

**COUNTRY PROFILE
ON
ENVIRONMENT**

ZAMBIA

FINAL REPORT

November 1998

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JAPAN INTERNATIONAL COOPERATION AGENCY

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USERS GUIDE: Contents of the Report

This report consisted of the following Chapters on environmental information of the country.

1. Keywords of the Environment

Various features and principal environmental issues and their related matters of the country are schematized within 1 page to easily understand the country's natural and social environmental issues on the whole.

2. Fact Sheet

Principal indices and natural and social environmental characteristics of the country such as economy, demographic statistics, socio-economic conditions, various important resources available in the country are described.

3. Institutional Context

3.1 Environmental Agency

Matrix table on governmental agencies related to the environmental issues in the Chapter 4 is described to grasp the role of the agencies easily. Responsibilities and organizational structure of the principal responsible agency for the environment, and responsibilities of related agencies are explained. Main activities of the various environmental non-governmental organizations are described in the table.

3.2 National Environmental Policy

Environmental policy of the country such as national environmental action plan is explained.

3.3 Environmental Laws and Regulations

Environmental laws and regulations of the country including their status of applications are described.

4. State of the Environment

In this Chapter, status of the various environmental issues as follows are covered with information on related agencies, related standards, laws and regulations, examples of the issue are explained. In the section 4.3, other kind of considerable environmental issues in the country are described based on the report which local consultant prepared.

4.1 Air Pollution	4.7 Waste Water Management
4.2 Water Pollution	4.8 Forest Conservation/Desertification
4.3 Other Pollution	4.9 Biodiversity
4.4 Waste Management	4.10 Natural Resource Management
4.5 Energy Conservation and Alternative Energy	4.11 Natural Disaster
4.6 Water Supply	4.12 Environmental Education

5. International Relationship

Status of the implementation of the economic and technical assistance projects in the country are outlined. International conventions and agreements on environment which the country agreed and ratified are listed up in section 5.1, and environmental projects which are funded and/or implemented in the country by donor countries and international organization in the section 5.2. In addition, location map of the project funded and implemented by using the Official Development Assistance (ODA) of Japanese government are showed.

6. Sources of Information

Governmental environmental agencies related institutions and NGOs are listed with the some information such as contact address and e-mail address.

7. References

References used in the report are listed.



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1. KEYWORDS OF THE ENVIRONMENT

1.1. Features of the Country

	Related pages
① Gross Domestic Production(GDP) US\$1,516 per capita (Japan : US\$33,857, China : US\$361) Total : US\$54 billion	· 2. Fact Sheet p.3
② High-concentrated Urban Population Urban population rate: 73% Total population: 35 million, Urban population: 26 million	· 2. Fact Sheet p.3 · 4.1, 4.2, 4.4
③ Abundance of Mineral Resources Fifth copper production in the world (other resources: cobalt, lead, zinc, silver, etc.)	· 2. Fact Sheet p.3

1.2 Keyword of Environmental Issues

	Related page
① Soil degradation <ul style="list-style-type: none"> · Inappropriate crop production method (ex. shifting cultivation) · Deforestation · Pesticides and fertilizer pollution 	4.8 Forest conservation p. 21
② Water pollution <ul style="list-style-type: none"> · Industrial effluent (ex. from mining activity) · Chemical contamination from disposal site · Drinking water · Untreated domestic wastewater 	4.2 Water pollution p. 14 4.4 Waste management p. 17 4.6 Water supply p. 19 4.7 Waste water management p. 20
③ Mineral industrial pollution <ul style="list-style-type: none"> · Copper refinery pollution · Air pollution · Water pollution · Waste management 	4.1 Air pollution p. 12 4.2 Water pollution p. 14 4.4 Waste management p. 17
④ Natural disaster <ul style="list-style-type: none"> · Drought =>Disease outbreaks 	4.11 Natural Disaster p. 29

