, and participate on an equal basis in negotiating environmental conventions and associated protocols.

Establishment of an interdisciplinary Institute of Environmental Studies to build national capacity in this area will fill a large gap. Such an institute could deal with climate change issues, renewable energy and other environmental issues of national concern as outlined in NEAP such as air and water pollution, and biodiversity protection. An Institute for Environmental Studies could contribute to fulfilment of Zambia's commitment under the UNFCCC and CBD, and assist in achieving national objectives on environmental education as stipulated in NEAP. Appropriate linkages would need to be established with other regional / international institutions.

Other Environmental Planning Priorities

After examining Zambia's obligations under the relevant conventions against the National Environment Action Plan and other relevant strategies and programmes, the following environmental planning requirements were identified:

- Zambia is signatory to over 25 international and regional conventions related to the environment - 8 of which are reviewed in this report. The country's participation in each of these would benefit from a review of their national relevance and action to coordinate and rationalize required responses.
- In light of the above, a national database on conventions and agreements should be established which identifies the conventions' status and obligations with a view to incorporating convention commitments more effectively into national planning and programmes.
- While Zambia's NEAP is remarkably complete in addressing most of the issues raised in the Biodiversity Convention and the Climate Change Convention, it fails to propose or define the cross-sectoral / integrated approach necessary to effectively meet these global environmental challenges.
- Attention needs to be given to ensuring the government has in place and empowers a coordinating body for national planning, strategies and policy development. Such a body must seek to secure full participation of the population in identifying priorities, designing programmes and contributing to implementation.
- Zambia has completed both a National Conservation Strategy and a National Environment Action Plan, and has completed or is embarking on a number of sector specific strategies and plans (agriculture, forestry, etc.). Attention must be focused on practical field implementation of these strategies and plans within a framework which allows feedback and refinement of these documents. Such feedback and refinement could be guided, in part, by Zambia's commitments under the various international conventions rather than pursuing convention specific strategies.
- It must be recognized that little effort has been made to revisit national legislation and policy in light of new commitments adopted via ratification of various environmental conventions. Following rationalization of existing convention commitments, attention should be given to conducting the necessary environmental law review; however such a review should follow - not pre-empt - careful national consideration of appropriate approach to meeting the commitments. Without such a strategic framework, legal reviews have elsewhere tended towards over-regulation and protectionism.
- Viable approaches to build national scientific and technical capacity and infrastructure include enhanced funding for specific projects in universities and government laboratories, twinning of research institutions with those in developed countries, strengthening regional research centers, and establishing national, regional and international networks to improve information access and flows. SADC, IUCN and other regional institutions should assist in ensuring utilization of national capacities in their programmes and in establishing appropriate networks.

With regard to the issue of institutional and human capacity, there was broad consensus that Zambia needed to experiment with a more decentralized approach to its natural resource management and rural development programme. In this regard attention needs to be given to the contradictory provisions in the NEAP regarding its promotion for indigenous and traditional management systems while calling for a reduction in the power of Chiefs.

In line with the philosophy of decentralization, the following broad recommendations on policy, institutional and capacity issues, and the roles for various institutions are drawn:

- ▶ Central Government should focus on creating the supporting (policy, legislative and economic) environment necessary for successful and sustainable local level natural resource management.

This work would greatly benefit from the international experience and expertise housed by multilateral institutions such as the World Bank.

- ▶ Sectoral departments, parastatals, universities and international/regional NGOs should focus their attention on providing the technical support and information necessary to ensure the local level skills and institutional structures exist for natural resource *management* to occur.

Funding from national government, bilateral and multilateral donors will be required to support the technical support, training and associated research.

- ▶ Local community and district level authorities should be allowed to play an increasing role in the decision-making relevant to their own local land-use practices and production systems. Initial emphasis needs to be placed on identifying the decisions which need to be made at the local level, and then ensuring the requisite information is available to make such decisions.

In addressing all the actions outlined throughout this report, there exists consensus by all the contributors that the institutional and human capacity development could best be achieved by utilizing existing national capacity, and, where required, providing limited strategically targeted support from external technical assistance. *Building* national capacity by *utilizing* national capacity in applied practical projects is the chief recommendation. The development of the implementation plan, including the human and capital inputs and the time-frame, for the NEAP and the programmes of the Environment Investment Programme should reflect this emphasis.

CONTENTS

Terms of Reference	i
Responsibility	ii
List of Acronyms	iii
EXECUTIVE SUMMARY	iv
CONTENTS	ix
1.0 Review of Global Environmental Conventions and National Environmental Action Plan	1
1.1 Basis for Action	1
1.2 Methodology of the Study	1
1.3 Background on International Conventions	3
1.4 Towards Effective Implementation	5
2.0 Convention on Biological Diversity (CBD)	7
2.1. Introduction	7
2.2 National and Global Priorities	8
2.3 Zambia's Biodiversity and Global Species Richness	9
2.4 Assessment of NEAP against CBD	10
2.4.1 Strategies, plans and programmes	10
2.4.2 Inventories and assessments	11
2.4.3 In-situ conservation	11
2.4.4 Customary use, traditional practices	12
2.4.5 Research and training	12
2.4.6 Education and awareness	12
2.4.7 Environmental impact assessment	13
2.4.8 Genetic resources - benefit sharing	13
2.4.9 Technology transfer	13
2.5 Convention Gaps and Recommendations	15
2.5.1 National Biodiversity Strategy	16
2.5.2 Biodiversity Country Studies	17
2.5.3 National Systems Plans for Protected Areas	18
2.5.4 Protection of Ecosystems, Threatened Species and Populations	19
2.6. Global Overlay - Biodiversity Convention and Zambia's NEAP	21
3.0 The UN Framework Convention on Climate Change (UNFCCC)	38
3.1. Background	38
3.2 Observations, Issues and Implementation of the UNFCCC	38
3.3 Current Programmes and Activities in Convention Related Issues ..	39
3.4.1 Country Studies on Climate Change	39
3.4.2 WWF/CRU Regional Study of Climate Vulnerability in Southern Africa	40
3.4.3 Drought Monitoring in Eastern and Southern Africa	40
3.4.4 Energy Efficiency and Alternative Energy Programmes	41
3.4.5 Activities in Forestry	42
3.4.6 Development of Alternative Crops	42

3.4.7	Capacity Building in Energy and Environmental Physics in Zambia	43
3.5	National Environmental Action Plan (NEAP) and the UNFCCC	43
3.6	Gaps, Deficiencies and Policy Measures	44
3.6.1	National Inventory of Greenhouse gases	45
3.6.2	Mitigation/Abatement	45
3.6.3	Impacts	47
3.6.4	Adaptation	47
3.6.5	Capacity Building	48
4.0	Convention on International Trade in Endangered Species of Flora and Fauna - (CITES)	51
4.1	The Convention	51
4.2	The CITES Species	51
4.3	Convention Obligations	53
4.4	CITES Actions	57
4.5	Existing CITES Plans	57
4.6	Recommendations	58
5.0	Convention on Wetlands of International Importance Especially as Waterfowl Habitat	60
5.1	The Convention	60
5.2	Convention Obligations	60
5.3	Convention Plans	62
5.4	Convention Gaps and Recommendations	63
6.0	Convention on the Protection of World Cultural and Natural Heritage	65
6.2	Plans	67
6.3	Gaps and Recommendations	67
7.0	Convention to Combat Desertification	68
7.1	The Convention	68
7.2	Obligations	68
7.3	Activities	69
7.4	Plans	70
7.4	Gaps and Recommendations	70
8.0	Action Plan for the Environmentally Sound Management of the Common Zambezi River System	72
8.2	Obligations	72
8.3	Plans and Activities	72
8.4	Gaps and recommendations	73
	REFERENCES	76

1.0 Review of Global Environmental Conventions and National Environment Action Plan

1.1 Basis for Action

In the course of finalizing the National Environmental Action Plan, it was recognized that the exercise would benefit from a review of Zambia's commitments under those global and regional environmental conventions and agreements to which it is a signatory. Specifically, the Government of Zambia wished to assess its own national plans and strategies, as summarized and clarified in the NEAP, against these regional and/or global commitments. In so doing, the Ministry of Environment and Natural Resources and the NEAP Secretariat would be better equipped to develop a comprehensive funding plan for the projects identified on the basis of the NEAP. The World Bank agreed to provide the finances from the GEF Trust Funds to undertake such a review and assessment. The Government of Zambia then engaged the IUCN-World Conservation Union, of which Zambia is a state member, to administer and implement the study. The study was conducted to provide the Government of Zambia with background information only, with an aim to facilitate the following:

- the identification of national priorities listed within the NEAP which might be eligible for GEF funding; and,
- the preparation of a GEF Programme portfolio with direct reference to national planning priorities.

As a secondary output, it was recognized that such a review would assist the government in taking stock of the full range of environmental obligations to which the country has committed itself, and assist in streamlining their response and reporting to the various convention secretariats. Furthermore, it would provide a basis for assessing the present value of the various conventions, and allow the government to review its participation in them.

The exercise should not be misinterpreted as distorting the national and local focus of the NEAP in favor of global environmental priorities. The exercise merely sought to complement the NEAP through the presentation of the international dimension. If the report has been successful in achieving this, the information should facilitate strategic planning for securing and allocating national and international resources towards Zambia's own environmental priorities.

1.2 Methodology of the Study

The study has been carried out in five phases:

- (a) an initial round-table meeting to discuss the focal areas for the study;
- (b) collection, analysis of information and the preparation of an initial summary of findings and recommendations by the national consultants;
- (c) a second round-table to discuss the initial findings and discussion thereof;
- (d) preparation of the final draft for submission to IUCN; and,
- (e) final review and revision by IUCN prior to submission to the Government of Zambia and the World Bank Resident Representative in Lusaka.

The first roundtable meeting was held at Lilai Lodge, Lusaka, and was attended by representatives from :-

1. Ministry of Environment and Natural Resources
2. Ministry of Agriculture, Food and Fisheries
3. Environmental Council of Zambia
4. Natural Resources Department
5. Zambia National Farmers Union
6. Zambia Consolidated Copper Mines, Operations Centre
7. University of Zambia, Biology Department
8. University of Zambia, Physics Department
9. Wildlife Conservation Society of Zambia
10. Zambia Environmental Education Programme
11. World Bank, Lusaka
12. Mano Consultancy Services, Lusaka
13. IUCN-The World Conservation Union.

The meeting discussed the terms of reference and focal areas which the study should investigate. It was agreed that the study should focus on Zambia's obligations under the two major global environmental conventions: Framework Convention on Climate Change (FCCC) and the Convention on Biological Diversity (CBD); as well as the Convention on Wetlands of International Importance, especially as Waterfowl Habitat (RAMSAR), Convention on International Trade in Endangered Species of Fauna and Flora (CITES), Convention on the Protection of World Cultural and Natural Heritage, Convention on the Protection of the Ozone Layer and its Montreal Protocol, and the Action Plan for the Environmentally Sound Management of the Common Zambezi River System. These conventions and agreements were then to be assessed against the actions that Zambia has undertaken or advocates through the NEAP, and thus establish the gaps and deficiencies that exist. The study was to further suggest what could be done to fill these gaps. Since the GEF II project priorities have not yet been agreed upon, the study was only to indicate the project concepts for filling these gaps.

The national consultants and IUCN studied the various conventions and discussed with relevant institutions to generate the information that has been used in this paper.

The second round table meeting was held on 23 September 1994 and reviewed the first report of the consultants. The comments from that meeting have been used to finalise the draft report which was sent to IUCN on 17 October 1994. IUCN reviewed and revised the final report, seeking to achieve further clarity in the comparative analysis between the global environmental conventions and the NEAP, as well as in the recommendations for potential GEF financing. Comments on the draft report were sought from additional national experts as well as the Southern Centre for Energy and Environment in Harare, Zimbabwe.

The draft final report was submitted to Dr. Emmanuel O.A. Asibey, Task Manager, World Bank and Mr. P.L. Mwamfuli, Permanent Secretary, Ministry of Environment and Natural Resources, Government of the Republic of Zambia on 3 March 1995. GRZ approval was transmitted to IUCN ROSA by the Permanent Secretary on 27 April 1995. The World Bank requested certain revisions in a fax dated 27 June 1995. This final report takes account of those comments.

1.3 Background on International Conventions

Zambia is signatory to over 25 international and regional conventions which are related to the environment. These conventions vary in scope from the the establishment of various international bodies (e.g. the Bretton Woods Institutions) to nuclear test bans and human rights issues. Thirteen of these conventions are focussed specifically on the environment (Table 1), and this study focuses on a selection of these (shown in italics).

Table 1: Environment Conventions Signed and Ratified by Zambia

Convention (Location, Date / Date Revised)	Acronyms used in report
<i>International</i>	
Convention on Plant Protection (... , 1951 / revised 1979)	
<i>Ramsar Convention on Wetlands of International Importance especially as a Waterfowl Habitat (Ramsar, 1971 / revised 1982)</i>	RAMSAR
<i>Convention on the Protection of World Cultural and Natural Heritage (... , 1972)</i>	WCNH
<i>Convention on International Trade in Endangered Species of Wild Flora and Fauna (Washington, 1973)</i>	CITES
Convention on the Law of the Sea (... , 1982)	
<i>Convention on the Protection of the Ozone Layer (Vienna, 1985)</i>	
» <i>Protocol on Substances that Deplete the Ozone Layer (Montreal, 1987)</i>	MP
<i>Framework Convention on Climate Change (New York, 1992)</i>	UNFCCC
<i>Convention on Biological Diversity (Rio, 1992)</i>	CBD
<i>International Convention to Combat Desertification (1994)</i>	ICCD
<i>Regional / Restricted</i>	
Convention on the African Migratory Locust (... , 1962)	
African Convention on the Conservation of Nature and Natural Resources (Algeriers, 1968)	
<i>Action Plan for the Environmentally Sound Management of the Common Zambezi River System (... , 1987)</i>	ZACPLAN

The level of adherence to the various Conventions within southern Africa is indicated in Table 2. While national priorities in the developing countries of this region must remain the paramount concerns of the national governments, it is recognized that benefits are derived from membership of and participation in international conventions. Such benefits include:

- participation in a forum for coordinated management and conflict resolution regionally and internationally;
- access to a large pool of knowledge and expertise in which parties can share;
- safeguarding of property rights;
- access to financial assistance (GEF, Wetland Conservation Fund, etc.); and,
- ability to contribute to Convention restructuring.

Table 2. Status of southern African countries vis-a-vis some international conventions

	Biological Diversity	CITES	RAMSAR	World Heritage	International Undertaking on Plant Genetic Resources
Angola	S	X	X	R	X
Botswana	S	P	X	X	-
Lesotho	S	P	X	X	X
Malawi	R	P	X	R	A
Mozambique	S	P	X	R	A
Namibia	S	P	X	X	X
South Africa	S	P	P	X	A
Swaziland	R	X	X	X	X
Zambia	R	P	P	R	A
Zimbabwe	R	P	X	R	Res A

[Notes: A = adhere to Understanding/Convention; P = party to Convention (either by ratification or accession); R = ratified; Res = reservation; S = signatory; X = nonparty to Convention. *Source: Huntley, 1994*]

Zambia leads the rest of the region in its positive response and ratification or accession to these and other international conventions. For these conventions to be effective, it is essential that relevant government agencies and NGOs actively pursue the acquisition and dissemination of information related to the conventions to all affected groups or relevant parties. Information needs to be presented in layman's version and in local languages. Such information should clearly identify the benefits, as well as the obligations, of being party to a Convention. A national database on Conventions in terms of status, signing, ratification and obligations should be established, with a view to streamlining national responses to the various conventions and incorporating their obligations more effectively into national planning and programmes. The information presented in this report could form the basis for the development of such a database.

The creation of both national and regional forums of government departments and NGOs can facilitate information exchange, technical and technology transfers, as well as mobilize

other southern African states to remain in step with their regional neighbors and the international community in their approach to the conservation of biological diversity and the stewardship of the global environmental commons. At the national level, a forum, such as that proposed in the NEAP under ECZ, could discuss new developments pertaining to the Conventions, including obligations, opportunities, action plans, etc., and be affiliated with science and technology Councils. Closer collaboration between scientific and technical agencies responsible for conventions and legal departments on Convention matters is required to prepare for national participation in convention negotiations. Capacity building throughout the relevant scientific, technical and legal disciplines is needed.

1.4 Towards Effective Implementation

Effective implementation of international conventions in Zambia is hindered by the inadequate scientific and technical infrastructure, the relatively few number of scientists and trained experts focused on broad multidisciplinary work directed towards biodiversity conservation, climate change, etc., and inadequate technical facilities to train its own experts, or retrain them once trained. These limitations in the scientific and technical infrastructure restrict Zambia's ability to: i.) meet the requirements of the conventions, ii.) design and implement cost-effective and sustainable projects; iii.) participate on an equal footing in negotiating environmental conventions and associated protocols; iv.) participate in the Subsidiary Bodies on Scientific, Technical and Technological Advice established by the conventions; and, v.) conduct the scientific, technical and economic assessments necessary for national and international decision making.

The GEF could potentially contribute significantly to rectifying the above deficiencies. It is noted that the restructured GEF has preliminarily identified a role in supporting human and institutional capacity-building, as well as other enabling activities, necessary for parties to the FCCC and CBD to effectively implement these conventions. Therefore, GEF support should be directed towards the country studies required under the FCCC and CBD, and such studies should be designed and carried out in such a manner that they maximize the utilization and strengthening of national scientific, technical, legal and economic capacity. Additional benefits from this type of investments should be forthcoming through improvements in the implementation of other conventions as well as improved capacity to contribute broader scientific and technical knowledge to national, regional and international regulations and policies.

Viable approaches to improve the scientific and technical infrastructure in most developing countries include enhanced funding for specific projects in universities and government laboratories where appropriate, twinning of research institutions in developed and developing countries, strengthening regional research centers, and establishing sustainable training programmes. Establishment of networks will be necessary to help Zambia's scientists get access to, and provide, the most up-to-date scientific information.

International governmental bodies (e.g., World Meteorological Organization (WMO), United Nations Environment Programme (UNEP), United Nations Scientific and Cultural Organization (UNESCO), and Food and Agricultural Organization (FAO)) and non-governmental organizations (e.g., International Council of Scientific Unions (ICSU) and International Social Science Council (ISSC)) can play important roles in facilitating international coordination of research programmes, and information and technology

exchange among countries.

SADC and IUCN represent two regional organizations which can facilitate information exchange, as well as research coordination and scientific and technical capacity building. Indeed, at a Southern African Regional Biodiversity Workshop held in Bulawayo, Zimbabwe in March 1993 with funding from CIDA, government and non-government participants from each of the SADC countries called for the the creation of a regional forum to promote collaboration among the SADC member states with respect to biodiversity conservation. The Workshop resolutions listed the creation of such a forum as a top priority and suggested it be a SADC functionary coordinated by IUCN. This forum should house a metadatabase on biodiversity information held in the member states, as well as directories of institutions, researchers and projects on biodiversity conservation within the SADC region.

Under the realm of climate change, similar forums or networks could be established with links to the Southern Centre for Energy and Environment and/or the southern African START (System for Analysis, Research and Training) component of the International Geosphere-Biosphere Programme (IGBP) administered by the ICSU which operates on the basis of IGBP National Committees.

This completes the summary of issues relevant to Zambia's participation in and implementation of international conventions. The following sections serve to provide more detailed analysis of these same issues on a convention by convention basis.

2.0 Convention on Biological Diversity (CBD)

2.1. Introduction

The Convention on Biological Diversity was adopted in Nairobi in May, 1992, and subsequently signed by a record number of over 150 States in June, 1992 at the UN Conference on Environment and Development in Rio de Janeiro. The Convention entered into force on 29 December 1993 following its legal ratification by the 30th State. It has now been ratified by 103 countries, including Zambia (28.5.93), Malawi (2.2.94), Swaziland (9.11.94), and Zimbabwe (11.11.94) in southern Africa.

The Convention is recognized as being unique in its comprehensive rather than sectoral approach to the conservation of the Earth's biodiversity and sustainable use of biological resources. It recognizes the vital point made in the *World Conservation Strategy* (1980), *Caring for the Earth* (1991), the *Global Biodiversity Strategy* (1992) and many other international documents that both biodiversity and biological resources should be conserved for reasons of economic benefit, ethics and basic human survival.