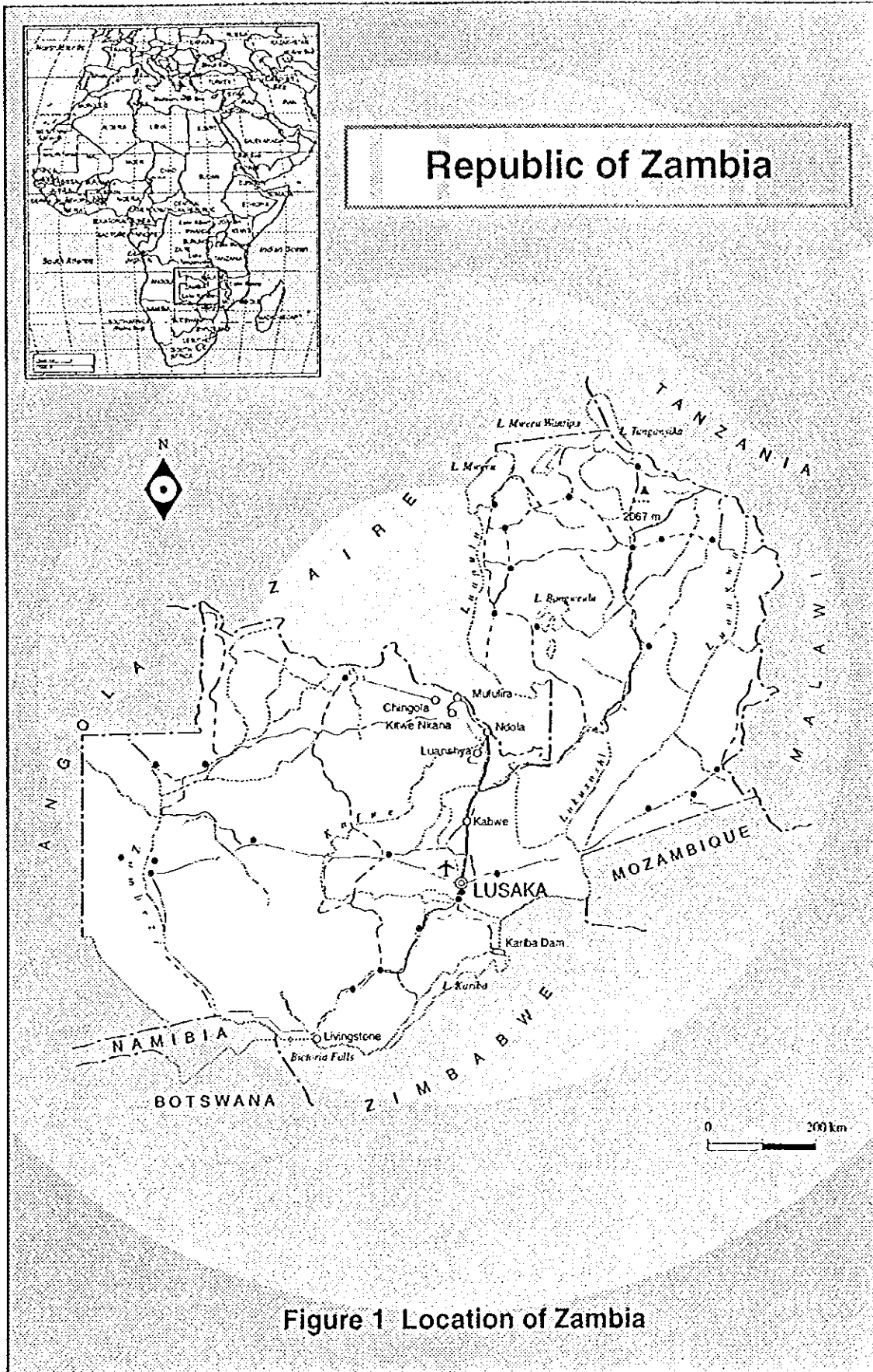


Figure 1 Location of Zambia

Source: Data Atlas 1994 - 1997

2. FACT SHEET

2.1 Socio-economic Index

Index	Data	Data year	Reference
Population	9.46 million (annual average incremental rate : 3.0 % (1990~95))	1995	b)
Race	73 tribes	(no information)	d)
Religion	Most are Catholicism and traditional religions. Others are Hinduism, Muslim, etc.	(no information)	d)
Literacy rate	Adult female : 65% Adult male : 82%	1990	b)
Urban Population rate	43% (4.07 million)	1995	b)
Life expectancy	48.9 (1990~1995 average)	1990-95	b)
Under-5 mortality rate	203 (per 1,000)	1993	b)
GNP ¹⁾	\$3,396 million (\$380/person)	1993	b)
GDP ¹⁾	\$3,685 million (\$412/person)	1993	b)
GDP structure	Agriculture : 34% Industry : 36% Service industry & others : 30%	1993	b)
Prime industry	Mining	1996	d)
Prime resource	Emerald, copper, zinc, gold, lead, silver, uranium, raw rubber, corn, tobacco, peanut, cotton, sugar cane	1996	d)
Safe water (% of population with access) ²⁾	Urban : 64% Rural : 27%	1980-1995	b)
% of sewerage population ³⁾	Urban : 67% Rural : 25%	1980-1995	b)
Human Development Index (HDI)	0.369 (World rank 143, GDP per capita rank 128 in same year)	1994	c)

*1 : The estimated value of the GNP was exchanged and adjusted from local currency into US\$ by means of 3-year average of exchange rates. The estimated value of the GDP was presented in US\$ of 1993 based on the exchange rate.

*2 : "Safe water" includes treated surface water, and untreated water which is pumped up from protected spring / excavated well and sanitary well.

*3 : "Sewered population" should be met conditions that the population in urban area can use public sewerage and indoor facility such as dug hole outdoor toilet, pouring water toilet, private sewerage system, public community toilet, and similar facilities, and that the population in rural area can use dug hole outdoor toilet, pouring water toilet, or other proper treatment methods.