The Convention, however, goes beyond the conservation of biodiversity *per se* and the sustainable use of biological resources, to encompass such issues as access to genetic resources, sharing benefits from the use of genetic material and access to technology, including biotechnology.

It was decided from the outset of the negotiations that a global convention on the formidable issue of biodiversity, including sustainable use of agricultural, forestry, and fisheries resources, amongst others, would need to approach the issues in a very broad socio-economic context in order to be realistic, effective, and recognized. As the majority of the world's biological diversity is found in the tropical and subtropical Third World countries, the mandate for the Convention was explicitly clear on this point. The link was also made by the developing countries between biodiversity and biotechnology, as part of the socio-economic approach, thereby introducing the value of and control over the genetic resources of the developing countries into the negotiations.

Though the utilization aspect of biodiversity is strongly supported throughout the Convention, it is equally underlined that States are "responsible for conserving their biological diversity and for using their biological resources in a sustainable manner". It says that "the fundamental requirement for the conservation of biological diversity is the *in-situ* conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings".

The fact that biological diversity is unevenly distributed around the globe is also recognized in the Convention. The North, biologically poorer, has depleted its biodiversity reserves over time, but such reserves are still found in the biologically rich South. If biodiversity is to be conserved, this imposes a heavier burden on the South, at a time when the use of biological resources is of paramount importance for developing countries in achieving development. The Convention recognizes that this burden, in turn, can only be alleviated by additional contributions (financial assistance, protection of intellectual property rights, and transfer of relevant technology) from the industrialized North and through increased partnership between both developed and developing countries.

2.2 National and Global Priorities

The Convention's primary aim is to encourage and enable all countries to conserve biodiversity and to use its components sustainably in support of national development. It is in the nature of biodiversity management that many policies and actions converge and support one another if success is to be achieved. The logical basis for policy and action is integral to the Convention itself, and a list of actions directly based on the provisions of Articles 6-14 and 17-18 was given by UNEP (1993), with a further commentary by IUCN (1993) and de Klemm & Shine (1993).

Among the many possible responses, the World Conservation Monitoring Centre drew from the World Resources Institute (WRI, 1994) in identifying ten important actions that a country can take to implement the Convention in their publication *Priorities for conserving global species richness and endemism* (WCMC, 1994). These include the following:

- *In response to Article 6:* develop national plans, strategies, and/or policies to improve the capacity to conserve biodiversity and to use its components sustainably.
- *In response to Article 7:* identify important components of biodiversity (i.e. ecosystems, species, lineages, etc.), conduct biodiversity inventories and surveys, identify activities that adversely affect biodiversity, and develop a system of organizing and maintaining this information so that it may be acted upon.
- *In response to Article 8:* (a) establish or strengthen networks of national protected areas in order to protect species, habitats, representative ecosystems and genetic variability within species; (b) control, eradicate or prevent the introduction of alien species that threaten ecosystems, habitats or indigenous species; and (c) develop or maintain necessary legislation, institutional capacities and other provisions for the protection of threatened species and populations.
- *In response to Articles 8, 10, and 11:* manage and use biological resources sustainably outside protected areas, including degraded ecosystems, and adopt economic and social incentives to that end.
- *In response to Article 9:* establish and/or strengthen facilities for the off-site (*ex-situ*) conservation of biodiversity that support and complement on-site (*in-situ*) conservation efforts.
- *In response to Article 14:* improve legislation and institutional capacity to assess and manage the impacts of planned and existing projects, programmes or policies on the environment in general and on biodiversity in particular, while also encouraging public participation.
- *In response to Article 15:* consider options for developing national and/or state or provincial regulations to govern access to and exploitation of genetic resources.

In addition to these proposed actions, Zambia's NEAP notes the need for "a comprehensive conservation education programme" which, if implemented, would be an appropriate and important response to Article 13: Public Education and Awareness.

Thus the kinds of action envisioned by the Convention are fairly clear. Attention needs to be given to establishing priorities for local, national and international action. It is generally accepted that Parties to the Convention should focus on conserving species and their natural habitats described in Annex 1 to the Convention. This can best be done by managing communities of organisms in the wild, using *in-situ* measures. Particular attention needs to be paid to the role of planning, priority-setting and conservation action

at the national level in accordance with Articles 6, 7 and 8 of the Convention. However, some actions are immediately justifiable on the basis of current knowledge, and these should be undertaken as soon as possible to counter the decline in biodiversity. The following priorities were amongst those set by WCMC (1994) to be addressed by the financing mechanism for the Convention:

- ▶ support conservation action to safeguard viable samples of terrestrial habitats known to be rich in species and/or high in endemism, including but not limited to areas which are legally protected but which are threatened by factors which can be controlled in a cost-effective manner;
- ▶ support conservation action to safeguard other sites of special merit for biodiversity, including areas of lowland tropical forest, temperate grassland, cave systems, islands, isolated mountains seamounts, lakes, rivers and wetlands;
- ▶ support countries known to be rich in species and endemism, thus helping them to comply substantively with Articles 6, 7 and 8 of the Convention; and,
- ▶ support actions which can best be undertaken at a global level, including coordinating activity under existing international agreements and programmes which affect biodiversity, monitoring threats to global biodiversity, collecting, analyzing and disseminating information on biodiversity, and promoting the exchange of skills in biodiversity management.

2.3 Zambia's Biodiversity and Global Species Richness

Analyses of WCMC's current data holdings on global species richness and endemism, as well as regional assessments of mammals, birds, amphibians, swallowtail butterflies and angiosperms by McNeely *et al.*, suggest Zambia belongs amongst the 25-50 most biodiverse countries in the world (WCMC, 1994).¹

WCMC advises that all 48 of the developing countries (including reference to some countries which GATT and others rank as transition or middle income countries) within the list of the 50 most biodiverse countries "should be given special consideration in the allocation of resources to assist them in improving their capacity to manage biodiversity". In particular, assistance should be provided towards enabling activities supporting the countries ability to comply with Articles 6, 7 and 8 of the Convention.

Noting Zambia's status as a party to the CBD and its participation in the GEF, these

¹ WCMC suggests "that the 50 countries or territories which possess most species and most endemism can be divided into two groups, as follows, with the countries in each listed in alphabetical order:

- Group 1 (the 25 most biodiverse countries): Argentina, Australia, Bolivia, Brazil, Cameroon, China, Colombia, Costa Rica, Ecuador, Ethiopia, India, Indonesia, Madagascar, Malaysia, Mexico, Papua New Guinea, Peru, the Philippines, South Africa, Tanzania, the United States of America, [ex-USSR], Venezuela, Viet Nam and Zaire; and
- Group 2 (the 25 next-most biodiverse countries): Angola, Botswana, Cambodia, Central African Republic, Chile, Congo, Cote d'Ivoire, Cuba, Gabon, Ghana, Guatemala, Guyana, Iran, Kenya, Laos, Myanmar, Nigeria, Panama, Paraguay, Sudan, Suriname, Thailand, Turkey, Uganda and Zambia.

recommendations lay the foundation for preparing biodiversity conservation projects for GEF consideration.

2.4 Assessment of NEAP against CBD

A full summary of the primary obligations of the CBD and the recommendations of the NEAP are listed in the matrix attached at the end of this section. Some of the findings of this exercise are outlined below.

In general, Zambia's National Environment Action Plan is remarkably complete in addressing the issues raised in the CBD and in identifying institutional and legislative changes which would improve Zambia's compliance with the intent of this Convention. The NEAP however fails to break from the traditional sectoral approach to natural resource management, and therefore falls short of providing a comprehensive national approach to biodiversity conservation.

The CBD has not been explicitly integrated into environmental planning in the NEAP or elsewhere. Yet the CBD is consistent with several other previously ratified conventions, therefore Zambia's response to these, such as Ramsar, effectively means that Zambia is already moving towards conforming with much of the CBD.

Notwithstanding the above, fulfilling the requirements of the CBD requires certain explicit convention oriented activities - such as the compilation of a biodiversity inventory, development a national biodiversity strategies (or modification of existing national environment strategies), and site, species and population specific conservation action.

2.4.1 Strategies, plans and programmes

Biodiversity conservation has been integrated to some extent into the strategies, plans and programmes for the agricultural, forestry, fisheries and National Parks sectors. The NEAP highlights the lack of required coordination between ministries and sectors, the lack of management capacity and the need to rationalize environment legislation.

Plans for the agricultural sector do not pay much heed to biodiversity, other than in the need to monitor and control the use and particularly the run-off of agricultural fertilisers and chemicals.

Plans for forestry, however, have the preservation of biodiversity of natural woodlands as a central objective. The major immediate actions recommended include an inventory of forest resources, and assessment of the environmental costs of existing damage and utilisation activities. The integration of communities and the private sector into sustainable use management is recommended, and forests management is viewed in terms of its role in an entire ecosystem (e.g. as part of river basin).

Fisheries plans have been made in both the ASIP and the NEAP. Although the co-ordination between them was weak, the consistency is strong. Both have conservation and sustainable use of fisheries areas, including rivers, lakes and wetlands, as the major component of the sectoral strategy.

The NEAP states that the conservation of ecosystems and biodiversity is a major function

of the Department of National Parks and Wildlife Service (DNPWS). The NEAP recognises that national parks contain rich biodiversity, with cultural, education, aesthetic, ethical and scientific value. However, in terms of the actions and recommendations for National Parks, no mention (direct or indirect) is made of the full range of biodiversity, referring only to wildlife resources with emphasis on that within protected areas.

Environmental considerations are not always paramount in other sectoral plans, or at least are subject to little systematic review and guidance from conservation disciplines. The difference between the plans for seed production and selection of varieties for agriculture between the NEAP and ASIP is a good illustration of this. Sectoral plans *may* include biodiversity considerations, but there is no mechanism to ensure this, or to monitor inclusions and omissions effectively. Apparent compliance with CBD must not be taken as an assurance that appropriate mechanisms are in place to integrate biodiversity into sectoral plans.

2.4.2 Inventories and assessments

Plans to carry out a biodiversity inventory, which would identify important components for conservation and sustainable use, and put in place a monitoring system, are not incorporated in the NEAP. Although the NEAP recognizes the constraints placed on environmental planning by the scarcity of existing, available data and information.

Sectoral biodiversity identification and monitoring activities are covered in the NEAP, as mentioned above, for forestry and fisheries, but apparently omitted for national parks and other sectors. No specific attention is given to wetlands in the NEAP, although biodiversity monitoring is and will continue to be part of the Wetlands programme (see component on Ramsar).

NEAP calls on ECZ to organize a coordinating committee for national environment monitoring.

2.4.3 In-situ conservation

Zambia has an elaborate protected area (PA) system under DNPWS and the Forestry department. These cover nearly 40% of the country. However, in the absence of guidelines for their management and lack of adequate resources, over 60% of these areas is considerably depleted and degraded. For example, species such as the Black Rhino (*Diceros bicornis*) and Shoe Bill stock (*Balaeniceps rex*) are nearly extinct due to excessive hunting and loss of habitat respectively.

While NEAP emphasizes the need for a review in and improvement of Zambia's PA system, many gaps in the current PA system and conservation by-laws exist, including:

- ▶ the lack of protection for non commercial animals and trees;
- ▶ the emphasis on exotic species in forest plantations; and,
- ▶ the lack of a protected area system for the fisheries sector.

Furthermore, the original designation of Zambia's PA was not based on an ecosystem approach and this has yet to be reviewed or rectified.

To address conservation needs outside PAs, Zambia has introduced the ADMADE Programme (under DNPWS) which allows for participation of local people in conservation issues, and strives to create conditions where local economic benefit can be generated from sustainable use of resources. The relative infancy of this programme limits the possibility of fully reviewing its potential or impact.

Degradation of ecosystems in Zambia is largely attributed to over exploitation, poor agricultural practices, increasing human population and poorly planned settlements. This factor is worsened by the lack of adequate management. With the exception of mine sites, the NEAP fails to adequately address the issue of rehabilitation of ecosystems.

The only context in which the danger of exotic species introduction is mentioned is in future plans for the fisheries sector - where moves are to be taken to ensure that they are not introduced.

2.4.4 Customary use, traditional practices, and indigenous management systems

NEAP states support for indigenous management systems and traditional institutions in environmental management on the one hand, while calling for the reduction of the power of Chiefs over traditional land and movement toward a "new property rights regime". There are serious inconsistencies in these two positions which need to be addressed. In this regard the NEAPs proposed push for improved land and labour markets, and greater economic efficiency in utilization and production, could prove difficult and even damaging in the absence of sound natural resource valuation and accounting.

2.4.5 Research and training

At present there is little research being carried out in Zambia. However, NEAP recommends research and monitoring of *inter alia* water resources of the Kafue basin, indigenous forest management, wildlife management, renewable sources of energy, mined land reclamation, etc, and training to improve management capacity of the sectoral departments.

NEAP suggests ECZ be appointed to organize a coordinating committee for research and monitoring in these areas. Other participants should include MAFF, WAD, FD, UNZA, and NCSR.

2.4.6 Education and awareness

The need for a comprehensive conservation education programme is clearly stated in NEAP. However, current activities are confined to sectors such as wildlife and forestry. Conservation education is not well established in the country, particularly in rural areas. Partnerships are required between teachers, NGOs, and national ministries of education and environment to develop both formal and non-formal education programmes. Success in such a programme will depend on whether conservation information can be translated and disseminated in local languages.

2.4.7 Environmental impact assessment

The need for EIAs is articulated throughout the NEAP, which identifies the ECZ as a central institution for coordination, enforcement and evaluation (as stipulated in the EPPCA).

The Environment Council of Zambia has already made considerable strides in this area, and legislation is in place. Attention must now be given to building the capacity of ECZ to fulfill its foreseen roles, and to educate government, private sector and the general public on the new legislation's intent and its procedural requirements.

2.4.8 Genetic resources - benefit sharing

This issue is not addressed in the NEAP. The regional genebank based in Lusaka has plans devised under the SADCC regional programme, of which Zambia is a part, to facilitate the protection of genetic resources. These plans include capacity building in member countries for the creation, maintenance and improvement of national genebank facilities.

Apparently, Zambia's main concern today in this regard is in regards to the use of indigenous plants for pharmaceuticals. Plans to tackle the lack of biodiversity information and monitoring, and the poor control of exports are probably a precursor to further plans in this regard. In any case, the implied responsibility is with the expropriator of genetic resources.

2.4.9 Technology transfer

Without explicit reference to biodiversity, the NEAP and other national plans contain a wide range of suggestions which conform to the CBD in terms of promoting technologies for sustainable use of natural resources (largely in-situ). Technologies include methods such as community management or environmental impact assessments, as well as tangible tools. Emphasis on sustainable use of natural resources appears in all sectors - agriculture, water, forestry, wildlife, fisheries, tourism, mining, industry, population, and energy. Highlights from the various sectoral plans are summarized below:

- (a) *Agriculture*: soil conservation, agroforestry, crop rotation, green manuring, intercropping, animal manure, and improved water use are all mentioned in NEAP as technologies for sustainable agricultural development, and incorporated in ASIP as well. The ASIP plans will largely meet the NEAP priorities. Both plans incorporate environmental sustainability as a priority in both research and extension. Other than specific projects such as the Soil Conservation and Agroforestry Programme, the prioritisation of sustainable techniques in ZAREP is particularly significant, as this single programme consumes over half the donor finance in the sector (approximately US\$17m pa).
- (b) *Water*: Plans for the water sector are all based on the need for integrated river basin management, to allow the adoption of watershed areas as a management unit for optimal and sustainable utilisation and conservation. This is the governing

strategy behind all plans for the sector. Specific technologies are not mentioned but would of necessity be part of plans developed in compliance with this strategy.

- (c) *Forestry*: Technologies to be adopted include participatory management, and those directed at sustainable fuel wood strategies. Various smaller programmes include the sustainable use of forest resources such as fruit, mushrooms, roots, insects and honey, and technologies to facilitate this.
- (d) *Wildlife*: Sustainable use of genetic resources through community based wildlife management is a key component of the plans in NEAP. This technology is not only developed and extended in Zambia, but also exported to other countries.
- (e) *Fisheries*: The plans for the fisheries sector in both NEAP and ASIP pay great attention to implementing biodiversity conservation programmes. Technologies to be promoted include appropriate fish gear and methods, community based fisheries management, and those oriented at alleviating environmental damage from processing (e.g. deforestation from fish smoking).
- (f) *Tourism*: The NEAP proposes the use of environmental impact assessments prior to new tourism development proposals, the adoption of integrated management plans for tourist areas, and the provision of infrastructure which will halt environmental degradation (e.g. road, footpaths, sympathetic design and material use, and appropriate waste facilities).
- (g) *Mining*: The NEAP proposes the use of environmental impact assessments prior to issuing of new licenses, including small scale mining in protected areas. Investigation of technologies for making disused mines safe are proposed. Air and dust pollution reduction techniques are also recommended.
- (h) *Industry*: The NEAP proposes an incentive structure for the adoption of 'clean' technology, the development of a waste disposal strategy for industry, and the requirement of an annual environmental audit. Research into pollution reducing technologies is also proposed.
- (i) *Population*: The NEAP proposes the increased availability of family planning services and child health facilities to reduce population growth through decreased fertility and infant mortality rates.
- (j) *Energy*: Technologies recommended by NEAP include research & development of renewable sources (solar, wind and biogas), environmental impact assessment of woodfuel use, dams and fossil fuel operations, economic incentives for adoption of 'clean' technologies, and increased electrification programmes.

2.5 Convention Gaps and Recommendations

The CBD operates on two levels - the explicit biodiversity programmes (e.g. inventory and monitoring activities), and more general components related to sustainable use which can be more readily incorporated in sectoral plans. Zambia's existing environmental plans are strong on the latter, but have, to a great degree, excluded the former.

It is therefore recommended that biodiversity conservation be unambiguously accepted as a central tenet of environmental policy. This is the corollary of the full integration of biodiversity in the NEAP as a cross-sectoral priority (rather than a separate chapter). Any review of the NEAP should consider this as an urgent issue.

A biodiversity country study should be conducted, as far as possible adopting the following (ambitious) standard structure:

- review of the status of biological resources;
- identification of measures necessary for effective conservation and sustainable use;
- determination of costs and benefits of implementing these measures; and
- estimation of current unmet financial needs.

As part of the national biodiversity inventory, government should seek to ensure that structures and capacity exist to:

- monitor biodiversity, including the adverse effects of different activities;
- insure biodiversity considerations are incorporated in planning in all sectors;
- provide information to all sectors on technologies for sustainable resource use;
- support ex-situ genetic resource conservation programmes;
- press for action on issues of concern, with full environmental details and practical suggestions for solving problems - e.g. exotic weeds clogging the Kafue are sustained not only by pollutants in water, but by reduction in hippo numbers; and,
- monitor and advocate where genetic resources are or could be exploited by foreign concerns, to ensure revenue sharing and/or other benefits

Some structure should be designated or created to fill a "watchdog" role. Such a structure should be separated from all line ministries involved in national programme implementation, but should advocate for the integration of biodiversity considerations in sectoral programmes and plans.

The NEAP provides a solid national platform for identifying a number of additional projects relevant to the CBD which are in fact national priorities.

2.5.1 National Biodiversity Strategy

The NEAP introduction states, "The Government recognizes the need to promote and maintain the welfare of the people by adopting sustainable policies. These must aim to maintain ecosystems, essential ecological processes and the biological diversity of the country. Natural resource use must be sustainable for the benefit of both the present and future population." Article 6 of the CBD urges states to "develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes".

The NEAP identifies the lack of coordination between Ministries, the lack of institutional capacity, and the need to rationalize and harmonize environmental legislation as a priority to improve the longterm conservation and sustainable use of Zambia's environment and its associated natural resources. The NEAP calls for MENR to formulate environmental policies, establish an environment planning unit, and coordinate implementation of the NEAP. ECZ is called on to designate environmental officers in line ministries and local authorities and to coordinate all natural resource inventory and monitoring.

The NEAP advocates the development of a strategic wildlife policy framework giving clear objectives for the sector and recommendations for improving legislation. NEAP also calls for harmonization of the Tourist Act with the National Parks and Wildlife Act, and placement of DNPWS under MENR to separate "regulatory" and "client" institutions. Furthermore, NEAP recommends that reviews be initiated of the Agricultural Lands Act, Fisheries Act, and Forestry Act such that they take a more holistic view of natural resource management and conservation. Finally, NEAP calls for a review of the Mines and Minerals Act and Pollution Act to take account of pollution and waste dumps and the need for EIAs.

A National Biodiversity Strategy should be drawn up to guide the action required of the MENR and the ECZ, particularly the integration of sectoral and cross-sectoral plans, programmes and policies called for in Article 6(b). The objective of such a Strategy should be to determine national priorities in recognition of limited available resources and make specific recommendations for national action on conserving biodiversity and sustainable use of its components. It must: (i) identify areas for action; (ii) identify obstacles, such as national capacity, finances, technology, conflicting policies, inadequate laws or institutions; (iii) identify relevant government sectors and affected constituencies, such as local communities, business and industry; (iv) identify cost-effective solutions; and (v) assign tasks (IUCN, UNEP & WWF, 1991).

There is no set formula for preparing an NBS. Parties are free to embark on one comprehensive approach, or amalgamate several approaches. The Convention enables a Party to choose to develop new approaches or adopt others which exist. In Zambia, both the NEAP and the NCS, as well as the ZACPLAN, Lusaka Agreement and other existing plans or programmes can and should be drawn on to prepare an NBS. There must be a compromise between producing an NBS quickly so that the process of implementing plans and programmes can begin, while at the same time ensuring that the strategy is well prepared and has included the participation of all interested constituencies.

Once the NBS is finalized, the organizing unit (MENR/ECZ) must launch the strategy with the public, and then monitor implementation of the plans and programmes set forth. Monitoring reports could serve the basis for a Party to report back to the Convention's COP thereby fulfilling Article 26 (reports). The results of the process need to be evaluated and the process itself continued, regularly reviewed and revised, as appropriate, as part of a biodiversity strategy cycle.

National Biodiversity Group

The formation of a National Biodiversity Group (NBG), as proposed by the Steering Committees of IUCN's Species Survival Commission (SSC) and the Commission on National Parks and Protected Areas (CNPPA) could be a useful mechanism to assist the MENR/ECZ in any endeavours to prepare an NBS.

IUCN envisions that such a group would draw in expertise from government agencies, NGO's and academic institutions, but it would remain independent from them, providing impartial overview and analysis of biodiversity conservation options to the entire spectrum of the conservation community within a country. The work of NBGs would involve a bottom-up approach, assembling information from individual experts to provide a picture of national and subnational priorities. NBGs would be directly linked to the global network of the SSC and CNPPA, thus enabling them to receive and share experiences from other regions, and to obtain information on global priorities as they pertain to their own country.

NBGs would seek to provide top quality scientific and technical advice to biodiversity planning processes, thus enabling national plans and strategies to be based on the best possible information. They would utilize national expertise to assess the status of species and ecosystems, to determine biodiversity conservation priorities, and to evaluate management needs at the country level. In so doing, they would seek to ensure that there is wide local ownership of, and a sense of pride in, national biodiversity planning processes by natural resource managers and scientists working on biodiversity. Finally, NBGs would assist in catalyzing the implementation of priority conservation activities at the national level.

2.5.2 Biodiversity Country Studies

The lack of existing and available information on the current status and trends of natural resources in Zambia was identified as a major constraint to the NEAP process. The NEAP itself identifies the lack of baseline information on land degradation, and calls for immediate assessment of water, forest, wildlife and fisheries resources and the associated environmental costs of depletion. Recognizing the anticipated growth in manufacturing and industry and associated industrial waste, the NEAP also calls for an audit of industrial wastewater, air pollution and solids. Finally the NEAP identifies the need for improved capacity to carry out inventory and monitoring of the environment. ECZ is appointed to organize a coordinating committee for assessment and monitoring; MAFF, sectoral departments, UNZA and NCSR are identified as key partners in the process.

A Biodiversity Country Study is an assessment of biological diversity, its importance to the national economy, and the range of factors which threaten it. Such a study can provide an important start for a national biodiversity strategy, as well as for plans and programmes developed from the strategy. UNEP has taken the lead thus far in facilitating country studies. The UNEP document *Guidelines for Country Studies on Biological Diversity*

provides a sound overview of the tasks and process of preparing such a study. The tasks include:

- identifying the components of biodiversity important for conservation and sustainable use;
- collecting and evaluating data needed to effectively monitor the components of biological diversity;
- identifying the processes and activities which threaten biological diversity;
- evaluating the potential economic implications of conserving and sustainably using biological resources;
- determining the economic values of biological and genetic resources; and,
- suggesting priority actions for conserving and sustainably using biological diversity.

It is recognized that a national inventory of biological resources and assessment of their conservation status is an enormous task. Initial country studies should concentrate on readily available data, and then focus resources on the gaps. It should not seek to achieve comprehensive coverage through a one-off programme of new research. The country study should be seen as an on-going, evolving process. The initial work should identify and establish a framework for on-going inventory and monitoring, and should include recommendations for storage, maintenance and use of data.

The country study process contributes to the implementation of the CBD in a number of ways:

1. gathering and analyzing data to identify gaps and potential data conflicts (Arts. 6 and 7);
2. formulating strategies and plans based on data (Arts. 6, 10, 11, 12, 13, and 14);
3. implementing strategies and plans (Arts. 6-14)
4. evaluating the effectiveness of action taken against targets set in plans (Art. 7); and
5. reporting to the COP on national measures taken (Art. 26).

2.5.3 National Systems Plans for Protected Areas

Zambia has 19 national parks (NP) covering 6.4 million ha (8.4% of land area) and four bird sanctuaries. 11 of these national parks are greater than 100,000 ha in size; one is over 1 million ha. Game management areas (GMA) cover an additional 16.6 million ha (22% of land area). Zambia also has extensive forest reserves; some of which are designated for watershed protection, but all of which allow some form of harvesting.

The NEAP calls for a review of the national protected area system, and for the immediate development and implementation of management plans for protected areas which are threatened by human encroachment. The lack of existing management plans for many protected areas and for fisheries is identified as a problem.

The development of national systems plans for protected areas is an important element in developing a national biodiversity strategy and responding to the Biodiversity Convention. The need for comprehensive systems plans for terrestrial and marine protected areas was identified as a major priority in the Caracas Action Plan (*Action 1.1.*).

The establishment of most of Zambia's protected area network was not scientifically based. Zambia would benefit from an assessment of how well its protected area system is able to meet its objectives. A first step in promoting more effective management is to conduct such a review, including all categories of protected areas, both private and public, terrestrial, wetland, and marine; the systems plan should also establish linkages with areas used for production of biological resources, such as forestry, and with *ex-situ* activities which contribute to the conservation of biological diversity (botanic gardens, zoos, aquaria, game ranches, seed collections, and gene banks). An essential part of the planning process is "gap analysis", which requires the identification of species or ecosystems not represented.

An effective protected area system plan should:

- be cost-effective;
- ensure representation of major ecosystems and biogeographic regions;
- provide a political mechanism for marketing conservation;
- provide an effective tool for public involvement;
- build commitment from government, private sector, NGO's and local communities (IUCN, 1993b).

2.5.4 Protection of Ecosystems, Threatened Species and Populations

Zambia's NEAP notes that the DNPWS has as its primary objective the management of national parks for the protection of ecosystems and biodiversity. DNPWS is also responsible for the promotion of wildlife utilization as an alternative form of economic land use outside national parks, including local community involvement and private sector participation. The NRD is responsible for monitoring and controlling the management and use of natural resources outside protected areas. MEWD, in consultation with MENR, addresses water management and pollution control.

The NEAP recommends a restructuring of the DNPWS and increased support and promotion of community based wildlife initiatives. Similar recommendations are made for the fisheries, forestry and water sectors.

The NEAP specifically mentions the need to propagate and replenish stocks of endangered and depleted fish species. African elephant is the only terrestrial species recognized by the NEAP in need of similar action. Data held at WCMC suggests there are at least 10 other threatened mammal species in Zimbabwe and as many bird species which are in need of protection. The NEAP also identifies 10 threatened tree species but proposes no specific remedial action for these species.

As regards the control, eradication or prevention of the introduction of alien species (recognized by the scientific community as the second most serious threat to biodiversity after habitat loss), the NEAP only identifies the need to take action to prevent the introduction of exotic fish species.

Zambia's response to the institutional and legislative issues raised above will need to be addressed (ideally) in the course of a National Biodiversity Study, or sectorally in the course of reviews of the individual Acts and government agencies. The development of a protected area system plan should also have as one objective the promotion of the recovery of threatened species.

The management and conservation of Zambia's wetlands should be assessed as a potential priority for Zambia's biodiversity conservation. The conservation of biological diversity outside protected areas should explore opportunities available through a broader understanding of and improved enabling environment for the various indigenous resource management systems in existence. IUCN (1990) has identified the following critical sites and species which should be considered, amongst others, in Zambia's response to the the Convention.

Critical Sites

1. **Luangwa Valley and Lower Zambezi Valley:** A complex of protected areas with diverse habitats including dry mopane woodland on the valley floors and miombo (or *Brachystegia*) woodlands on, and above, the escarpments; as well as important riverine habitats which have hosted big concentrations of large mammals. The protected areas concerned are: the Lukusizi, Luambe, North Luangwa, South Luangwa and Lower Zambezi Valley National Parks, and the Luano, West Petauke, Chisomo, Sandwe, Lupande, Lumimba, Munyamadzi and Musalangu Game Management Areas.

Since the late 1980's, this area has been the target of the Luangwa Integrated Resource Development Project (LIRD), a project aimed at reconciling the human use of part of this area with conservation. In 1994, NORAD agreed to fund the development of a management plan for the South Luangwa Protected Area System.

2. **Kafue River System:** A diverse mosaic of miombo woodlands, grassland, seasonally inundated flood-plains (the Kafue Flats), and swamps. The protected areas are: the Kafue, Lochinvar and Blue Lagoon National Parks, and the Kafue Flats, Sichifula, Mulobezi, Namwala, Mumbwa, Kansonso-Busanga, Lunga-Luswishi, and Machiya-Fungulwe Game Management Areas.

Bangweulu Basin: A set of protected areas concentrated in an area of swamps, floodplains, and miombo woodlands south of Lake Bangweulu. These are: the Kasanka, Lavushi-Manda and Isangano National Parks, and the Mansa, Kalaso-Mukoso, Kafinda, Bangweulu, Chambeshi and Luwingu Game Management Areas. Recommendations have been made for an extension of protection to cover all of the Bangweulu Swamps and part of Lake Bangweulu itself, with an overall management plan covering both a strictly protected national park for a section of the Bangweulu Swamps and a sustained-yield utilization area to ensure the needs of the people and wildlife are reconciled.

The Kafue Flats (Lochinvar and Blue Lagoon) and Bangweulu Swamps (Chikuni) were designated as RAMSAR sites in 1991. A national policy on wetlands is being developed in consultation with DNPWS, ECZ, IUCN, and WWF, yet wetlands are treated only superficially in the NEAP. Kafue Flats and Bangweulu Basin are the subject of a multi-agency projects (Debt-for-Nature funds/ODA/WWF) seeking to

maintain the productivity of wetlands while improving the benefits derived by local people from wetland resources. These projects need to expand from the initial community wildlife management focus to a more holistic approach to the wetlands' ecosystems. EU/IUCN have recently initiated the development of a management plan for the Kasanka National Park.

3. Upper Zambezi: A large area of diverse habitats in the far west of the country, including dry mopane woodland in the southwest, miombo woodland, extensive wetlands and floodplains around the Zambezi River, and the important grasslands of the Liuwa Plain. There are two National Parks, Liuwa Plain and Sioma Ngwezi, and the huge West Zambezi Game Management Area.

DGIS/IUCN are working in the Western Province to develop a proposal for an integrated management plan of the Upper Zambezi wetlands. CIDA is also in the process of developing with IUCN a Zambezi Basin programme aimed at increased information collection and exchange on the goods and services provided by the Zambezi wetlands, monitoring of water quality, and carrying out research on the effects of climate change on the wetlands. The Upper Zambezi, Chobe-Linyanti, and Zambezi Delta are potential pilot sights for programme implementation.

4. Sioma Ngwezi - Mosi-Oa-Tunya: southern Zambia and the protected areas bordering the Caprivi Strip and the Chobe / Zambezi rivers encompass an area of great regional significance. The Caprivi Strip is an important wetland wildlife habitat which is already surrounded by nationally designated protected areas in Angola, Botswana, Namibia, Zambia and Zimbabwe. It is believed to form the core habitat for the Southern African Elephant population and hosts additional important large mammal populations. Over the past 20 years, poaching rings from most of the bordering countries, except possibly Botswana, have operated in this area. Joint or transboundary management could improve the overall management and protection of this habitat and its associated biological diversity. Such management would also contribute to improved management of the water resources, including its fishery resource.

2.6. Global Overlay - The Convention on Biological Diversity and Zambia's NEAP

This concluding portion of the section addressing the Convention on Biological Diversity presents a global overlay or policy matrix setting the principle articles of the CBD against the recommendations set forth in Zambia's NEAP as well as other relevant national action or plans. The final column outlines further action required in Zambia to fulfil its commitments as a party to CBD, which in turn provides the basis for further development of a national GEF Programme.

Convention on Biological Diversity Convention Obligations, Zambia's Response and Identified Needs

Obligations	Response (Direct or Indirect)	Needs / Opportunities/ Action
<u>General Measures (Art. 6)</u>		
<p>1. Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes; and,</p> <p>Integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.</p>	<p>1. Completed both NCS and NEAP. NEAP conducted specifically to review relationship between environment and the existing economic framework and policy measures - with reference to the macroeconomic framework established by the 1990 Policy Framework Paper (PFP). NEAP consistent in recommendation for decentralization and increased local participation in management and decision-making.</p> <p>NEAP notes lack of coordination between Ministries, lack of institutional capacity, and need to rationalize and harmonize environmental legislation.</p> <p>NEAP calls for:</p> <ul style="list-style-type: none"> ▪ MENR to formulate environmental policies, establish a planning unit, and coordinate implementation of the NEAP. ▪ ECZ to designate environmental officers in line ministries (with immediate priority to Ministry of Finance and NCDP) and local authorities. ▪ Natural Resources Department to address conservation across all sectors, in particular conservation and management outside protected areas. ▪ merging of the Departments of Forestry and Natural Resources. <p>NEAP recommends stringent requirement for EIAs as method to improve integration of environmental consideration into plans and programmes.</p> <p>NEAP recommends constitutional amendment identifying the <i>right</i> to a clean and healthy environment of all citizens.</p> <p>NEAP's sectoral recommendations address bio-diversity conservation indirectly; without integration. Little attention to biodiversity conservation outside protected areas.</p>	<p>1. Specific review of NEAP, and sectoral strategies, plans or programmes against the CBD. Findings used to integrate biodiversity conservation concerns comprehensively throughout NEAP, in lieu of drafting a separate National Biodiversity Strategy.</p> <p>Clarify roles of ECZ and NRD with view towards harmonization, and possible integration if appropriate. Action should be taken in step with review of all government institutional structure and environmental legislation. [Also clarify responsibilities and coordination required for endangered species and protected area management (MENR and MHA).]</p> <p>Other plans (e.g. ASIP) do not include consideration of biodiversity. The seed programme, for instance, makes no reference to conservation of genetic resources.</p> <p>Need general capacity building in management planning and implementation in central and local government, and local institutions. Need to involve all ministries and sectors in implementation of NEAP. Creation of National Biodiversity Groups should be considered.</p>

Obligations

Identification and Monitoring (Art. 7)

2. Identify components of biological diversity important for its conservation and sustainable use (with reference to Annex I);

Monitor the identified components of biodiversity, paying particular attention to those requiring urgent conservation measures and those with greatest potential for sustainable use;

Identify processes and categories of activities likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects; and,

Maintain and organize the data derived from the identification and monitoring activities.

Annex I IDENTIFICATION AND MONITORING

1. Ecosystems and habitats: containing high diversity, large numbers of endemic or threatened species, or wilderness; required by migratory species; of social, economic, cultural or scientific importance; or, which are representative, unique or associated with key evolutionary or other biological processes;

2. Species and communities which are: threatened; wild relatives of domesticated or cultivated species; of medicinal, agricultural or other economic value; or social, scientific or cultural importance; or importance for research into the conservation and sustainable use of biological diversity, such as indicator species; and

3. Described genomes and genes of social, scientific or economic importance.

Response (Direct or Indirect)

2. Lack of existing, available information on current status and trends of natural resources identified as a constraint to the NEAP process.

NEAP highlights water pollution/ sanitation, soil degradation, air pollution (Copperbelt), wildlife depletion, and deforestation as five issues with "greatest social cost", although on basis of preliminary analysis of limited data. NEAP review of agriculture specifically mentions lack of baseline data on land degradation

Biodiversity inventory and monitoring not incorporated in the NEAP, although plans for sectoral inventories exist. No requirement for sectoral inventories to capture broad spectrum biodiversity picture. Wetlands programme is an exception- is carrying out multiresource inventory and monitoring.

NEAP calls for:

- ECZ to organize coordinating committee for inventory and monitoring. MAFF, sectoral departments, UNZA and NCSR identified as key actors.

- improved capacity to carry out inventory and monitoring in water, forest, wildlife and fisheries sectors; and for immediate assessment of these resources and the associated environmental costs of depletion.

- natural resource valuation and accounting to determine cost to nation of environmental degradation.

- monitoring of impact of dam developments on habitats / ecosystems.

- an audit of industrial wastewater, air pollution, and solids. Specific mention is given to the need for a database of pollutants and degradation resulting from mining. Little existing data or knowledge of the levels or impacts of these pollutants.

- an inventory of Zambia's natural and cultural heritage to establish a tourism data bank for tourism development plans.

Needs / Opportunities / Action

2. Country Biodiversity Study is a required first step - beginning with identification and review of existing information (sectoral/geographic) and then focusing resources on the gaps. Final product of first phase should identify and establish framework for monitoring. Should also include recommendations for storage, maintenance and use of data. ECZ Coordination Forum should play central role, with possible external assistance to strategic areas of technical need. All external assistance should be geared towards capacity building through assignment of counterparts. Use should be made of graduate and post-graduate students in field work, and data analysis and management.

Concerted efforts should be made to identify the main activities and key factors (institutional, legislative, cultural, etc.) driving the "five major issues with the greatest social cost to Zambia". Remedial action should be taken.

Need personnel training and resources to carry out inventory/monitoring in all sectors.

Obligations

Response (Direct or Indirect)

Needs / Opportunities / Action

In-situ Conservation (Art. 8)

3. Establish a system of protected areas;

Develop / utilize guidelines for the selection, establishment and management of protected areas;

Regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas;

Promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings;

Promote environmentally sound and sustainable development in areas adjacent to protected areas;

Rehabilitate and restore degraded ecosystems and promote recovery of threatened species;

Establish or maintain means to regulate, manage, or control the risks associated with use and release of modified organisms resulting from biotechnology;

Prevent the introduction of, control or eradicate alien species which threaten ecosystems, habitats or species;

Endeavour to provide the conditions needed for compatibility between present uses and the conservation of biological diversity;

3. Zambia has 19 national parks covering 6.4 million ha (8.4% of land area) and four bird sanctuaries. 11 of these NPs are greater than 100,000 ha in size. Game management areas (GMAs) cover 16.6 million ha (22% of land area). Zambia also has extensive forest reserves (10% of land area); some of which are designated for watershed protection, all of which allow some form of harvesting.

Primary objective of DNPWS is management of national parks for the protection of ecosystems and biodiversity. NRD monitors and controls management and use of natural resources outside protected areas. MEWD, in consultation with MENR, addresses water management and pollution control.

NEAP promotes game ranching; Zambia currently hosts 19 game ranches and crocodile farms. NEAP advocates involvement of private sector in management of NPs through joint management concessions.

DNPWS responsible for the promotion of wildlife utilisation as an alternative form of economic land use outside national parks, including local community involvement and private sector participation. building on the ADMAD model and similar models from the region.