2.2 Geographical Characteristics

Area : 752,000 km ² (twice as Japan's)
Geographical features : (no information)
Highest place : (no information)

Source: a)

2.3 Meteorological Characteristics

Climate : Tropical type
Season : 1) hot wet season from November to April, 2) cool dry season from May to July, 3) hot dry season from August to October
Average temperature : average monthly minimum of about 10°C in June and July, average monthly maximum of about 30°C in October and November
Average annual rainfall : northern and northwest parts : about 1,500 mm/year, south and southeastern parts : 600 ~ 900 mm/year
Climatic classification : (no information)

Source: a)

2.4 Ecological Characteristics

Biogeographical feature: 14 vegetation-based ecosystem under four main categories; forest, thicket, woodland and grassland. In addition, aquatic and anthropic ecosystems : 1) dry evergreen forest, 2) dry deciduous forest, 3) montane forest, 4) swamp forest, 5) riparian forest, 6) thickets, 7) chipya woodland, 8) miombo woodland, 9) kalahari woodland, 10) mopane woodland, 11) munga woodland, 12) terminalia vegetation, 13) dambo grassland, 14) flood plain and swamp grassland, 15) aquatic (lakes and rivers), 16) anthropic (cropland and fallow, forest plantations and built-up areas)
Identified animals and plants : (no information)
Protected area : 19 national parks (Sumbu national park, etc. : 8.4% of country's total area), 34 game management areas (22% of country's total area)

Source: a)

2.5 Hydrological Characteristics

Main river : Zambezi, Kafue, Luangwa, Lukanga, Chambeshi, Lunga, Kabompo, Luapula, Lukusashi
 Lakes : Bangweulu, Mweru, Mweru Wantipa, Kariba, Itzhi tezhi, Tanganyika
 Swamps : Lukanga swamp, Falls : Victoria falls

Source: a)

2.6 Environmental Issues and On-going Activities by Provinces

(1) Central Province
Environmental issues
• Deforestation • Soil erosion • Shifting cultivation • Bush fires
• Over exploitation of natural resources (Fish & Game) • Overgrazing • Agro-chemical pollution
• Poor urban sanitation • Solid waste dumping • Land dereliction
• Water pollution from inadequate sewage treatment in Lusaka urban
On-going activities
• ADMADE wildlife program • Soil Conservation and Agroforestry Extension Program (SCAFE)
(2) Copperbelt Province
Environmental issues
• Deforestation • Soil acidity • Pollution • Land dereliction • Poor urban sanitation
• Unplanned urban developments • Noxious weeds arising from eutrophication of waterways by sewage effluent
On-going activities
• The ZCCM Group Environmental Services are carrying out environmental monitoring work for informed implementation of mitigation measures on problems resulting from mining.
• The enforcement of the Environmental Protection and Pollution Control Act (EPPCA) is slowly helping in monitoring pollution problems
(3) Eastern Province
Environmental issues
• Deforestation • Over-exploitation of game • Soil erosion • Bush fires • Water pollution and poor sanitation
On-going activities
• The LRDP and ADMADE programs under the NPWS • The SCAFE program
(4) Luapula Province
Environmental issues
• Deforestation • Over-exploitation of game • Soil acidity and infertility • Wildlife and fish over-exploitation
On-going activities
• The WWF/DANIDA Wetlands Development Project • Local community participation in natural resource management
(5) Lusaka Province
Environmental issues
• Deforestation • Poor sanitation • Unplanned urban settlements • Industrial pollution • Vehicle exhaust emissions
On-going activities
• (none)
(6) Northern Province
Environmental issues
• Soil acidity and infertility • Deforestation • Over-exploitation of fish
On-going activities
• Soil Productivity Research Program
(7) North Western Province
Environmental issues
• Soil infertility • Poor sanitation • Deforestation • Bush fires • Soil erosion
On-going activities
• The GTZ supported Beekeeping and Forestry Project
(8) Southern Province
Environmental issues
• Deforestation • Soil erosion • Wildlife depletion • Pollution and sanitation
On-going activities
• SCAFE activities
(9) Western Province
Environmental issues
• Deforestation • Soil erosion • Bush fires • Water pollution
• Poor sanitation • Floods and drought
On-going activities
• The Upper Zambezi Wetlands Resources Project • The Liangati Integrated Development Area Project

Source: a)

3. INSTITUTIONAL CONTEXT

The environmental policies in Zambia are closely linked to the major economy sectors of the namely: agriculture, mining, transport and communications, manufacturing, energy, tourism and general natural resources management.

There are in total 28 different pieces of legislation relevant to the environment and specific to the different sectors of the economy. Since 1990 the Environmental Protection and Pollution Control Act is the principle environmental law on which all the environmental legislation is based. The Act provides for the environmental protection and pollution control through the establishment of the Environmental Council of Zambia whose main task is to implement the Act.

3.1 Environmental Agency

3.1.1 Governmental Agency

(1) Environmental issues and Related Governmental agencies

(see "6. SOURCES OF INFORMATION" on each agencies and its contact address.)

Governmental Agency	4.1	4.2	4.3			4.4	4.5	4.6	4.7	4.8	4.9	4.10	4.11	4.12
	Air pollution	Water pollution	(1) Radioactive	(2) Noise	(3) Odors	Waste	Energy	Water Supply	Waste Water	Forest	Biodiversity	Resources	Disaster	Education
Ministry of Environment and Natural Resources (MENR)	○	○	—	—	na	○	—	—	○	○	○	○	—	—
Environmental Council of Zambia (ECZ)	○	○	—	○	na	○	—	—	○	—	○	—	—	—
Environmental Management Unit - Roads Department	○	—	—	—	na	—	—	—	—	—	—	—	—	—
Environmental and Social Affairs Unit — Zambia Electricity Supply Corporation (ZESCO)	—	—	—	—	na	—	○	—	—	○	—	—	—	—
Group Environmental Services — Zambia Consolidated Copper Mines (ZCCM)	○	—	—	—	na	—	—	—	—	—	—	—	—	—
Others	○	○	○	○	na	○	○	○	○	○	○	○	○	○

Note: 1) : ○ → related — → no relation na → no information

2) : 4.3 other pollutions,

4.3(1) Radioactive substances, 4.3(2) Noise and vibration, 4.4 Waste management,

4.5 Energy conservation and alternative energy, 4.7 Waste water management,

4.8 Forest conservation / desertification, 4.10 Natural resource management,

4.11 Natural disasters, 4.12 Environmental education

3) : Refer to each section related to other agencies when column is filled by ○.