NEAP calls for:

- a review of the current protected area system.
- development of management plans for protected areas and immediate implementation where there is threat from human encroachment. Notes problem of lack of existing management plans to PA system and to fisheries.
- harmonization of Tourist Act with National Parks and Wildlife Act, improved conservation by tourism operators, and placement of DNPWS under MENR to separate "regulatory" and "client" institutions.
- development of strategic policy framework with clear objectives for wildlife sector and recommendations for improving legislation, and for review of Agricultural Lands Act, Fisheries Act, etc towards holistic view of natural resource conservation.

Only recommended action regarding the prevention of the introduction of alien species is directed towards exotic fish species.

3. National Systems Plan for Protected Area -

Current protected areas system account for over 40% of Zambia's total land area, yet the designation were not based on an ecosystem approach nor is the protected area system representative of the variety of habitats nor biodiversity. Lack of adequate financial and management resources has resulted in the degradation of approximately 60% of the total protected area.

Gaps in Zambia's in-situ conservation include the following:

- non-game animals and non-commercial trees are not protected;
- forest management emphasizes plantations of exotic species;
- fisheries sector has no established protected system.

The development of a national systems plan for protected areas would begin with an assessment of how well the PA system meets its objectives, with particular attention on gap analysis of species or ecosystems not represented as well as national capacity to manage existing PAs.

Attention should be paid to water basin management, mountain vegetation, breeding areas and spawning sites.

Involvement of local government and rural communities, as well as private sector essential.

Obligations

In-Situ Conservation (Continued)

Subject to national legislation, respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity;

Develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations;

Where a significant adverse effect on biological diversity has been determined, regulate or manage the relevant processes and categories of activities; and,

Cooperate in providing financial and other support for *in-situ* conservation, particularly to developing countries.

Response (Direct or Indirect)

NEAP supports the promotion of IKS and traditional institutions in management, but also call for reduction of power of Chiefs over traditional land and move toward "new property rights regime". Potential conflicts in two processes, including problems posed by shift towards improved land and labour markets in absence of sound natural resource valuation and accounting.

NEAP notes recent increase in tourism development without adequate planning. Such development has particularly lacked attention to social/environmental impacts and influence on other land use. Particular problems areas are Vic Falls, Kariba and South Luangwa National Park.

NEAP identifies the need to rehabilitate disused mines and recommends the establishment of a revolving fund, financed by mining companies to repair environmental damage.

NEAP notes that mining activity causes land dereliction, water and air pollution. Particular attention drawn to Kafue water system, although NEAP reports the water still satisfactory today.

NEAP calls for:

- restructuring of DNPWS and increased community based wildlife initiatives. Similar emphasis on community management approaches in fisheries, forestry and water sectors.
- propagation and replenishment of stocks of endangered and depleted fish species. Elephant is the only terrestrial animal recognized in need of similar action.
- review of Mines and Minerals Act and Petroleum Act to take account of pollution, waste dumps and need for EIAs.
- strengthening of legislation and law enforcement in water, forestry, wildlife and fisheries.

Needs / Opportunities / Action

Work is currently being undertaken to broaden understanding of IKS in the Western Province through a collaborative effort by World Bank, IUCN, MENR, provincial government and Barotse Royal Establishment. Lessons learned should be incorporated in design and implementation of local field projects. Review and revision of policy and legislation required to ensure supporting environment and incentives exist encouraging positive aspects of such IKS. Similar studies and process should be conducted in other areas of country.

10 species of trees endangered - NEAP identified problem but no specific action recommendation to these species.

Existing data suggests Zambia hosts at least 10 threatened mammal species, and as many birds, including Black rhino (*Diceros bicornis*) and Shoe bill stork (*Balaeniceps rex*) respectively, all of which require more stringent protection and habitat conservation measures.

Need government commitment and external human and financial resources to promote recovery programme of degraded NPs, GMAs, and Forest Reserves. Careful planning required to address issue of "illegal" settlements, particularly in forest reserves.

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Ex-situ Conservation (Art. 9)</u>	<p>4. NEAP fails to address ex-situ conservation specifically.</p> <p>Very little of Zambia's botanic diversity known. Ex-situ collections and storage facilities considered inadequate in comparison to its high level of plant diversity. Scarcity of existing human capacity, and new students. Review by Hedberg (1991) suggests Zambia's capacity second poorest in southern Africa, and existing three herbaria fall short of minimum requirements in terms of personnel and equipment.</p> <p>Zambia is host to SADC Gene Bank, established in 1987 with 20 year financial support from Nordic Council (decreasing incrementally after year 10). Objectives are:</p> <ul style="list-style-type: none"> ▪ to assist SADC Member States to establish National Plant Genetic Resource Programmes; ▪ to lobby for inclusion of genetic resource budget in appropriate ministries; ▪ to construct / modify gene bank facilities; and, ▪ to sponsor trainees. 	<p>4. Essential to underwrite in-situ conservation with basic ex-situ conservation strategy due to uncertainty of long-term survival of in-situ sites and their supported species and genetic material. In-situ conservation vulnerable to natural disaster (including global warming), land pressure, and the expense of management and protection. Furthermore in-situ material is less accessible to research.</p> <p>Need investment in facilities, and human resource development with creation of permanent posts for such skilled personnel.</p> <p>Assessment should be carried out of regional ex-situ conservation capacity with an aim to developing comprehensive regional coverage which could initially be funded by a trust fund or endowment.</p>
<p>4. Adopt measures for the <i>ex-situ</i> conservation of components of biological diversity, preferably in the country of origin of such components;</p>		
<p>Establish and maintain facilities for <i>ex-situ</i> conservation of and research on plants, animals and micro-organisms, preferably in the country of origin of genetic resources;</p>		
<p>Adopt measures for the recovery and rehabilitation of threatened species and for their reintroduction into their natural habitats;</p>		
<p>Regulate and manage collection of biological resources from natural habitats for <i>ex-situ</i> conservation purposes so as not to threaten ecosystems and <i>in-situ</i> populations of species; and,</p>		
<p>Cooperate in providing financial and other support for <i>ex-situ</i> conservation outlined above and in the establishment and maintenance of <i>ex-situ</i> conservation facilities in developing countries.</p>		

Obligations

Sustainable Use of Components (Art. 10)

5. Integrate consideration of the conservation and sustainable use of biological resources into national decision-making;

Adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity;

Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements;

Support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced; and

Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources.

Response (Direct or Indirect)

5. NEAP introduction states, "The Government recognizes the need to promote and maintain the welfare of the people by adopting sustainable policies. These must aim to maintain ecosystems, essential ecological processes and the biological diversity of the country. Natural resource use must be sustainable for the benefit of both the present and future population."

The NEAP's action recommendations include:

- i.) integrate EIA's in development planning;
- ii.) strengthen environmental regulatory capacity;
- iii.) review and reform property rights;
- iv.) build capacity for natural resource valuation and accounting;
- v.) review and revise impact of incentives inherent in existing economic framework on environment; and,
- vi.) decentralization or decision-making, and increased private sector and community participation.

NEAP also identifies waste disposal (all sources), including run-off and leaching, as well as agricultural extensification, poor livestock and fisheries management and poor protected area enforcement (national parks and forest reserves) as areas where remedial action are required to minimize adverse impacts on biological diversity.

As noted above, under *In-Situ Conservation*, government recognizes the role of customary use of biological resources, but potential conflict exists in plans to shift towards new property rights regime. NEAP advocates promotion of local food crop varieties, including breeding research and better marketing.

Needs / Opportunities / Action

5. Focus needs to be given to building or supporting local community institutions and capacity. Decentralized approach critical in light of limited human and financial resources within central government. In this regard, particular attention should be given to:

- education and awareness (in local languages);
- information assessment and collection required for local decision-making;
- transfer of necessary technology and / or materials;
- organizational or administrative support; and,
- financial assistance.

To secure sustainable use of components of biodiversity at local level and by private sector need to ensure a supporting environment created by national laws, institutions and policies. Therefore necessary to:

- identify and amend exiting national laws, institutions and policies which promote conflict, competition and disenfranchisement;
- identify customary uses and traditional knowledge compatible with conservation or sustainable use requirements;
- establish mechanisms for effective community participation in management decisions which affect them, such as establishing a protected area; and,
- strengthen community level institutions.

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Incentive Measures (Art. 11)</u>		
<p>6. Adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.</p>	<p>6. NEAP call for review and revision of existing incentive structure in national and local economies, with particular attention drawn to incentives facing agricultural sector and rural communities.</p> <p>NEAP advocates the granting access to user rights to wildlife to land holders.</p> <p>NEAP calls for the immediate review and revision of forest producer fees (including stumpage, charcoal and concession fees) to reflect real and environmental costs.</p> <p>NEAP also calls for review and revision of fish levies in order to ensure management cost recovery and to encourage community participation in sustainable management of the resource</p> <p>In addressing energy, industry and pollution, NEAP calls for review of electricity tariffs, review and creation of incentives to promote adoption of non-polluting energy sources, and clean technologies, particularly in mining.</p>	<p>6. Need to review existing incentives, both direct (i.e. credit facilities, user rights, ownership, technology transfer, etc.) and indirect (i.e. taxes and subsidies, debt-for-nature, public education or technical assistance).</p> <p>To develop effective incentive structure, it is necessary to understand causes of biodiversity loss. Incentive mechanism(s) must be anchored in legislation, and flexible to changing conditions.</p> <p>The development of an appropriate incentive structure will be an iterative process; monitoring its impacts is essential to ensuring appropriate modifications take place.</p>

Obligations

Response (Direct or Indirect)

Needs / Opportunities / Action

Research and Training (Art. 12)

7. Establish and maintain programmes for scientific and technical education and training in measures for the identification, conservation and sustainable use of biological diversity and its components and provide support for such education and training for the specific needs of developing countries;

Promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, and,

In keeping with the provisions of Articles 16, 18 and 20, promote and cooperate in the use of scientific advances in biological diversity research in developing methods for conservation and sustainable use of biological resources.

7. ECZ appointed to organize coordinating committee for inventory and monitoring. MAFF, WAD, FD, UNZA and NCSR identified as key actors in such research and work.

NEAP calls on MAFF to strengthen its research and capacity to conserve crop genetic diversity, and identifies need for research on livestock management, animal health and tsetse control by DVTC. NEAP also notes complementary roles of NCSR (Livestock and Pest Research Unit) and UNZA (Departments of Animal Science and Crop Science).

Key research activities identified in the NEAP include:

- ▶ water resources of Kafue basin
- ▶ indigenous forest management
- ▶ wildlife management
- ▶ fisheries inventory and monitoring
- ▶ mining resource recovery and mined land reclamation
- ▶ air and water quality control in mining areas
- ▶ renewable sources of energy

NEAP also notes the need to strengthen management capacity in forestry, wildlife and fisheries.

7. Lack of adequate trained manpower is one of the most serious problems limiting natural resource research, particularly botanical, in Zambia. Need both basic and applied research at sectoral and national levels.

UNZA and Copperbelt University should seek to expand their research and training capacity and opportunities.

Key first step is documentation of national biodiversity with the objective of identifying the valuable and threatened species and varieties. This should be followed by monitoring of the status and trends of habitats/ecosystems and the application of such knowledge in assisting local government and local communities to identify sustainable land use options.

Additional research should focus on the development and experimentation of new and more productive land use practices which minimize the loss of biodiversity. Complementary research is required to identify markets for broader range of cultivated and wild products, and efficient means to secure profits from such markets.

Should also assess and model how conservation directed at species and populations affects conservation status of ecosystems.

Due to necessity for such scientific and technical capacity to implement conventions and identify priority, cost-effective projects, GEF funding is appropriate for investments outlined above.

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<p><u>Public Education and Awareness (Art. 13)</u></p>		
<p>8. Promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media, and the inclusion of these topics in educational programmes; and</p> <p>Cooperate, as appropriate, with other States and international organizations in developing educational and public awareness programmes, with respect to conservation and sustainable use of biological diversity.</p>	<p>8. NEAP states that "a comprehensive conservation education programme is a major requirement for a successful NEAP; unless people are aware of their own environment, efforts to conserve the environment may be worthless."</p> <p>NEAP notes that the Ministry of Education is responsible for the integration of environment education in schools. NEAP identifies need to promote awareness amongst the business and informal sectors. Suggests possible role for a National coordinating committee, comprising all relevant ministries and NGOs, under ECZ Education Unit.</p> <p>NGOs and CBOs are highlighted for potential capacity to carry out education and awareness programmes.</p> <p>NEAP notes capacity programmes in education and awareness should be introduced where appropriate.</p> <p>NEAP calls for:</p> <ul style="list-style-type: none"> ■ sectoral departments to strengthen their extension services and community involvement. ■ comprehensive environmental education programme targeting government leadership, private sector, teacher programmes, Universities, secondary schools, NGOs and CBOs on down to rural poor. The education should focus on those priority environmental issues identified in the NEAP. ■ incorporation traditional knowledge systems - not rely on modern education. ■ establishment of Institute of Environment at UNZA to carry out research and training in line with NEAP and to promote collaboration with industry. A scientific and technical research fund should be established to support topical research. ■ strengthening of non-formal education programmes. 	<p>8. Partnership between teachers, NGOs and national ministries of education and environment should develop national curricula which:</p> <ul style="list-style-type: none"> ■ emphasizing biodiversity's contributions to community health and welfare; ■ emphasizing biodiversity's contributions to the health of ecosystems; and, ■ linking ecological, economic, and social themes together. <p>In this regard, progress can be built on the programmes currently being run by WWF and WCSZ, particularly WWF's <i>Zambian Environmental Education Programme</i>.</p> <p>Attention must also be given to informal education using different media and languages for target appropriate groups, be they politicians / civil servants, business representatives, consumers, or local communities.</p> <p>Regional links can be achieved through, for instance, IUCN's regional communicating the environment programme or fostering efforts to develop primary and secondary school involvement in monitoring the Zambezi river basin.</p>

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Impact Assessment, etc. (Art. 14)</u>		
<p>9. Introduce appropriate procedures requiring EIA's of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures;</p>	<p>9. NEAP articulates need for EIAs throughout and refers to coordination, enforcement and evaluation role of ECZ as stipulated in EPPCA. NEAP specifically refers to need for EIAs in forest reserves and protected areas prior to issuing grants for mining, fishing, tourism, logging and roads; and the need to charge deposits against inadequate rehabilitation of sites.</p>	<p>9. Capacity-building within ECZ required to fill role, as well as public education on new legislation's intent and practical process.</p>
<p>Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies are duly taken into account;</p>	<p>NEAP advocates review of legislation to <i>Town and Country Planning Act, Tourism Act, Mines and Minerals Act, Petroleum Act, etc.</i>, to ensure EIA's are required and enforced consistently.</p>	<p>ECZ/IUCN have developed National Environmental Assessment and Planning Programme proposal. Yet to secure financing. DGIS and CIDA potential donors.</p>
<p>Promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate;</p>	<p>CIDA currently supporting planning capacity in ECZ which includes assistance in development of Environmental Assessment Policy. Draft EA Policy has been developed.</p>	
<p>In the case of imminent or grave danger or damage, originating under its jurisdiction or control, to biological diversity within the area under jurisdiction of other States or in areas beyond the limits of national jurisdiction, notify immediately the potentially affected States of such danger or damage, as well as initiate action to prevent or minimize such danger or damage; and</p>	<p>NEAP notes that there is currently no requirement for EIAs in mining operations. Recommend this be addressed as well as hydropower and fossil fuel operations.</p>	
<p>Promote national arrangements for emergency responses to activities or events, whether caused naturally or otherwise, which present a grave and imminent danger to biological diversity and encourage international cooperation to supplement such national efforts.</p>	<p>NEAP calls for an assessment of rural and urban woodfuel consumption and the environmental impact of its use.</p>	

Obligations	Response (Direct or Indirect)	Needs / Obligations / Action
<p><u>Access to Genetic Resources (Art. 15)</u></p> <p>10. Recognizing the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.</p> <p>Create conditions to facilitate access to genetic resources for environmentally sound uses by other Contracting Parties and not to impose restrictions that run counter to the objectives of this Convention.</p> <p>Develop and carry out scientific research based on genetic resources provided by other Contracting Parties with the full participation of, and where possible in, such Contracting Parties.</p> <p>Take legislative, administrative or policy measures, as appropriate, and in accordance with Articles 16 and 19 and, where necessary, through the financial mechanism established by Articles 20 and 21 with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources. Such sharing shall be upon mutually agreed terms.</p>	<p>10. Not addressed in NEAP.</p> <p>No readily available examples of other nations / companies sharing the benefits of utilization of Zambia's genetic resources with the Zambia.</p> <p>Pharmaceutical exploitation the most common cause of complaint due to lack of fair sharing.</p>	<p>10. Develop a uniform policy on genetic resource access issues.</p> <p>Establish a proper and binding legislation regarding collection and utilisation of biological resources for research and commercial use. Such an instrument should also address the question of mutually agreed terms, prior informed consent (PIC), equitable sharing of research and development results and commercial and other benefits arising from the use of the genetic resources.</p> <p>Ensure customary and other local uses are not impeded by extension of intellectual property rights to non-Zambian breeders or inventors.</p>

Obligations

Access to and Transfer of Technology (Art. 16)

11. Provide and/or facilitate access for and transfer to other Contracting Parties of technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources and do not cause significant damage to the environment.

Access to and transfer of technology to developing countries shall be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms where mutually agreed.

Take legislative, administrative or policy measures, as appropriate, with the aim that Contracting Parties, in particular those that are developing countries, which provide genetic resources are provided access to and transfer of technology which makes use of those resources, on mutually agreed terms.

Take legislative, administrative or policy measures, as appropriate, with the aim that the private sector facilitates access to, joint development and transfer of technology for the benefit of both governmental institutions and the private sector of developing countries and in this regard shall abide by the obligations included above.

Ensure that intellectual property rights are supportive of and do not run counter to its objectives.

Response (Direct or Indirect)

11. NEAP calls for clean mining technology and effective industrial waste treatment technology. In both regards there is a need for both the hard technology itself, as well as the capacity to operate, maintain and further develop it.

NEAP also recognizes the technological value of the country's community-based natural resource management systems and the potential export of this technology.

Sectoral plans and programmes promoting utilization of sustainable technologies and techniques in production.

Most 'hard' technology or capital equipment transfers funded through traditional development assistance. No evidence of 'fair and favourable' exchanges of appropriate technologies within private sector.

Needs / Opportunities / Action

11. Seek access to and transfer of appropriate and safer technologies on favourable, concessional and preferential terms relevant to the conservation and sustainable use of biological diversity. In addition, efforts should be made to develop modern, traditional or indigenous technologies which can assist to fulfil the goals of the Convention.

Broad objective above requires following facilitating measures:

- tax and other economic incentives encouraging imports;
- review and possible revision of foreign investment rules;
- trade assistance and grants;
- expanded intellectual property rights protection;
- collaborative research and development arrangements; and possibly,
- establishing national or regional technology clearing house mechanisms (and possibly technology transfer advisory group).

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Exchange of Information (Art. 17)</u>		
<p>12. Facilitate the exchange of information, from all publicly available sources, relevant to the conservation and sustainable use of biological diversity, taking into account the special needs of developing countries.</p> <p>Such exchange of information shall include exchange of results of technical, scientific and socio-economic research, as well as information on training and surveying programmes, specialized knowledge, indigenous and traditional knowledge as such and in combination with the technologies referred to in Article 16, paragraph 1. It shall also, where feasible, include repatriation of information.</p>	<p>12. Not addressed in NEAP.</p> <p>Existing institutions/organizations which could facilitate the exchange of information include SADC (esp. SADC ELMS and SADC FFW), IUCN Regional Office for Southern Africa, and the Southern African Research and Documentation Centre - Environment Resource Centre.</p>	<p>12. The Southern African Regional Biodiversity Workshop held in Bulawayo, Zimbabwe, March, 1993, proposed the establishment of a regional forum to promote collaboration among the SADC member states on biodiversity conservation.</p> <p>The Workshop Resolutions suggest such a forum should be a SADC functionary coordinated by IUCN, and that it should assist in securing funding for biodiversity programmes, training and the establishment of a regional biodiversity information network.</p> <p>The Workshop Resolutions also called for linkages with UNESCO, GEF, UNEP, UNDP, IUCN's Commissions, and international NGOs.</p>

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Technical and Scientific Cooperation (Art. 18)</u>		
<p>13. Promote international technical and scientific cooperation in the field of conservation and sustainable use of biological diversity, where necessary, through the appropriate international and national institutions.</p> <p>Promote technical and scientific cooperation with other Contracting Parties, in particular developing countries, in implementing this Convention, inter alia, through the development and implementation of national policies. In promoting such cooperation, special attention should be given to the development and strengthening of national capabilities, by means of human resources development and institution building.</p> <p>Encourage and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies, in pursuance of the objectives of this Convention. For this purpose, the Contracting Parties shall also promote cooperation in the training of personnel and exchange of experts.</p> <p>Promote the establishment of joint research programmes and joint ventures for the development of technologies relevant to the objectives of this Convention.</p>	<p>13. Not covered in NEAP.</p>	<p>13. External technical and scientific cooperation requested to assist it with the implementation of the Convention. Such cooperation should aim at developing and strengthening national capabilities by means of human resources development and institutional building.</p> <p>Regional biodiversity forum discussed above could facilitate such cooperation and exchange.</p> <p>Government policies and legislation should encourage development of scientific and technical cooperation.</p>

Obligations	Response (Direct or Indirect)	Needs / Opportunities / Action
<u>Handling of Biotechnology and Benefits (Art. 19)</u>	14. Not covered in NEAP.	14. Establish guidelines pertaining to the safe handling of biotechnology especially the handling of living modified organisms and other alien species provided by other Parties.
14. Take legislative, administrative or policy measures, as appropriate, to provide for the effective participation in biotechnological research activities by those Contracting Parties, especially developing countries, which provide the genetic resources for such research, and where feasible in such Contracting Parties.		Ensure legislation and procedures in place to secure benefits from collaborative research <i>within</i> Zambia wherever feasible, to support training and involvement of local researchers and transfer of hard technologies.
Take all practicable measures to promote and advance priority access on a fair and equitable basis by Contracting Parties, especially developing countries, to the results and benefits arising from biotechnologies based upon genetic resources provided by those Contracting Parties. Such access shall be on mutually agreed terms.		Zambia should support the establishment of a Protocol on Biosafety.
The Parties shall consider the need for and modalities of a protocol setting out appropriate procedures, including, in particular, advance informed agreement, in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that may have adverse effect on the conservation and sustainable use of biological diversity.		
Each Contracting Party shall, directly or by requiring any natural or legal person under its jurisdiction providing the organisms referred to in paragraph 3 above, provide any available information about the use and safety regulations required by that Contracting Party in handling such organisms, as well as any available information on the potential adverse impact of the specific organisms concerned to the Contracting Party into which those organisms are to be introduced.		

Obligations

Response (Direct or Indirect)

Needs / Opportunities / Action

Financial Resources (Art. 19)

15. Provide financial support and incentives in respect of those national activities which are intended to achieve the objectives of this Convention, in accordance with its national plans, priorities and programmes.

Developed country Parties shall provide new and additional financial resources to enable developing country Parties to meet the agreed full incremental cost to them of implementing measures which fulfill the obligations of the Convention and to benefit from its provisions.

Developed country Parties may also provide, and developing countries avail themselves of, financial resources related to the implementation of this Convention through bilateral, regional or multilateral channels.

Effective implementation of this Convention depends on developed countries fulfilling their commitments related to financial resources and technology transfers.

15. NEAP proposes the establishment of a revolving fund under ECZ to be financed by mining companies to repair emergency environmental damages caused by mining.

Otherwise sources of financial resources not explored in the NEAP.

15. It is recognized that many of the obligations set forth in the CBD are being met or have been addressed in the NEAP. Therefore, many of the actions to be taken up by Government and those to be presented for subscription to the Donors in the EIP will be of relevance to the CBD.

Therefore, with reference to this Article, it is recognized that the funding of activities of particular relevance to the CBD, such as the implementation of country studies, national strategies, critical site or species protection, etc. may be eligible for additional funding specifically earmarked for this Convention, such as the GEF, and efforts should be made to secure such funding.

More generally, it is recognized that adequate financial resources are available for properly defined environmental projects which are supported by an enabling policy and legislative framework. However, information on and coordination of the various sources of funding is poor and should be taken up by the ECZ Coordination Forum.

Lessons must be drawn from the collapse of several projects following the conclusion of external financial assistance. Financial (as well as institutional and structural) sustainability of projects must be assessed and secured. There is a need to design and test effective financial frameworks to ensure the sustainability of projects initiated with external financing, including both site specific conservation trust funds as well as national environmental funds.

3.0 The UN Framework Convention on Climate Change (UNFCCC)

3.1. Background

The United Nations Framework Convention on Climate Change (UNFCCC) was signed by 156 nations at the UN Conference on Environment and Development in Rio de Janeiro, June 1992. The fiftieth country (Portugal) ratified the convention on 21 December, 1993 and the convention came into force on 21 March 1994. As of 30th August, 1994, 93 countries had ratified the Convention, including Zimbabwe (03.11.92), Zambia (28.05.93), Botswana (27.01.94), and Malawi (21.04.94) in southern Africa.

The developed countries which are party to the convention were to submit their first national communications outlining their programmes and policies for implementing the Convention by September 94. The first Conference of the Parties (COP) will meet from 28 March - 7 April, 1995 in Berlin initiating the implementation of the treaty.

While the number of countries ("parties") ratifying the convention is steadily increasing, the International Negotiating Committee (INC) which drafted the convention has met on a regular basis to work out the many practical details which remain undefined in the treaty. The last and the 11th session of the INC was held in New York in early February before the first COP.

3.2 Observations, Issues and Implementation of the UNFCCC

The central objective of the UNFCCC is "to achieve...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

The FCCC is a consensus building instrument and recognises the common but differentiated responsibilities of all Parties. The convention also recognises sovereign rights of nations over their natural resources. The climate convention further sets up commitments with appropriate machinery for implementation which range from national to global levels.

The Convention is weak in its failure to set specific targets for the reduction in the emission of the greenhouse gases. This is due to the uncertainties and lack of knowledge which still remain in some of the climate change issues.

The commitments in the Convention fall under the following broad themes:

- Developing, updating and publishing of national inventories of GHG.
- Adopting mitigating measures
- Climate change impact assessment
- Adaptation to climate change
- Scientific research in areas of inadequate understanding
- Education, training and public awareness

Under the UNFCCC, the major responsibility for technology transfer, financial resources and expertise falls on the developed countries. The specific needs of the developing countries (which are also predicted to be the most vulnerable to climate change) are

recognized in the convention and the development targets of these countries need not be sacrificed.

An important concept of *Joint Implementation (JI)* was proposed by the Norwegian delegation in the UNFCCC. Its definition and proposed implementation is being closely debated in academic, government and business circles. JI has been used to describe a wide range of possible arrangements between countries that are Parties to the UNFCCC. These cooperative arrangements may lead to projects that either reduce the emissions of greenhouse gases or increase their terrestrial or oceanic sinks. In the future it is possible that participating countries will be allowed to share the resulting "greenhouse credits" according to rules that would be set by the international community.

The concept of JI was originally viewed with skepticism by a number of countries and no operational definition could be agreed during the negotiations. As a result, the Convention offers no specific guidance on the meaning and application of JI and leaves it to the COP to set the rules.

The most widely recognised benefit of JI is its potential to limit global emissions of greenhouse gases at the lowest possible overall cost. This could occur because the cost and extent of opportunities for reducing emissions or enhancing sinks varies among countries and across regions. A JI regime would encourage one country to underwrite emissions-reduction activities in another country when the per tonne cost is lower than what the investing country could realise within its own borders. Many developing countries have however expressed reservations about the concept. They fear it could become a loop-hole allowing developed countries to avoid tackling their own emissions. The second potential benefit of JI is its presumed ability to influence the direction of private capital flows. The third set of benefits includes the potential to accelerate technology development and to encourage the co-development of new applications for existing technologies.

3.3 Current Programmes and Activities in Convention Related Issues

Climate change is an issue whose importance has been widely recognised only recently in Zambia. Zambia hosts no institution offering formal training, education, research, development, application, or awareness opportunities in this field. As a result there is a serious national deficiency in human and institutional capabilities. In spite of this, a few national and individual scientific activities have been initiated.

3.4.1 Country Studies on Climate Change

Such studies are required for all the Parties under Article 4(a) of the UNFCCC. Two such studies are underway. One of the studies is being implemented by the Ministry of Energy and Water Development (MEWD) with the financial support of the GTZ. The main objectives of the study are to establish an inventory of greenhouse gas emissions in Zambia, to identify technological options for reducing the emission of these gases and to assess the cost (through building abatement cost curves) of carrying out activities for reducing the emissions.

The other study is being funded by the U.S. government under the U.S. Country Studies Programme to address climate change. It is being implemented by the Environmental

Council of Zambia. This study includes the study of the vulnerability of Zambia to climate change.

Both studies involve multidisciplinary teams of researchers from several national institutions like UNZA, Meteorological Department, Energy Department and the Environmental Council of Zambia. These studies are the first of their kind in Zambia, and are being implemented worldwide in response to the requirement of Article 4 (a) of the UNFCCC with financial support from the developed nations and the international organizations.

Both studies will last for about one year each. Zambia will require further investment to ensure the necessary expertise exists in the country for periodically updating and refining the country study and report as required under the UNFCCC.

3.4.2 WWF/CRU Regional Study of Climate Vulnerability in Southern Africa

This project is funded by WWF International and coordinated from the Climatic Research Unit at the University of East Anglia. Scientists from Europe and SADC countries are working together towards the development of a detailed regional review of the possible impacts of greenhouse induced climate change. The context for undertaking this regional study is the UNFCCC. The project aims to achieve the following objectives:

1. Publication of a detailed African regional review of potential impacts of greenhouse induced climate change using General Circulation Models, the latest Intergovernmental Panel on Climate Change (IPCC) data and partially dynamic vegetation models;
2. Input to the Second IPCC Scientific Assessment and to the first Conference of the Parties to the UNFCCC in April 1995;
3. Generate and provide planning information for SADC countries to use in the preparation of their national climate strategies (as required under UNFCCC).
4. Provide necessary information for the long-term planning of conservation strategies in the SADC region.

The project is focussing on a vital issue facing the SADC region, viz., the impact of climate change. It has arisen in direct response to the obligations in the UNFCCC and will help in filling a large void of knowledge. However, the above is a one year study which is primarily being conducted by an outside institution with the help of a few local experts. The provision for training is highly inadequate - merely two candidates from the whole of SADC region for 3-4 months each at the U.K. Therefore there is little chance to sustain and pursue such studies meaningfully in the future from within the region unless an institutional infrastructure with international links is created for constant training and capacity building.

3.4.3 Drought Monitoring in Eastern and Southern Africa

Under the UNDP/WMO RAF/88/044 project, two drought monitoring centres (DMCs) were established in Harare and Nairobi in 1989. Their functions are to produce and disseminate agrometeorological products necessary to control drought and desertification. The

products issued by the DMCs primarily attempt to satisfy the needs of National Meteorological Services (NMS) in their effort to produce specialised drought-related agrometeorological and hydrological reports and forecasts. These products also assist regional institutions, international organizations and donors in their activities related to food production in the region. The DMCs also serve to strengthen NMS capabilities to produce and provide meteorological, agrometeorological and hydrological products to the various national users.

The potential products from the DMCs in the near-term are: enhanced satellite derived rainfall map, satellite-derived vegetation index, moisture stress index map, rainfall probability map and the intertropical convergence zone (ITCZ) map. The long-term products include El Nino - Southern Oscillation (ENSO) watch, rainfall, rainfall estimation for watersheds, satellite-derived thermal field map, geographic information system (GIS) map and crop yield forecasts. The DMCs publish a monthly bulletin "Drought Monitoring".

3.4.4 Energy Efficiency and Alternative Energy Programmes

Energy programme at the National Council for Scientific Research (NCSR)

The objective of this programme is to provide alternative sources of energy, and increase efficiency in energy use so as to reduce the use of traditional fuels like firewood. The programme started in 1981 and consists of three projects: (i) Coal briquette, (ii) Clay stove, and (iii) Biogas.

The coal briquette project is meant to provide additional sourced of energy to replace the use of charcoal. The project is being funded by JICA (Japan). The briquettes are made out of 95% coal slurry and 5% agricultural waste (saw-dust and bagasse) to enhance combustion. These are carbonized and desmoked to render the briquettes smokeless. Following the initial laboratory tests, a pilot plant was built in 1987. The pilot plant has been successful in producing coal briquettes. Maamba Collieries has conducted feasibility studies and is now expected to construct a plant for producing coal briquettes commercially. The Japanese equipment is very expensive and other countries suppliers, such as China, are being explored for acquiring the necessary equipment.

The clay stove project aims to improve the efficient burning of coal briquettes. The briquettes require high concentrations of air, and therefore the traditional "mbaula" stove is not suitable. The clay stoves provide one window for air control, and is more efficient in charcoal burning as well. The project has been successful at the demonstration stage and is ready for commercial production.

The biogas project is being funded by NORAD. Pig and cattle manure is used to produce methane gas which can be used for household cooking and lighting purposes, thus reducing the need for firewood in rural areas. The digested material serves as a good fertiliser. About 10 biogas digesters have been built around the country and their utility established. There remains the problem of its large scale dissemination. Training of trainers is required for building and maintaining the plants. Services of sociologists are required for helping in tackling some of the problems associated with social acceptability.

Charcoal stove project at the DOE

The objective of this project is to disseminate the use of more efficient charcoal stoves

throughout Zambia in order to reduce the consumption of fuelwood. The project has received intermittent funding from NORAD, YMCA, DOE, DANIDA and the Dutch government. The efficiency of the improved charcoal stove ("mbaula") is claimed to be about 30% in contrast to the ordinary stove with an efficiency of 8-10%. Artisans in compounds and market places have been trained to manufacture these stoves. Women have been trained on the best procedure of cooking. However, the lack of funding is inhibiting further progress of the project. A mechanism for making it self-sustaining is required.

3.4.5 Activities in Forestry

Forests provide a major sink for carbon dioxide, besides being very important for the socio-economic development of the country. A number of activities are on-going in this sector. Zambia Forestry Action Plan is the largest forestry programme which is due to start with support from UNDP, Finnish government and the Dutch. Under this programme, different issues in the forestry sector, such as capacity building, project identification and forest management, will be addressed.

Forest inventory is critical to any forest management. Zambia's last comprehensive forest inventory dates back to the late 1950s to early 1960s. There is no up-to-date harmonized inventory - different provinces and districts have their own ways of doing it. A national level system is required.

Teak wood forests are important for Zambia in various ways. Being located in sensitive ecosystems, they help in stopping desertification and are important in regulating the flow of the Zambezi river. JICA is funding an inventory of teak forest in the South-Western part of Zambia. This will result in a management plan; the implementation of which will subsequently be taken up by the Forestry Department with support from GTZ.

Reforestation programs have not been successful. Involvement of people and adequate incentives for their involvement are required. The national tree planting programme aimed to plant 20m seedlings per year. However, only 10m trees have been planted since 1985. The Soil Conservation and Agro Forestry programme works with farmers in collaboration with MAFF and the regular extension system. Only 80 ha of fuelwood plantations have been established around urban areas since 1980.

3.4.6 Development of Alternative Crops

Agriculture is one of the most vulnerable sectors to climate change. A number of programmes have been initiated to develop alternative drought resistant crops and varieties. Over the last few decades, there has been a shift of food habits from the traditional crops of sorghum and millet, which are drought resistant, to maize which is quite vulnerable to heat. This has resulted in declined productivity in traditional crops and decreased food security of the nation.

The Sorghum and Millet Improvement Program started in 1983/84 with the financial support from SIDA. Sorghum and millet are traditional crops of Zambia. The overall goal of the project is to develop alternative cereal crops for the areas that are marginal in the production of maize and have perennial food deficits. The programme is based on a multidisciplinary approach to research, involving breeding, agronomy, pathology and entomology. The team has produced well adapted indigenous cultivars of sorghum, pearl

millet and finger millet for different agro-ecological regions of the country.

Besides these programmes, the Oil Seed Improvement Programme, funded by Belgium and FAO, is developing such crops as sunflower, soya-beans and groundnuts. The Root and Tuber Research Team is based at the research station at Solwezi, Mutanda, and the FAO assisted Green Legume Programme is dealing with groundnuts and beans.

The SADC Regional Genebank Programme is providing support to every crop improvement programme. It is involved in the collection, maintenance, preservation, cataloguing and utilisation of old and existing germ plasm in the region through support to National Gene Banks.

3.4.7 Capacity Building in Energy and Environmental Physics in Zambia

This project is on-going at the Physics Department of the University of Zambia. Financial support is being provided by SIDA. The project seeks to develop facilities and introduce, for the first time, new courses at the undergraduate and the post-graduate levels on climate change and renewable energy sources. The project was launched recently in August 1994 and aims to provide formal training through the introduction of the following courses:

- (i) Physics of Renewable Energy Resources and Environment
- (ii) Physics of the Atmosphere and Climate Change
- (iii) Solar Energy and Applications

The project also involves the development of an Energy and Environmental library and a climate research lab. This is perhaps the first serious attempt at capacity building through an existing formal infrastructure, viz, the University of Zambia. However, the study is limited in its scope. Being implemented at the physics department, it is looking at these topics through a physicist's point of view. Climate change in fact requires an interdisciplinary approach which is lacking in this project. The role, responsibilities and structure for an interdisciplinary Institute for Energy and Environment in Zambia should be explored.

3.5 National Environmental Action Plan (NEAP) and the UNFCCC

The NEAP has attempted to cover the local, provincial and national issues quite comprehensively, but is deficient on international conventions including the UNFCCC. NEAP has adopted a sectoral approach while UNFCCC is issue based and cross-sectoral. The issues of greenhouse gases and global warming are touched in the NEAP but there is no linkage with the UNFCCC nor any mention of the issue of climate change, its impacts nor related policy issues. This fact enhances the importance of the current study as this should complement the NEAP by providing a global overlay to the NEAP.

NEAP does not mention the national inventory of the greenhouse gases emissions sources and sinks (which is required by Article 4 (a) for all Parties to the UNFCCC) nor the detailed study of the impacts and options for mitigating and or adapting to climate change. The issue of the adaptation to environmental impacts has been addressed briefly in the agriculture section wherein it notes that:

"the past overemphasis on the promotion of hybrid high yielding varieties, especially maize and exotic animal breed, through research and commodity extension service has increased the vulnerability of these crops and livestock to natural disasters, such as disease, drought and pest outbreaks and has contributed to the erosion of the genetic diversity, through lack of promotion of local breed and crop varieties. The MAFF should reverse this trend by strengthening research and capacity to conserve crop genetic diversity, including wild relatives of cultivated crops".

The impacts of climate change on other vital sectors, in particular water resources, which are responsible for 94% of the nation's electricity production, as well as the maintenance of important ecosystems and health remain unaddressed.

Environmental education and capacity building at the tertiary level and awareness creation have been addressed in the NEAP recommendation for the creation of an Environmental Institute at UNZA.

NEAP identifies the principal sources of the emission of carbon dioxide - the most important greenhouse gas - as:

- (i) burning of fuelwood (firewood and charcoal) as a source of energy
- (ii) use of fossil fuels (oil and coal)

In addition to the emission of carbon dioxide, fuelwood burning exposes the users to direct health hazards through smoke and harmful gases like carbon monoxide. The excessive use of fuelwood is identified as a primary causes of deforestation which plays an important role in the socio-economic development of the nation. The suggested strategy for woodfuel is to reduce and ultimately replace its use by alternatives. Among the suggested actions in the NEAP to decrease the use of woodfuel and fossil fuels are:

- (a) Review of levies to reflect material and environmental cost,
- (b) Improve the efficiency of energy utilisation,
- (c) Expansion of household electrification where grid extension viable,
- (d) Promoting the use of new and renewable sources of energy,
- (e) Increasing public awareness about the health and environmental effects of woodfuel burning, and,
- (f) Use of technologies which reduce emissions from fossil fuels.