(2) Governmental organization related to environmental issues

Organization / Outline of activities	Annual budget	Number of staff
Ministry of Environment and Natural Resources (MENR) <ul style="list-style-type: none"> • established in 1991 • supreme body for environmental protection and natural resources management • environmental protection and quality control is facilitated by the ECZ while natural resource conservation falls under the Department of Natural Resources and Forestry 	(no information)	(no information)

Organization / Outline of activities	Annual budget	Number of staff
Environmental Council of Zambia (ECZ) <ul style="list-style-type: none"> established in 1991 following the enactment of the Environmental Protection and Pollution Control Act No. 12 of 1990. run by a board whose members are drawn from all relevant ministries of government, private sector, academia, the mining sector and NGO's charged with <ul style="list-style-type: none"> advising government on the formulation of environmental policies recommending measures to control pollution coordinating activities of all ministries involved in environmental protection advising on co-operation on national and international organizations implementing the EPPCA and its associated regulations advising on the effects of any socio-economic developments on the environment 	(no information)	(no information)
Environmental Management Unit - Roads Department <ul style="list-style-type: none"> recently established oversee the implementation of environmental mitigation measures in the roads rehabilitation and construction activities Its activities include: <ul style="list-style-type: none"> building of capacity in the Ministries of Local Government and Housing, Works and Supply and Communications and Transport in environmental management of issues resulting from road works. identification of road works requiring impact assessment studies and carrying out monitoring working conjunction with the Environmental Council of Zambia. 	(no information)	(no information)
Environmental and Social Affairs Unit – Zambia Electricity Supply Corporation (ZESCO) <ul style="list-style-type: none"> oversee the environmental and social issues resulting from the ZESCO operations and activities throughout the country responsible for carrying out environmental audits of ZESCO installations and operating areas and the assessing the likely social implications of ZESCO activities in its provision of electricity 	(no information)	(no information)
Group Environmental Services – Zambia Consolidated Copper Mines (ZCCM) <ul style="list-style-type: none"> established following the ZCCM environmental statement of 1992 activities include environmental data management, water management, air management, and waste management in the mining areas the specific activities are the implementation of environmental management systems to meet the ECZ Statutory Instrument (SI) provisions. This is helping ZCCM in meeting some of the emissions and discharge limits set by ECZ such as in water quality 	(no information)	(no information)

Source: a)

3.1.2 Non-governmental Agency (NGO)

(no information)

3.2 National Environmental Policy

Policy/Project Name and Contents	Funding or Implementing Agency
National Conservation Strategy (NCS) <ul style="list-style-type: none"> developed in 1985 the NCS became the government's official environmental policy document the policy objectives of the NCS were to ensure the sustainable use of renewable natural resources, maintenance of biodiversity, ecological processes and life – support systems 	(no information)
National Environmental Action Plan (NEAP) <ul style="list-style-type: none"> completed in 1994 provides an overview of the country's environmental problems, existing legislation and institutions and strategic options for improving environmental quality all legal frameworks and policy changes are based on the recommendations of the NEAP provides institutional and policy recommendations for all the major sectors of the economy. 	(no information)