NEAP does not address the emission of the other important greenhouse gases, such as methane and nitrous oxide. In Zambia, the potential sources of the emission of methane include oil processing, storage and transportation, biomass burning, coal mining and sewage and waste water treatment plants.

3.6 Gaps, Deficiencies and Policy Measures

Unlike some other environmental issues, climate change has some peculiarities which must be accounted for in drawing up an appropriate strategy. Environmental problems due to water pollution, waste disposal and air pollution from smoke, for example, are easily seen and appreciated by naked human senses. Climate change is quite different. It is only

through detailed and painstaking scientific investigations that one can develop meaningful insight into this problem. In contrast to some of the environmental problems where one generally reacts to tangible signals, climate change requires anticipation in prevention and action. For the same reason, the field is highly technical, requiring high level human and institutional capacity to appreciate it in depth and participate in meeting its challenge. Lastly, climate change has long-term implications and requires long-term planning and commitment. The issue is truly interdisciplinary in nature and therefore requires an interdisciplinary approach involving agriculturists, economists, natural scientists and social scientists.

3.6.1 National Inventory of Greenhouse gases

A national inventory of greenhouse gases is an important commitment on all Parties. It is mandatory to update, refine and publish these studies. Currently there are serious gaps in the acquisition and availability of the data which is required for this study in Zambia. For example, there is no homogenized system of forest inventory at national level. As a result the rate of deforestation is not known accurately. Technology and end use based data for consumption of fossil fuels is not available for accurate GHG monitoring and assessment. Country specific emission factors are required for accurate compiling of national GHG inventories; no work is being done in this direction. All these gaps need to be filled up by more human capacity building, and by undertaking relevant research. This should be done by the MENR, MEWD and the ECZ through proper coordination and liaison with the CSO. The proposed IEE could be involved in such research work.

3.6.2 Mitigation/Abatement

Mitigation measures form the backbone of the Convention because these measures ensure a decrease in the rate of onset of climate change. However, Zambia is a developing country; its developmental goals must not be compromised in developing an abatement strategy. GHG studies started recently in some countries including Zimbabwe. In Zambia, this study is due to be conducted under the GTZ/MEWD and US/ECZ country studies. The following discussion will be based on preliminary information and experience from different sources. Detailed cost-benefit analysis should be done at the full project formulation stage.

Carbon dioxide is the principal greenhouse gas which contributes to about 65% of the global warming. This conclusion is not likely to be very different for Zambia. The main thrust of mitigation strategy should be on the reduction of CO₂ emissions. As is well known and also identified in the NEAP, the principal sources of CO₂ emission in Zambia are the burning of fossil fuels, mainly petroleum, and woodfuel. Mitigating policies should therefore center around the following two themes:

- (i) minimising the use of fossil fuels, and
- (ii) arresting deforestation

A look at the Zambia's energy supply and demand patterns will help in the identification of policy measures for achieving the above objectives. Of the four basic forms of energy consumed in Zambia (relative share in parenthesis) - wood (66%), hydro (13%), petroleum (12%) and coal (9%) - only petroleum is imported. Wood is the only non-commercial energy resource consumed in the country through its use as firewood in rural areas and as charcoal in urban areas. 88% of total woodfuel use is consumed in households, 9%

in industry and 3% in agriculture.

With average annual output of about 470,000 tons and vast reserves of 80 million tons, coal is abundant in Zambia. Mining and industry together account for about 93% of the domestic coal consumption. Hydropower with an existing installed capacity of 1670 MW supplies 94% of the country's electricity. Estimated potential of hydropower in the country is 4000 MW, additional capacity could be secured from the development of a regional power grid.

Though a national inventory of GHG is yet to be completed in Zambia, first hand estimates suggest that the contribution of petroleum to GHG emissions is about double that of coal. Transport alone takes up 49% of the national petroleum consumption and therefore is a key sector for the reduction of GHG emissions. However, controlling consumption of petroleum through unrealistic increase in prices would be detrimental to national development. Reductions in petroleum consumption should be brought about through increased efficiency. This could be done in a number of ways such as creating more efficient road networking, decreasing the need for transportation through improvement in telecommunication network, and enforcement of traffic regulations for controlling emissions. Improvement in communication through the use of hightech and expensive optical fibre technology may also be considered. These measures need investments. There is need for research/feasibility and cost/benefit studies on these with the involvement of the PTC and the MTC.

Two thirds of the primary energy demand in Zambia is met by woodfuel supplies in the form of firewood and charcoal. The NCSR energy programme, DOE project on improved charcoal stove and forestry management programme are current activities geared towards increasing efficiency of use and developing alternative supplies. However, adequate forest management is not currently possible due to several factors. A homogenized system of national forest inventory is required for sound forestry management. Public participation is also necessary and the Forestry Act needs to be changed in that respect.

There are a number of renewable energy technological options which can be considered to replace the use of fossil fuels and woodfuel in some areas. With an annual solar insolation level of 7.1 GJ/m², Zambia is among the nations most suited for the exploitation of solar energy. Photovoltaic (PV) power is a mature technology but needs large initial investments. The Southern Centre for Energy and Environment in Zimbabwe have done detailed analysis of abatement options and found PV power to be very expensive. In spite of the current high costs, PV power remains a promising option because it is modular, reliable, and omnipresent. future costs should come down significantly. PV should remain in the national strategy, at least in the long-term, as one of the possible options for supplying electricity to remote areas where the cost of electric grid extension is very high.

Solar driers and hot water systems are well tried and proven technologies which could be used in areas with no electricity and high woodfuel use. Biogas is another potential renewable source of energy which can be used for cooking and lighting to replace diesel operated power plants and the use of firewood/charcoal in remote areas.

Hydropower can provide a viable substitute for woodfuel and fossil fuel burning in urban households where the cost of grid extension is relatively cheap. In the townships around the cities, extension of electricity is a feasible proposition. In fact, urban electrification is among the priority programs of ZESCO in view of its role in national development.

Electrification of these townships will result in decreasing use of woodfuel, paraffin and diesel. Availability of funds has been the main inhibiting factor.

3.6.3 Impacts

Zambia has been and will remain amongst the smallest contributors to global greenhouse gas emissions (calculated either on a gross or per capita basis), yet it is likely to be one of the most severely affected by rapid climatic changes. The recent drought in Southern Africa is a reminder of how susceptible this region is to changes in rainfall pattern. The areas most likely to be affected by rapid climatic changes are:

- (a) agriculture,
- (b) water and energy resources,
- (c) ecosystems and
- (d) disease patterns.

Agriculture is a key sector for Zambia which can be seriously affected by climate change. The output for maize, the staple crop of Zambia, is likely to decrease as a result of warming and decreased rainfall. Reduced rainfall and more evapotranspiration from the Zambian rivers will have an adverse impact on the country's hydropotential. There is need to study these effects carefully.

Reduced rainfall would also adversely affect the country's forests. Natural forests will be affected severely due to moisture stress. The normal functioning of the country's forests ecosystem is likely to be disrupted due to changes in the timing and vigor of flowering and fruit production. Increased severity and frequency of bush fires under drier conditions may further degrade the forests. These effects of reduced rainfall are also likely to be felt by the country's savanna woodlands and the large diversity of wildlife they host.

The country is severely lacking in human, scientific and technical resources to effectively deal with these challenges. There are lot of uncertainties amongst global climate change studies. For example, one GCM showed a water shortage for the Zambezi under conditions of doubling of CO₂ concentrations, while two other studies showed an increase in the amount of water available. Similarly one study relating to effect on crops shows that in tropical and subtropical regions, higher evapotranspiration would lead to an output reduction of 5-7%. But these predictions of crop yield models have significant uncertainties due to their dependence on input data from climate models and economic forecasting models. The uncertainties in the outcome of these studies is many times greater than those of the climate models alone. The central lesson therefore is the need for having highly trained manpower who can understand the strengths and weaknesses of such studies and refine them to more accurate levels to provide a solid foundation for policy measures. Such training should be imparted locally as well as through international links. These concerns, though of national importance, are not likely to find funding from within due to competing scarce resources. Therefore strong multilateral donor support is necessary. Relevant ministries can be involved in studying the impact of climate change on a given sector.

3.6.4 Adaptation

Some climate changes are likely to occur in spite of the best possible mitigation measures. There is therefore a need for assessing the impacts of the imminent climatic changes and

adopting necessary policy measures to minimise their socio-economic impacts. For example, if the existing crop yield is likely to decrease, there is need for research into new varieties of crop more suited to the anticipated climatic changes. Maize production in Zambia is affected by the total rainfall during the growing season, the distribution of this rainfall, as well as the temperature conditions. Preliminary studies show a higher warming trend in Zambia than the global average. Temperatures were on average close to 0.6°C warmer during the 1980s than the mean for the preceding two decades (the mean warming for the same period over Southern Hemisphere land masses was about 0.2°C). The climatological outlook for maize production in Zambia does not appear good. There is therefore a need for a shift of both farming and consumption patterns to more drought resistant cereal crops.

Similarly, if the amount of water in Zambezi is going to be less, one needs to prepare for the resulting shortfall in hydroelectricity. If the incidence of malaria is going to be increased due to climate change, as is feared, there have to be some measures to protect human health. Once again, all these issues are highly technical and need a lot of research and studies before establishing accurate facts so as to pave the way for firm policy measures. The areas of importance are the same as those under the impacts studies.

3.6.5 Capacity Building

Studies related to climate change are in their infancy in Zambia. There is a general critical shortage of human capacity to understand, appreciate and effectively deal with issues related to climate change. The reason has been that the interest in these activities started only recently. There is no institutional framework for imparting interdisciplinary training and education systematically, undertaking research and development, creating awareness and providing information. Almost all the issues in climate change need such highly trained manpower. Therefore this task should be of very high priority.

Establishment of an interdisciplinary Institute of Energy and Environment (IEE) to build national capacity in this area will fill a large gap. Such an institute could deal with climate change issues, renewable energy and other environmental issues of national concern as outlined in NEAP such as air and water pollution, and biodiversity protection. Such an institute would not only fulfill Zambia's commitment under the UNFCCC under Articles 4 (1(g) to (i)), Article 5 and Article 6, but also will help in achieving national objectives on environmental education as stipulated in NEAP. Appropriate linkages would need to be established with other regional / international institutions such as the Southern Centre for Energy and Environment in Zimbabwe, and programmes such as UNFCCC/UNITAR.

Table 1. Policy matrix to fulfill Zambian commitments to the Framework Convention on Climate Change

Commitments and Issues	UNFCCC Ref	Current Activities	NEAP status, Gaps, Required policies	Proposed projects/actions	Institutional/Funding
National inventories of sources and sinks of greenhouse gases	Article 4 1 (a)	GTZ/MEWD country study on climate change and US/ECZ country study on climate change are both in progress	Not covered in NEAP Need for reliable data acquisition and compilation: forests, emission factors, technology and end-use based fossil-fuel consumption, etc. Need for human capacity building	Ongoing country study programmes and projects should continue Research on country specific emission factors should be undertaken. Identification of data requirements and steps to compile them is required, including a National forest inventory.	MEWD and ECZ should identify the data requirement, and continue strengthening, coordinating and implementing through existing and future donor supported activities. UNZA should be involved in research activities
Mitigation/ Abatement	Article 4 1(a) to (d)	Both the above studies include abatement studies NCSR energy programme for alternative energy and energy efficiency DOE project on improved charcoal stove Forest management programmes	NEAP recommends energy efficient practices and technology in the use of fuelwood and fossil fuels. Also recommends the development and use of alternative energy sources to replace the use of fossil fuels. But no mention of reduction of methane and nitrous oxide emissions. NEAP recommends: - forest management and conservation with public participation - replacement of firewood and charcoal with alternative energy supplies - adoption of efficient energy practices in all sectors, and - reduction of emissions of methane and nitrous oxide.	Extend urban household electrification to replace the use of woodfuel and petroleum. Use solar driers for fish drying and solar water heaters to replace the use of fuelwood. Use photovoltaic power in place of diesel operated power plants in remote areas and the ZCCM. Use biogas for supplying household energy Study and implement energy efficient transport system. Control transport emissions through legislation. Improve transport system through efficient road network. Improve communication system through extending telephone exchanges and the use of optical fibres. Reduce emission of methane from coal mining, oil transport and storage, sewage and water treatment plant. Also harvest methane for productive purposes.	These form potential projects for GEF funding due to their global implications. Involvement of MEWD, IEE, MTC, UNZA for research and implementation will be required. External technical expertise would be needed.

Table 1 (continued)

Commitments and Issues	UNFCCC Ref	Current Activities	NEAP status, Gaps, Required policies	Proposed actions/ projects	Institutional/Funding
Education, training, research, development, awareness creation and information	Article 4 1(g) to (i) Article 5 Article 6	UNDP/WMO Drought monitoring regional centres in Harare and Nairobi SIDA funded project on capacity building in energy and environmental physics at Physics Dept, Unza	NEAP recommends the setting up of an Environmental Institute at UNZA Priority need for human capacity building in all climate change issues and relevant renewable energy technologies	Set up an interdisciplinary Institute of Energy & Environment	A high priority potential project for GEF/WB funding. UNZA, MENR, MEWD and MTC to implement. WB should facilitate links with other similar regional and international institutions.
Impacts	Article 4 1 (f)	US supported country study on climate change has this component WWF/CRU regional study on climate vulnerability	NEAP does not cover impacts of climate change Assessment of impacts of climate change in various sectors should be undertaken Need for human capacity building	Projects on studies of the impacts of climate change on agriculture, water resources, energy resources, ecosystem and disease patterns	Relevant ministries together with UNZA and IEE to implement through international donor support and links
Adaptation	Article 4 1(b) and (f)	Several alternative crop development programs are going on, e.g. sorghum and millet improvement program, root and tuber research program, green legume program. Genebank SADC project for preserving genetic plant material. Also National Genebank	NEAP recommends to conserve crop genetic diversity for protection against crop vulnerability. Study of alternative options available and their costs assessment is required after careful assessment of the impact of climate change Food consumption patterns should change to traditional drought resistant crops	No specific projects at this stage unless more work on impacts is done.	Relevant ministries, UNZA and the IEE to address the issue

4.0 Convention on International Trade in Endangered Species of Flora and Fauna - (CITES)

4.1 The Convention

The CITES convention came into force in 1980, and was ratified by the Zambian National Assembly in 1981.

CITES aims to provide some degree of protection to animal and plant species, and their populations, which are deemed to be threatened by international trade. CITES establishes a system of regulation by permits and certificates issued only when certain scientific and management conditions are met.

The core of the convention are its three appendices, with varying levels of trade restrictions for the species listed under each. Appendix I lists endangered species, and prohibits trade other than in exceptional circumstances. Appendix II lists species which are threatened by trade, and thus imposes requirements for strict regulation. Appendix 2b is for species (e.g. look-alike species) whose control facilitates better control of threatened species. Appendix 3 allows countries to nominate species whose national populations may be threatened; as such trade restrictions pertain only to exports from that particular country.

The convention, having defined the appendices, then sets out a list of requirements and conditions for their import and export from party countries.

CITES is a 'non-self-regulating' treaty. This means the convention sets out principles and rules which cannot be implemented unless the party countries adapt appropriate national law for implementation and enforcement. The lack of a matching provision under national law makes the task of enforcing CITES difficult in Zambia.

4.2 The CITES Species

The CITES species listings are extraordinarily lengthy, but the list of species indigenous to Zambia is less so. Ironically, much of the effort in CITES implementation in Zambia concerns other non-indigenous species which are traded or smuggled from neighbouring countries - notably Chimpanzees and African Grey Parrots.

Those species indigenous to Zambia are shown below using the common English name, type of species (bird, mammal, reptile, etc.) and appendix listing. Inclusion on the schedule of protected animals under the Wildlife Act, 1991, is also indicated, and the significance of this discussed in the next section.

The table is indicative, not comprehensive, and seeks to illustrate the lack of corresponding regulation between CITES and Zambian law. It must be noted however that CITES is undergoing its own review following a request from the last COP in Fort Lauderdale, Florida, November 1994. This review was prompted by, amongst other issues, recognition that the current species listings under CITES would benefit from a comprehensive scientific assessment of their merit.

Table 4.1 Animal species indigenous to Zambia on CITES Appendices

English Name	Type	Protected Status
Appendix I		
Great hornbill	B	
African elephant	M	Special clauses
Black rhinoceros	M	Special clauses
Brown hyena	M	
Cheetah	M	
African slender-snouted crocodile	R	Yes
Appendix II		
African crowned eagle	B	
African cuckoo falcon	B	
African Goshawk	B	
African grassowl	B	
African little sparrowhawk	B	
African pigmy falcon	B	
Bateleur	B	
Black parrot	B	
White-headed hornbill	B	
Wrinkled hornbill	B	
African blind barb fish	F	
African caracal	M	
African clawless otter	M	Yes
Antelopes (inc lechwe, roan, sable)	M	
Baboon (all subsp)	M	
Grysbok	M	Yes
Lion	M	Yes
Serval	M	Yes
Wild cat	M	
African chameleon	R	
African rock python	R	Yes
African savannah monitor	R	Yes
African serrated tortoise	R	
Common chameleon	R	
Nile crocodile	R	Yes

Note: B:Bird; M:Mammal; R:Reptile, and indication of inclusion on list of protected species, Wildlife Act 1991.

No list of plants indigenous to Zambia and listed in CITES appendices was located during the course of this study. Most are likely to be varieties of orchid. The absence of this information indicates the lower priority attached to plants, compared with the large, charismatic mammals and migratory birds inhabiting the national parks. The proposal for a regional botanical specialist network stemming from the Conference on the Conservation and Utilization of Southern African Botanical Diversity held in Cape Town in September 1993, seeks to address the pervasive regional neglect of botany and botanical species.

Zambia has not (in common with most parties) listed any species on Appendix III of CITES, despite there being a number of species which could theoretically be nominated (e.g. Aardwolf, Klipspringer, Giraffe, various birds). A review of Zambia's participation in CITES should consider the potential national value of listing species in this appendix, as well as limitations to national capacity to enforce CITES regulations.

4.3 Convention Obligations

Ratification of CITES commits parties to implementing certain regulations and procedures. As noted above, legal changes are usually required to provide a complete and non-contradictory framework for implementation.

Although a new Wildlife Act was introduced in 1991, ten years after national ratification of CITES, the changes therein did not address the requirements for CITES implementation nor alter to any great extent the colonial legislation pertaining to trade in species. The main changes related to the introduction of statutory penalties for internal poaching and smuggling of ivory and rhino horn, as well as other protected species. They did not define the conditions under which trade licenses would be issued, and no separation of definitions applying to different species and appendix listings was made.

Convention obligations must therefore be examined in the context of the current legal structure in Zambia. The following table seeks to provide such context.

Table 4.2 Convention obligations and legal position in Zambia.

Convention Obligation	LEGAL POSITION IN ZAMBIA
<i>Definitions of Appendices - Species mentioned herein should only be traded in accordance with the convention</i>	<i>Appendix definition or differentiation between species not included in law. Instead, a schedule of 'protected species' lists a number of appendix I and II species, plus others (which could be nominated for appendix III).</i>
Appendix 1: All species threatened with extinction which are or may be affected by trade. Trade in these is restricted to particularly strict regulation in order not to endanger further their survival, and must only be authorised in exceptional circumstances;	Ivory / rhino horn trade and trade in other wild species subject to permits issued by the Minister / Director. No conditions are specified, and no justification has to be made for granting a permit. No distinction between different levels of threat.
Appendix 2a: Species not currently threatened, but subject to adverse pressure from trade and in need of stringent management;	No parallel legislation for plants.
Appendix 2b: Other species which must be regulated to enable 2a to be effective (i.e. look-alikes);	Does not fulfil CITES requirements.
Appendix 3: All species identified by a country as requiring regulation to prevent or restrict exploitation, and needing cooperation of other 6 countries to control.	Lack of recognition / action on appendices means that species protected under 1991 Wildlife Act but NOT in CITES lists are not necessarily accorded appropriate treatment in other countries.
<i>Trading Appendix 1 Species</i>	
<p>Control on the export, import and re-export requires:</p> <p>Scientific Authority to advise that the movement is not detrimental to the species;</p> <p>Management Authority (export, re-export)/ Scientific Authority (import) to be satisfied on housing, transport, care and safety to the specimen</p> <p>Specimen legally obtained (export only)</p> <p>Import / export permit granted in destination country (export & re-export / import);</p> <p>Not for primarily commercial purposes (import only)</p>	<p>Scientific Authority not appointed; condition not specified in law.</p> <p>Scientific Authority not appointed; condition not specified in law.</p> <p>Condition not specified in law.</p> <p>Condition not specified in law.</p> <p>Condition not specified in law.</p>

Trading Appendix 2 Species	
<p>Export of species requires:</p> <p>Scientific Authority to advise that the movement is not detrimental to the species;</p> <p>Management Authority to be satisfied on housing, transport, care and safety to the specimen, and that specimen legally obtained.</p>	<p>Scientific Authority not appointed; condition not specified in law.</p> <p>Condition not specified in law.</p>
<p>Scientific Authority must monitor exports to judge if limits should be applied (i.e. through application of limits to exports)</p>	<p>Scientific Authority not appointed, although NPWS Research department (designated Management Authority) assumed to be aware. CITES Liaison Committee unofficially supposed to fulfil this role, but has only met once (1993).</p>
<p>Imports to be permitted only where export or re-export permits are available from source country</p>	<p>Wildlife Act 1991 Section 150 part 1b enforces for all wild animals</p>
Trading Appendix 3 Species	
<p>Export of species requires:</p> <p>Management Authority to be satisfied on housing, transport, care and safety to the specimen, and that specimen was legally obtained.</p>	<p>Condition not specified in law.</p>
<p>Import requires presentation of certificate of origin / export permit if listed in country of origin</p>	<p>Wildlife Act 1991 Section 150 part 1b enforces for all wild animals</p>
Permits	
<p>Should include specified information</p>	<p>No conditions specified in law.</p>
Exclusions	
<p>Specimens in transit - defined as in customs and bond areas only.</p>	<p>Wildlife Act 1991 Section 155 part 1 excludes permit requirements from people in transit where (1a) valid transit papers are held from country of origin or (1b) granted when customs accepts that the specimens have been legally exported and are genuinely in transit.</p> <p>This law is somewhat vague, and is used to confiscate animals from time to time. However, part 1a is weak since only 'necessary transit documents from the country of origin or export' are required (part 1b being an alternate condition). The Act also allows road transit across Zambia</p>
<p>Specimens acquired prior to convention</p>	<p>No conditions specified in law.</p>

Personal/household effects (except being exported from source to owner's home country)	No conditions specified in law.
Appendix 1 species bred in captivity (treated as appendix 2)	No conditions specified in law.
Export requirements for specimens bred in captivity	Export permits required for wild animals and species 'found in Zambia in a wild state' (i.e. including those bred in captivity)
Zoos, circuses etc. can only be imported where the animals were bred in captivity or captured prior to CITES, and where conditions etc. are acceptable	Recent encounter with Egyptian circus hindered by the lack of CITES specific legislation. No mention of circuses etc. in Zambian law - hence subject to normal import requirements as above (i.e. according to conditions decided by the Director / Minister). Whilst chimps were confiscated, pythons and tigers remain in circus.
<i>Management and Scientific Authorities</i>	
Each state will appoint: A Management Authority competent to grant permits & certificates, to be registered with CITES A Scientific Authority to advise the Management Authority	One officer plus (recently) deputy in Research Department at DNPWS nominated to CITES. Not recognised in law - all permit power vested in Director / Minister. Restricted focus to fauna; not adequate attention to flora. Not nominated or legislated for.
<i>Trade with Non-CITES Countries</i>	
Must demand documentation which 'substantially conforms' with CITES requirements	No conditions specified in law.
<i>Measures to be Taken</i>	
The state must apply appropriate penalties and confiscation procedures Living specimens confiscated are in the care of the Management Authority, and either return to state of origin, or to a rescue centre etc. as appropriate, advised by Scientific Authority	Illegal activities in ivory or rhino horn subject to mandatory prison sentence of 7 years minimum (Section 174 part 2). Other species minimum penalty of K5000 (US\$7) or six months in prison. Trophies, animals and meat, as well as tools and vehicles used for illegal activities to be seized & disposed of. Means of disposal at Director's discretion - usually meat to hospitals, animals to care centres, ivory in store. 1991 Act allows for the 'immediate disposal by sale or otherwise'.

<p>Annual summary reports and biennial reports on legislative, regulatory and administrative procedures taken to be presented to the CITES Secretariat, and available to the public</p>	<p>No conditions in law. No public access assured.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------

4.4 CITES Actions

It would be unfair to criticise the actual management and implementation of CITES in Zambia, since the law is insufficient to permit officers to act in accordance with the convention.

Additionally, the allocation of only two officers to the Management Authority, and the absence of a Scientific Authority, with limited resources, communication facilities, field support and information systems, inevitably hampers what performance is feasible within the confines of existing legislation.

Zambia has in-fact carried out a number of activities in direct support of CITES, which are as follows:

- The enforcement agency has succeeded in blocking certain imports and exports of listed species. The recent battle with a visiting Egyptian circus succeeded in confiscating their chimpanzees. Pressure is on to remove the other endangered species held there, and it is possible that this may be achieved. This procedure succeeded in Zambia, after failing in other countries - including Kenya and Tanzania.
- The continued existence of a substantial and world-renowned private sanctuary, Chimfunshi, (primarily for Chimpanzees) in the Copperbelt, and the good relationship between this organisation and DNPWS, has increased Zambia's participation in CITES. Chimps and other animals have been confiscated and sent to Zambia from every continent of the world. Recognition of the standards and the long term legal security of the animals has created confidence in sending endangered species from developed countries to African care facilities - the reverse of usual practices.
- Zambia is up-to-date in CITES reporting requirements (and is even ahead in the submission of the report for 1993). This is despite several years of failure to comply in the late 1980s. The precise format has not always been adhered to, but CITES has nonetheless accepted them. This success is unusual. The location of the Management Authority at NPWS Research Department means that the most competent people are in charge of meeting this reporting requirement, but a lack of resources and low prioritisation of convention requirements limits the ability to fulfil these tasks.
- Although not specifically covered in CITES, illegal possession and movement is clearly at the heart of the treaty. Continued policing of ivory and other poaching activities is needed to stop the supply of materials for illegal trade. Levels of elephant poaching have declined, at least in some areas.

4.5 Existing CITES Plans

Plans to improve the implementation of CITES must be based on an amendment of the Wildlife Act 1991 and revision of other relevant legislation. Without this, adjusting the management strategy for the implementation of the treaty will yield few benefits. It is noteworthy that:

- Legislation is scheduled to be reviewed at DNPWS, with participation of the Management Authority. The terms of reference for the study are already developed, to recommend and draft changes to the act which would national capacity to implement the convention.
- In terms of the subsequent Management Structure, it is proposed that the current Management Authority would become the secretariat for the Scientific Authority (which includes a consultative group outside the confines of DNPWS). The Management Authority would then move to another department of DNPWS, more accustomed to operational and implementation issues.

Additional consideration should be given to nominating a limited number of border posts for the import and export of endangered, protected and listed species. CITES Verification Officers should be posted at each. Other suggestions include:

- Training activities for customs officers are required. Attempts will inevitably be made to import or export specimens in the absence of CITES Verification Officers. Knowledge of the law, the convention and of the affected species would improve the ability of officers to make correct decisions on these issues. At present, few border officers are familiar with CITES permits nor knowledgeable about the various species requiring permits. Consideration should also be given to training a core team to respond to border control requests for CITES support.
- A further plan is the 'Lusaka Agreement', a sub-regional strategy, signed as this study was being carried out, to co-ordinate anti-poaching and illegal trade work. This is sought particularly for eco-systems in more than one country - such as the Lower Zambezi Valley. UNEP is supportive of the idea, which was initiated by the Ministry of Tourism.

These plans are all potentially useful means of implementing CITES effectively. However, they do not appear in the NEAP document. The whole issue of controlling trade in endangered species has not been explicitly raised in the NEAP.

Plans for future implementation of CITES focus on animals, particularly mammals and to a lesser extent birds. The integration of plant species, and less conspicuous animal species, is central to the complete fulfilment of the treaty.

Future management strategies do not propose a specific role for the Species Protection Department of the Anti Corruption Commission. The SPD is an investigative branch which can and does intercept illegal movement of CITES specimens. Relations between SPD and NPWS are apparently poor, which wastes effort and talent. The roles and relations, along with the mode of every day interaction, should be established in order to create the most effective Management Authority.

4.6 Recommendations

Establishing the legal framework for implementing CITES is a necessity, but such work must bear in mind the recommendations of the last COP to conduct a review of CITES and its Appendices. With that in mind it is critical that Zambia pursue an improved

understanding of the effect of trade on its species and populations, and concentrate on pursuing improved CITES implementation where such linkages are of direct merit to national needs.

It has been noted that the import and export of all species are at the discretion of the Director and/or the Minister. No national criteria have been established. CITES spells out such criteria for species listed under its appendices, and this work should be drawn upon to assist the Director and/or Minister in retaining control over trade.

In a legal review, the following issues should be considered:

- The species listed in the 1991 Act are incomplete, and a full review of appropriate inclusions should be carried out.
- Mechanisms for the transfer of species from one category to another should be included. It must be considered whether this should be tied to CITES categorisation, or if complete independence in this should be retained.
- The control of all endangered animal and plant species should be regulated under the same act. This will entail a legal review of the Fisheries Act and the acts controlling the import and export of plants. These acts are couched mainly in terms of disease control, and will continue to do so. However, specific restrictions for all species identified as appropriate for CITES listing must be integrated into one act and management system. Consideration of how to incorporate this should be made.
- Implementation authorities should be established by law, with an adequately resourced Management Authority, and a suitably distinguished Scientific Authority. It is recommended that prior to the legal establishment of the Management Authority, proper consideration be given to the respective roles of NPWS, the SPU (Anti-Corruption Commission), and the customs department.
- Criteria for the import, export and re-export of these species should be established in law, with a fully transparent structure for application, decision, appeal and arbitration. Such a structure should not award discretionary powers to a Minister or Director.

Following such a review of the legal status of CITES implementation, the following further recommendations should be considered.

- Zambia's NEAP be revised to reflect all relevant CITES criteria and obligations.
- Zambia nominate suitable species of animals and plants for Appendix III listing, following a wide ranging evaluation procedure managed through the (newly established) Scientific Authority;
- A training programme for Customs Officers be established, in order to reduce illegal trade permitted through ignorance. This training should include follow-up printed media for display in customs posts;

- The practicality of nominating specific posts for import and export of protected species should be considered carefully, particularly the chance of eliminating trade at the other border posts;
- The Lusaka Agreement will clearly have an impact on the control of illegal trade. It is recommended that this regional programme be pursued. It is a viable, regional programme, which will enhance the efforts of all participant countries in the control of illegal trade;
- The viability of operating a Management Authority from a place with such poor communications as Chilanga is very much open to question. It is suggested that whatever institutional arrangements are decided, consideration of implementation strategy includes the need for openness, accessibility, and information exchange.

5.0 Ramsar Convention on Wetlands of International Importance Especially as a Waterfowl Habitat

5.1 The Convention

The Ramsar Convention dates back to 1971, and was the first (of two) international conventions to regulate site-specific conservation of a defined ecosystem type.

Ramsar controls the conservation of wetlands, which it defines as:

areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres

By 1993 there were 582 sites covering 36 million hectares listed, in 71 contracting parties. Zambia acceded to the convention in 1991, designating the Kafue Flats (Lochinvar and Blue Lagoon) and Bangweulu Swamps (Chikuni) on the convention list, a total of 333,000 hectares representing the fifteenth largest national area designation in the world.

Wetlands in Zambia are subject to great pressure. The demands on these fragile ecosystems come from fishing, agriculture, grazing, tourism, wildlife, human settlement, water supply and hydropower development.

In its first form, the Ramsar convention emphasised conservation of wetlands through non-use or 'preservation', emphasizing the role of wetlands as waterfowl habitat. As the treaty evolved, and was eventually amended in 1987, emphasis shifted towards the 'wise use' of wetlands.

5.2 Convention Obligations

Obligations under Ramsar are often taken to be applicable only to sites listed. Although nomination of a site is a condition for acceding to the convention, parties are subsequently obliged 'as far as possible' to conserve all wetlands in their territory. Those clauses of the convention which apply generally to wetlands, rather than specifically to those on the list, cover conservation and management, maintenance of habitats for waterfowl, research and information exchange, as well as institutional and human capacity development.

The following matrix lists the conventions obligations against existing activities and policies in Zambia.

Table 5 Ramsar Convention obligations and current activities in Zambia, Ramsar.

Convention Obligations	CURRENT ACTIVITIES
To designate wetlands for the list of wetlands of national importance.	<p>On acceding to the convention (1991), Zambia nominated Bangweulu basin (Chikuni) and Kafue Flats (Lochinvar & Blue Lagoon) to the Ramsar list, a total of 333,000 ha. All these are also protected as GMA/National Park sites</p> <p>Other wetlands which could be listed include Mweru Wantipa, areas round Lake Tanganyika, and parts of Kasanka National Park, and the Upper Zambezi</p>
Formulate & implement planning so as to promote conservation of listed sites /or promote wise use of wetlands.	<p>National wetlands policy being devised at present, as a consultative process with all stakeholders.</p> <p>Planning for listed sites through Wetlands Project, at NPWS. Conservation through integrated programme, combining sustainable use and socio-economic development.</p> <p>Unlisted wetlands (especially those outside protected areas) are vulnerable to less sensitive planning processes, as environmental specialists are not generally found at district or provincial planning level</p>
Advise bureau of any changes in ecological structures	<p>Research component of Wetlands Project enables monitoring of listed sites, with full information available for bureau and all national and international users.</p> <p>Other sites not monitored effectively</p>
Compensate for loss of wetland resources if listed wetland is deleted or restricted.	Listed sites intact
Make environmental impact assessments before transformations of wetlands & make national wetland inventories.	<p>EIAs not required before transforming wetlands. No protection extended to those outside NPs/ GMAs.</p> <p>A wetland inventory for sites in protected areas (NPs / GMAs) is being compiled by NPWS, whilst ECZ are compiling information on unprotected areas. Not complete. SADC / IUCN / ECZ completed a basic status report on wetlands.</p>
Establish nature reserves on wetlands & provide adequately for their wardening, & through management to increase waterfowl populations on appropriate wetlands.	'Nature reserves' in the traditional sense not appropriate, as all wetlands can only be conserved through sustainable but profitable use. Wardening of wetlands in NPs / GMAs varies in extent, probably highest at Kafue Flats, where pressure is also great. No wardening at all outside NPs / GMAs.
Train personnel competent in wetland research management & wardening.	Training of specialists, both for research and management, very limited at UNZA, necessitating expensive overseas education. Warden training for community based natural resource management is however quite well covered in Zambia.

<p>Promote conservation by combining far-sighted national policies with the coordination of international action, to consult with other parties about implementing obligations arising from the convention, especially about shared wetlands & water systems.</p>	<p>National policy still being developed. Should be comprehensive and far-sighted. The question of implementation needs serious consideration.</p> <p>Low priority generally attached to wetlands, and convention not 'exploited' fully.</p> <p>Relevant shared wetlands mostly river systems - e.g. Zambezi - which receive attention through other channels / under other conventions.</p>
<p>Promote wetland conservation concerns with development aid agencies.</p>	
<p>Encourage research & exchange of data.</p>	<p>Research carried out on listed wetlands, and to a lesser extent in NPs / GMAs. Accessibility of information and findings above average.</p>

5.3 Convention Plans

There are various progressive plans (including some already initiated) in hand which will increase the extent to which Zambia fulfils the requirements of Ramsar.

However, specific plans for wetlands are virtually absent from the NEAP. In fact, wetlands are only mentioned incidentally in the document to make the following observations:

- Wetlands store water, contribute to water purification and flood control, and are the main source of recharge for ground water;
- Wetlands are destroyed by siltation, sedimentation and dam construction;
- Poor roads damage wetlands;
- Settlement of wetlands should not be permitted where it requires dredging or drainage;
- WWF Wetlands Project is an example of community management of wildlife resources;

Impressions gained during the course of this consultancy indicate clearly that this general omission is probably accidental - wetland conservation attracts much attention from many of the major players in the environmental sector.

Notwithstanding the NEAP, the plans in the wetlands sector are:

- A national policy on wetlands is being developed in consultation with ECZ, IUCN, WWF, and DNPWS. This will define approaches to wetland conservation throughout Zambia, including both important Ramsar-listed protected areas, and lesser wetlands in National Parks and GMAs, as well as those currently with no protection at all. The existence of a policy will itself assist in up-grading the status of wetlands; and already, an initial wetland survey has been completed which will facilitate policy formulation work.

- Information on wetlands sites is being gathered by DNPWS and by ECZ, for areas inside and outside protected areas. Continuous gathering and monitoring of information will increase Zambia's participation in the convention, and assist in identifying the major threats facing wetlands conservation;
- Community based programmes in wetland management have been pioneered in Zambia. These will continue. Lessons are being learned which will assist if and when the programme is extended to other suitable sites;
- International co-operation on shared wetlands is planned. With the signing of the Lusaka Agreement (aimed at co-operative anti-poaching and illegal trade of endangered species), the Zambezi could be better protected, as may other wetlands in border areas, such as those around Mweru Wantipa and Lake Tanganyika. These plans are drawn from other sectors - CITES implementation, and fisheries plans in ASIP - but nonetheless will directly benefit wetlands.

5.4 Convention Gaps and Recommendations

- 5.4.1 The elevation of wetlands as a national concern is a pre-cursor to further recommendations. Whilst the wetlands of Zambia are one of the countries major natural resources, the attention they receive is somewhat secondary. This is despite the fact that the WWF and others (IUCN, ECZ) are active in the sector. Fortunately, this problem is being tackled in the development of a national policy on the sector. This will enable wetlands programmes to be given greater priority. It is hoped that the policy will provide for protecting defined wetlands areas, through a practical implementation mechanism. It is further hoped that the policy incorporate the framework of the Ramsar convention, as this will enable better adherence.
- 5.4.2 The consolidation of information is a gap which should be filled. Information is currently being generated by different organisations, and for different purposes. Individual accessibility is good, but overall, information is dispersed. It is recommended that for national and international benefit, an effective monitoring and information gathering and collating unit be established. This would also assist in identifying areas where development should be subject to EIAs and/or other controls. The NEAP identifies ECZ as the responsible agent for such coordination.
- 5.4.3 Training of staff is a deficit area. Professionally, UNZA does not offer appropriate courses at all at a higher level, although courses are currently being introduced in fresh water biology. Wetlands are not central to conventional wildlife biology, and researchers and professional staff have to be trained overseas. There is need to enhance the undergraduate and post graduate courses in tropical ecology at UNZA. At a lower level, training for wardens lacks specialist wetlands orientation, and does not cover community based management techniques sufficiently. This deficit must be filled in-country through support for better and more specific training programmes, including in-service training.
- 5.4.4 Community based wetlands management programmes, such as WWF Wetlands Project are of long term. It can take a long time for the benefits of conservation to make a discernible impact on people's lives at household level, and projects that

promote community management require skilled people and expensive resources. However, these programmes have demonstrated some successes, and represent the only sustainable approach to conserving wetland resources. It is recommended that such programmes continue and serve as a model for future expansion.

- 5.4.5 Other sites could be nominated for Ramsar listing, but at this stage it is felt that there should be no rush in doing so. Until there is a national policy and legislation protecting wetlands, listing more sites would be fairly meaningless. Obliging oneself to conserve without the implementation capacity is not useful. International protection with no accompanying national law is only useful where regional controversy threatens a shared site, and a convention can be used on the side of conservation. Further areas that should be considered for the proposed new sites under wise use accept include; Busanga plain, Lukanga Swamp, Mweru wantipa, Mweru-Luapula, Lake Tanganyika, Part of Barotse plain and Chambeshi Flats.