Policy/Project Name and Contents	Funding or Implementing Agency
<p>The Environmental Support Program (ESP)</p> <ul style="list-style-type: none"> • a direct outcome of the NEAP and it seeks to provide a mechanism for the implementation of the recommendations of the NEAP • the objectives of the ESP are to strengthen capacities of institutions to manage the environment and empower local communities to participate fully in promoting sustainable use and management of natural resources (Mudenda 1998). • at policy level, Zambia has integrated environmental concerns in its development planning through the NCS, NEAP, ESP and a number of community based resource management programs through the development of the policy framework that has led necessitated the incorporation of environment in the planning process. • the ESP has now been launched as a national environmental program with an initial phase running from 1997 to the year 2001 • consists of four main components, which are closely inter-linked and mutually reinforcing. <ul style="list-style-type: none"> - institutional strengthening and legal framework - Environmental Education and Public Awareness (EEPA) - Pilot Environmental Fund (PEF) - environmental information management 	(no information)
<p>The Agricultural Sector Investment Program (ASIP)</p> <ul style="list-style-type: none"> • a World Bank supported program aimed at formulating government agricultural policy under the structural adjustment initiative • the objectives of ASIP <ul style="list-style-type: none"> - improving the policy - environment for agricultural growth through policy changes, which would enhance the incentive structure for farmers and agribusiness - expansion of cultivation of traditional commodities by making better use of under utilized land existing in large commercial farms - improving small holder productivity through strengthening the agricultural support services, technology and financial assistance to small holders - promote private sector development in agribusiness through improving policy environment and targeted support. • the key policy reforms included the creation of an enabling environment to support agricultural development, land use, land tenure, and institutional restructuring and capacity building. • ASIP has been running for a number of years now and is currently on hold because the other major donors have not supported it (Mudenda, 1998, Chinene et al 1996) 	World Bank
<p>The Zambia Forestry Action Program (ZFAP)</p> <ul style="list-style-type: none"> • initiated in 1992 to address the concerns on the increasing demands for fuel wood and charcoal, timber and other wood products that were largely responsible for deforestation and forest resource degradation • main objective is to support conservation and development of the forest sector and making a meaningful contribution to food security by adopting environmentally friendly and sustainable agricultural practices. This will be achieved through the Provincial Forest Action Programs (PFAP). • the ZFAP and its implementing arm the PFAP is a sector specific programme to be run by the Forest Department. 	Forest Department
<p>The Water Sector Reform Support Unit (WSRSU)</p> <ul style="list-style-type: none"> • undertake the water and sanitation restructuring programme • the objectives of the restructuring process is to reorganize the sector by decentralization and promotion of private involvement through changes in the institutional, legislative and organizational framework of the water sector • the Water and Sanitation Health Education (WASHE) programme is the executing arm of the Water and Sanitation Reform Support Unit. It promotes the linkages between water, sanitation and health education based on intersectoral and integrated approach to assessment, planning, development and management of sustainable community water supply and sanitation through health education. 	• Ministry of Energy and Water Development
<p>National Parks and Game Management Area Plans</p> <ul style="list-style-type: none"> • a number of National Parks Management Plans are under review by JICA for the Kafue National Park and the EDF Sustainable Wildlife Management Project for the Lower Zambezi and South Luangwa National Parks 	(no information)

Policy/Project Name and Contents	Funding or Implementing Agency
<p>Community Based Wildlife Resources Management Programmes (CBWRMPs)</p> <ul style="list-style-type: none"> • being implemented through the Administrative Management Design (ADMADE) and the Luangwa Integrated Resources Management Project (LJRDP) • these programs will be enhanced following the passing of the Zambia Wildlife Act of 1998, which has provided the legal framework for the local community institutions in the management of wildlife in the Game Management Areas • the Community Environmental Management Program under the Pilot Environmental Fund (PEF) is under way in two Pilot Districts of Mufulira and Mpika. This program is aimed at promoting community participation in local environmental and sustainable natural resources management. • under formulation are the National Biodiversity Strategy and Action Plan (NBSAP) and the National Action Plan to Combat Desertification and Mitigation of the Effects of Drought. 	(no information)

Sources: a)