6.0 Convention on the Protection of World Cultural and Natural Heritage

6.1 The Convention

The WCNH was signed in Paris in 1972. It establishes an international site-specific conservation system for globally significant cultural and natural heritage areas. It protects a relatively small number of areas of universal value to science, conservation or natural beauty.

By the end of 1992, there were 178 parties to the convention, and the list contained 378 sites (73% cultural, 23% natural and 4% mixed). Zambia acceded to the convention in 1984. Only one site in Zambia is listed - Victoria Falls.

WCNH, in contrast to its image, is a powerful and radical convention. It contains two legal principles which should be used in the conservation of heritage:

- There is a legal duty on the part of all states to conserve and take responsibility for all natural and cultural heritage (i.e. regardless of listing); and,
- Given the uneven distribution of heritage *vis a vis* wealth, there is a corresponding duty on the part of richer nations to contribute to the cost of conserving heritage in the developing world.

Natural heritage is not a 'current' term, but in fact includes such things as biological diversity. Hence the WCNH creates obligations and opportunities for assistance in many fields. Indeed, natural heritage areas, according to the convention, include all those which harbour endangered species - which includes most if not all National Parks, as well as areas (particularly wetlands) outside them.

For Zambia, although the conservation of Victoria Falls is important, the WCNH may also provide the framework for a much wider range of environmental conservation activities which are listed in the table below.

Table 6 Convention obligations and current activities on the protection of cultural and natural heritage in Zambia

Convention Obligations	Current Activities
<p>To be responsible for the identification, protection, conservation, preservation, & transmission to future generations of all national cultural & national heritage.</p>	<p>Zambia has identified and protected one site under WCNH - Victoria Falls.</p> <p>Other elements of cultural and natural heritage are also identified and protected through the National Heritage Conservation Commission (which covers 1600 cultural and natural sites), and National Parks and Wildlife Service (natural areas).</p> <p>Review of listed sites would reveal certain gaps in national recognition - e.g. rock paintings in Kasama; Shiwa N'gandu house, etc.</p>
<p>To take measures to protect, conserve & present cultural & natural heritage situation on its territory, each party shall</p> <p>(a) adopt a general policy which aims to give the cultural & natural heritage a function in the life of the community & to integrate the protection of that heritage into comprehensive planning programmes;</p> <p>(b) set up services for the protection, conservation & preservation of the cultural & natural heritage</p> <p>(c) research & work out methods of counteracting dangers threatening cultural or natural heritage;</p> <p>(d) take the appropriate legal, scientific, technical, administrative & financial measures for the conservation of this heritage</p>	<p>The ADMADE programme has integrated the community with the natural resources in National Parks and GMAs.</p> <p>Governments of Zambia and Zimbabwe have initiated, with assistance from IUCN/CIDA a strategic environmental assessment of the Vic Falls World Heritage Site with the intent of producing a master plan for conservation and development of the area.</p> <p>Natural sites under some research - see commentary on Ramsar and CITES.</p> <p>Legal situation provides for protection of areas designated as Parks, GMAs, forests, monuments etc., but implementation capacity often very limited. Creation of National Park management plans underway, which will improve performance in this respect.</p>
<p>To develop centres for training in protection, conservation, & presentation of the cultural & natural heritage & to encourage scientific research in this field.</p>	<p>Game scout practical training programmes include levels from village scout upwards, but academic training mostly overseas, especially for management issues (as opposed to biological).</p> <p>Local level training for sustainable resource use through LIRD, WWF Wetlands programmes, and others.</p>
<p>To recognise that national heritage constitutes a world heritage for which protection is the duty of the international community as a whole to co-operate</p>	<p>International community involved in protection of Victoria Falls (through WCNH) and in NPWS programmes & projects. Very little support solicited or given for other national sites.</p>
<p>Not to take any deliberate measures which might damage directly or indirectly the cultural & natural heritage situated on the territory of other states parties.</p>	<p>Co-operation with Zimbabwe over management of Victoria Falls in place.</p>
<p>To nominate certain properties to the World Heritage List</p>	<p>Victoria Falls listed, but no other sites ever nominated or even considered. Mana Pools in Zimbabwe listed - the nomination of Lower Zambezi National Park would therefore seem obvious.</p>

6.2 Plans

NEAP notes that wildlife ecosystems are a part of Zambia's heritage for 'biological diversity, cultural, educational, aesthetic, ethical and scientific reasons'. Cultural heritage is also mentioned as a matter for consideration. It condemns the hydro-power scheme at Victoria Falls, which turns the Zambian side into a 'mere cliff' in the dry season, and does so in terms of the site's status as a World Heritage Site.

NEAP proposes that a national survey and inventory be carried out, listing all national cultural and natural heritage sites. Although the precise mechanisms are not discussed, it suggests that a list should be established. Clearly, this study would be fairly lengthy, and require prior negotiation of definitions of cultural and national heritage, but it would nonetheless form the basis for stronger adherence to the spirit and content of WCNH.

Other NEAP proposals concur with WCNH, and are integrated into a number of different sectors. If national parks and wetlands areas are taken as the main components of natural heritage, there are many plans for protection, community participation, research, training, international co-operation etc.

6.3 Gaps and Recommendations

WCNH identifies its Party's obligations to conserve all heritage, and implies that finance should be made available for this. In order to carry this out more effectively, the following process would be necessary:

1. Identification of sites, in an inventory or list;
2. Identification of responsibility for management of different types of sites;
3. Establishment of effective conservation institutions / mechanisms / legislation / regulation, where currently absent; and,
4. Establishment of monitoring system for all identified sites.

The proposed study of national heritage would, if executed, be a very important step towards the express fulfilment of WCNH. This would be the start of the process described above, and the basis for development of a full and efficient heritage strategy.

NEAP is therefore very constructive in relation to the WCNH, and recommends the critical step in its future implementation in Zambia. The only concern, which should be noted, is that the study is mentioned as fourth priority in the action plan for the tourism sector. It should perhaps be considered as a priority starting point for the development a tourism plan, particularly in light of the tourism development history at Vic Falls.

7.0 Convention to Combat Desertification

7.1 The Convention

The Convention to Combat Desertification (CCD) is the newest of the global environmental conventions. Zambia has signed it but not yet ratified it, and the convention itself has not yet come into force.

Although a global treaty, CCD emphasises desertification and mitigation of drought in Africa. It seeks to engender long-term integrated strategies for:

- Improved productivity of land; and,
- Rehabilitation, conservation and sustainable management of land and water resources.

CCD recognises national territorial rights, but also specifies national responsibility for the impact of actions on other countries. It emphasises the need for local participation in strategic programme implementation.

CCD specifies that activities carried out under its auspices should be co-ordinated with other relevant conventions, especially FCCC and CBD, especially in relation to research, training and information activities.

7.2 Obligations

The specific obligations of CCD relevant to Zambia are as follows:

- (i) Adopt an integrated approach to desertification and drought mitigation, addressing the physical, biological and socio-economic aspects, including issues of poverty eradication;
- (ii) Establish sustainable national action plans to combat desertification and mitigate drought, tackling the root causes of such degradation;
- (iii) Facilitate local participation (especially of women and youth) in programmes, utilising NGOs as appropriate;
- (iv) Provide appropriate institutional mechanisms, legislation and an enabling environment to ensure effective and sustainable programmes;
- (v) Incorporate data collection and research on all aspects of land degradation, including physical, biological, socio-economic issues, local and traditional knowledge, technological and poverty oriented issues, and ensure accessibility of such data to all parties including local communities and NGOs;
- (vi) Acquire, use and make available relevant technologies;
- (vii) Encourage decentralisation and local resource tenure to strengthen local

participation;

- (viii) Incorporate into drought mitigation strategies: early warning systems; drought preparedness, including contingency plans; and, appropriate food security systems;
- (ix) Promote cooperation with other countries (international and regional) on relevant environmental protection and resource conservation issues, and liaise closely (directly and through intergovernmental fora) in elaboration and implementation of action plans.

Before assessing the actions and plans relevant to the CCD, one issue of definition should be raised. CCD rightly defines drought as rainfall 'significantly below normal recorded levels'. In Zambia, drought as per this definition was experienced in many areas in 1991/92, and it is this which is referred to in the CCD definition. However, 'drought' is often wrongly used in relation to the region I low rainfall areas. Clearly, if an area experiences 'drought' six years out of ten, then this is 'normal'. The areas frequently referred to as drought-prone normally have low rainfall, but suffer when cropping patterns and land husbandry do not acknowledge this. Maize planted in Chiawa, for instance, will regularly fail, whilst appropriate sorghum varieties will only do so rarely - in real droughts.

CCD itself is a little flexible on this matter, as it occasionally refers to drought-prone areas in such a way that normal low rainfall is implied.

7.3 Activities

As CCD has yet to come into force, it is not surprising that no programmes have yet been designed in direct reference to this convention. There are, however, on-going activities which meet the obligations of the convention, and others planned in the NEAP.

Desertification, especially through overgrazing of low-rainfall regions, is fully discussed in the NEAP. Land degradation is identified as one of the chief environmental problems in Zambia with livestock populations numbers and management and crop husbandry techniques identified amongst the causes.

NEAP identifies specific examples of serious degradation, such as found at Lusitu. The overpopulation of people and goats in this arid resettlement area (from the Zambezi Valley when Kariba was flooded) has created perhaps the worst land degradation in the country. Other fragile ecosystems in the same area are being threatened as the tsetse fly is eradicated driving an influx of people and domesticated animals.

Current strategies have focused on improving crop husbandry techniques, especially in low rainfall areas. The Soil Conservation and Agro-Forestry Extension Project (SCAFE) linked with the agricultural extension service has provoked interest for its work in Southern, Central and Eastern Provinces. Land management techniques are promoted through participatory community methods, allowing the full integration of women in planning and implementation. This programme has finished its first phase, and will continue in a similar manner. SCAFE is mentioned in the NEAP in relation to forestry work, but this is not really its key component. SCAFE is best understood as promoting community awareness of land management and conservation, preventing desertification and rehabilitating degraded land.

As such, it is very much in line with the overall objectives of CCD and NEAP.

Establishment of vetiver grass is supposed to be promoted through a programme supported by the World Bank in 1993. To date, however, little success has been achieved. The NEAP report makes no mention at all of this initiative. The programme is still scheduled to happen, and the technique offers a useful way of controlling erosion on high risk sites.

7.4. Plans

In the NEAP, a number of plans are presented which comply with CCD. They are mostly incorporated in the agriculture and forestry components, rather than being identified as a single group tackling desertification. Nonetheless, they meet most of the obligations of CCD. These proposed plans include:

- Review of land tenure arrangements in the light of environmental impact, coupled with the introduction of financial incentives for good land husbandry.
- Endorsement of the involvement of extension services, NGOs and community based organisations in an integrated participatory programme to prevent desertification and improve husbandry.
- Suggestion that NCSR, in conjunction with UNZA, be resourced to monitor land degradation. This would include observations on erosion, acidification, soil structure, deforestation, micronutrient loss and pollution. Information gathering and research obligations would thus be met.
- Encouragement for NGOs to promote land husbandry techniques to prevent desertification. A good example of this is the work of Harvest Help Zambia in the Gwembe Valley.
- Recommendations in support of technologies to control desertification such as agro-forestry and other land management techniques, although vetiver grass is not specifically mentioned.

Drought mitigation is mentioned not so much in NEAP as in the ASIP document. The key components of ASIP which comply with the CCD obligations are:

- Establishment and management of an early warning system. Information is published throughout the growing season, describing the status of the weather and the crop. This forecasting mechanism gives way to market information in the dry season, and the unit's publications are widely distributed. This programme will continue with FAO support.
- Promotion of agricultural diversification to achieve improved food security. The dominance of maize as a sole staple food means that more drought resistant crops have been lost. Various programmes are promoting more appropriate food crops in different areas, notably the new sorghum varieties in region I, or cassava in region III. These programmes are recommended in both ASIP and NEAP, and seem

likely to continue. Other food security programmes are examining food storage facilities at local level, to allow communities to keep adequate food safely, especially in remote areas.

- Drought preparedness is a question which is under consideration, especially following the 1991/92 drought. There is some debate about the level of reserve required, but it is likely that this will be satisfactorily resolved through the ASIP process.

7.4 Gaps and Recommendations

Many of the CCD obligations are already under consideration through various programmes, which are either being implemented or in development. Considering that the convention is extremely new, it is quite encouraging to observe the extent to which the content is already part of the national programme.

However, the fragmentation of national programmes relevant to this convention may cause a problem. The important issue of prevention of desertification and rehabilitation of damaged land is extremely pertinent in Zambia today. Aspects of forestry, agriculture, livestock, water, settlement, land tenure and natural resources are all involved. There is a strong emphasis in international circles on these issues, and finance is available. A vague and poorly integrated programme (even if it is strong in many ways) may mean that Zambia loses credibility and assistance unnecessarily.

8.0 Action Plan for the Environmentally Sound Management of the Common Zambezi River System

8.1 ZACPLAN

The Zambezi Action Plan (ZACPLAN) was initiated in 1985 through UNEP in collaboration with SADC. It was part of the UNEP's Environmentally Sound Management of Inland Water Systems programme, which adopted the Zambezi system as its first project.

A working group composed of representatives from Botswana, Malawi, Mozambique, Tanzania, Zambia and Zimbabwe, along with a UN representation for then-occupied Namibia, was formed, and negotiated the action plan. This drew on country studies carried out in each of these countries. ZACPLAN was signed in 1987, by all participating nations.

8.2 Obligations

ZACPLAN identifies four components necessary for the best management of the Zambezi system.

Environmental Assessment: gathering, analysing and monitoring the following information

- Water resources
- Socio-economic development
- Institutions, experts and resources in the region
- Pollution
- Human activity
- Vulnerable ecosystems

Such information is to be made available to all concerned and interested parties, including NGOs.

Environmental Management: From the assessment work, an integrated river basin approach to planning and management will be developed. This will be updated through review, and choices for development and related activities will be made within this framework.

Environmental Legislation: In order to facilitate better management and co-ordination, the legal framework concerning river basin management and/or the Zambezi river system should be harmonised between participating countries. A draft Zambezi Protocol with a proposal for a Zambezi River Basin Commission has been developed.

Supporting Measures: In order to facilitate the above process, countries must ensure that appropriate facilities for education and training are available, along with the necessary resources, and personnel to subsequently carry out whatever plans and programmes are agreed upon. The necessary high level political support, promoting co-operation and harmonisation, must also be secured.

8.3 Plans and Activities

Within the scope of this review, it has not been possible to establish what Zambia's activities in the light of this treaty consisted of, nor the implications of the 1990 review process.

8.4 Gaps and recommendations

ZACPLAN has direct relevance to both the Biodiversity and Ramsar Conventions considering the Zambezi Basin's important role as a source of water and aquatic habitat throughout Zambia. It also addresses critical concerns for the conservation of the integrity of the Victoria Falls World Heritage Site.

The NEAP does not explicitly acknowledge or address the obligations of ZACPLAN. It does identify the benefit of pursuing a river basin management approach to the Zambezi, both in the context of water and of fisheries resource management, but no specific suggestions to this effect are presented. The NEAP does recommend that a detailed inventory be carried out of the Kafue basin, in the light of environmental threats, but no similar mention is made of the Zambezi basin.

It is clear that a more detailed review should be carried out of the river basin strategy for the Zambezi.

As mentioned above, the Zambezi basin should not be considered only in the context of ZACPLAN. It is clearly a significant area (as a whole or in parts) in terms of Zambia's biological diversity, wetlands, natural heritage, and rangeland management / desertification. Expressed in these terms, there are substantial opportunities for support in its conservation, in relation to GEF and other programmes as well.

REFERENCES

- Biodiversity Support Program (1993). *African Biodiversity - Foundation for the Future*. World Wildlife Fund, The Nature Conservancy and World Resources Institute (Washington, DC, USA).
- Brown, C. J. (1993) *Namibia's 12 Point Plan for Integrated and Sustainable Environmental Management*. Directorate of Environmental Affairs, Govt of Namibia (Windhoek, Namibia).
- Chidumayo, E.N. (1993). *Zambian Charcoal Production - Miombo Woodland Recovery*. Energy Policy 21:586-597.
- GEF (1992). *Criteria for Eligibility and Priority for Selection*. GEF (Washington, DC, USA).
- Glowka, L, Burhenne-Guilmin, F, & Synge, H. (1994). *A Guide to the Convention on Biological Diversity*. Environmental Policy and Law Paper No. 30. IUCN-The World Conservation Union (Gland, Switzerland).
- Houghton J.T., Jenkins, G.J., & Ephraums, J.J. (1990). *Climate Change The IPCC Scientific Assessment*. Cambridge University Press. (Cambridge, UK).
- Huntley, B.J. (ed.) (1994). *Botanical Diversity in Southern Africa*. National Botanical Institute (Pretoria, South Africa).
- IUCN (1988). *The Evolution of CITES*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1988b). *Protected Landscapes - A Guide for Policy Makers & Planners*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1990). *Wild Plant Conservation & The Law*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1992). *World Heritage Twenty Years Later*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1993). *The Convention on Biological Diversity: an Explanatory Guide*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1993b). *Parks for Life: Report of the IVth World Congress on National Parks and Protected Areas*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1993c). *The GEF and Biological Conservation*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN (1993d). *Guidelines for Legislation to Implement CITES*. IUCN-The World Conservation Union (Gland, Switzerland).
- IUCN, UNEP & WWF. (1991). *Caring for the Earth*. IUCN-The World Conservation Union (Gland, Switzerland).

Jain, P.C. (1994). *Capacity Building in Energy and Environmental Physics in Zambia*. SIDA Project. (Physics Dept. UNZA).

Jain, P.C., Chibuye, T., & Kruss, P.D. (eds) (1993). *Proceedings of the Regional Workshop on Solar Radiation, Environment and Climate Change*. International Journal of Renewable Energy 3, No. 4/5. Pergamon Press. (Oxford, U.K.).

Klemm, C. de, & Shine, C. (1993). *Biological Diversity Conservation and the Law: Legal Mechanisms for Conserving Species and Ecosystems*. Environmental Policy and Law Paper No. 29. IUCN-The World Conservation Union (Gland, Switzerland).

Krattiger, A.F., McNeely, J.A., Lesser, W.H., Miller, K.R, St. Hill, Y., & Senanayake, R. (eds). (1994). *Widening Perspectives on Biodiversity*. IUCN-The World Conservation Union (Gland, Switzerland) & International Academy of the Environment (Gland, Switzerland).

McNeely, J.A., Miller, K.R., Reid, W.V., Mittermeier, R.A., & Werner, T.B. (1990) *Conserving the World's Biological Diversity*. IUCN-The World Conservation Union (Gland, Switzerland), and the World Resources Institute (WRI), Conservation International (CI), World Wide Fund for Nature (WWF) and the World Bank (Washington, DC, USA).

Ministry of Environment & Natural Resources (1994). *National Environmental Action Plan*. Government of Zambia (Lusaka, Zambia).

Munyati, C. (1993). *Effects of Climate Change on Forests, Montane Systems, Savannas, Protected Areas and Coastal Systems: An Analysis for Zambia and Southern Africa*. Project Report for the WWF Country Office. (Lusaka, Zambia).

Munyeme, G. & Jain, P.C. (1994). *Energy Scenario of Zambia: Prospects and Constraints in the Use of renewable Energy Resources*. In Proceedings of the World Renewable Energy Congress III (Edited by A A M Sayigh). (Reading, U.K.).

Ramsar Convention Bureau (1993). *Towards the Wise Use of Wetlands*. (Gland, Switzerland).

Southern Centre (1993). *UNEP Greenhouse gas Abatement Costing Studies: Zimbabwe Country Study Phase Two*. (Harare, Zimbabwe).

UNEP (1993). *Priorities for action for conservation and sustainable use of biological diversity and agenda for scientific and technical research*. United Nations Environment Programme (Nairobi, Kenya).

UNEP (1993b). *Guidelines for Country Studies on Biodiversity Conservation*. UNEP (Nairobi, Kenya).

WCMC (1994). *Priorities for conserving global species richness and endemism*. World Conservation Monitoring Centre (Cambridge, UK).

WRI (1994). *World Resources 1994-1995*. Oxford University Press (Oxford, UK).