3.3 Environmental Laws & Regulations

Laws & Regulations	Status	Related Pages
<p>Atmospheric pollution</p> <p>a) The Air Pollution Control (Licensing and Emission Standards) Regulation, 1996, of the Environmental Protection and Pollution Control Act No. 12 of 1990</p> <ul style="list-style-type: none"> • Main legislative instrument for the control of air pollution in Zambia • Enforced by the ECZ through a licensing system for emitting air pollutants 	<ul style="list-style-type: none"> • The ECZ as currently has no capacity to effectively enforce the regulations 	(no information)
<p>Water pollution and waste water management</p> <p>a) The Water Pollution Control (effluent and waste water) Regulations No.72 of 1993 of the Environmental Protection and Pollution Control Act No. 12 of 1990</p> <ul style="list-style-type: none"> • Main legislation for the protection of water from pollution • Enforced by the ECZ 	<ul style="list-style-type: none"> • Has not been very effective mainly due to lack of capacity by the ECZ to implement it and also because of the lack of incorporation of economic instruments in the control policies 	(no information)
<p>Waste Management</p> <p>a) The Waste management (Licensing of transporters of wastes and waste disposal sites) Regulations No.71 of 1993 of the Environmental Protection and Pollution Control Act No. 12 of 1990</p> <ul style="list-style-type: none"> • Enforced by the ECZ • Currently producers of waste are expected to get a license for discharging such waste, transporting waste or managing a disposal site 	<ul style="list-style-type: none"> • Compliance and hence, effectiveness of the regulation has been poor due to lack of capacity by the ECZ to implement it and also because of the lack of incorporation of economic instruments in the control policies 	(no information)
<p>Natural resources (general)</p> <p>a) The Natural Resources Conservation Act Cap 315 of 1970</p> <ul style="list-style-type: none"> • The main legal instrument for the management of natural resources outside Forest Reserves, National Parks, Fisheries and Mining areas <p>b) The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997</p> <ul style="list-style-type: none"> • Requires that all developments with major environmental impacts under go some Impact assessment before they are approved to go ahead • Enforced by the ECZ • Will help in attaining sustainable natural resource management in the country • The EIA regulations are the newest of the EPPCA regulations and require comprehensive capacity building before they can become effective in Environmental and Natural resources protection 	<ul style="list-style-type: none"> • However, the desolution of the Natural Resources Department has now rendered the Act to remain hanging with no institution to back it up.(Mtongo 1998) 	(no information)
<p>Wildlife</p> <p>a) The Zambia Wildlife Act No.12 of 1998 recently replaced the National Parks and Wildlife Act No.12 of 1991</p> <ul style="list-style-type: none"> • The Act establishes the Zambia Wildlife Authority and defines its functions as the : <ul style="list-style-type: none"> - Provides for the establishment, control and management of National Parks, and the conservation. 	(no information)	(no information)

Laws & Regulations	Status	Related Pages
<p>protection and enhancement of wildlife ecosystems biodiversity and for the promotion of opportunities for the equitable and sustainable use of the special qualities of National Parks.</p> <ul style="list-style-type: none"> - Provides for the establishment of Game Management Areas (GMA) by the President whenever appropriate. - Provides for the sustainable use of wildlife and the effective management of the wildlife habitat in GMA's - Provides for the enhancement of the economic and social well being of local communities within GMA's and provides for their involvement in the management of the GMA's - Provides for the development and implementation of management plans - Provides for the regulation of game ranching - Provides for the implementation of the CITES, RAMSAR and the Biodiversity Convention <ul style="list-style-type: none"> • This Act is new and will come in effect on 1st January 1999. <p>b) The Tourism Act of No.23 of 1989</p> <ul style="list-style-type: none"> • Provides the legal framework for the development and promotion of tourism • Does not explicitly address the issue of conservation or natural resource management • Is not effective and there is need to harmonize it with the Zambia Wildlife Authority Act of 1998 since tourism in Zambia is largely wildlife based 		
<p>Forestry</p> <p>a) The forest Act No.21 of 1974</p> <ul style="list-style-type: none"> • Main legal instrument for the establishment, control and management of forests • Makes provisions for the conservation and protection of forests and trees through the establishment of Forest Reserves. The Act has a number of weaknesses such as the lack of provisions for community participation in forest resource management • Does not empower local communities in open areas utilization and management of forest resources • At present the problem of illegal settlers encroaching on Forest Reserves has become rampant and political. This is threatening the existence of the forest estate in the country • The weaknesses of this Act <ul style="list-style-type: none"> - The lack of provision for community participation in forest management - Lack of provisions for development of forest management plans - Inadequate benefits from the reference derived through exploitation of forest accruing to local communities. • Efforts have reached an advanced stage in transforming the Forest Department into a Forest Authority with semi-autonomy to effectively manage the forest resources in the country sustainably and combat deforestation 	<ul style="list-style-type: none"> • The Forest Act is currently under going review to bring it in line with the requirements for the modern situation such as incorporation of gender in decision making, extension, training and funding for projects that target women in forestry, agroforestry, woodlots, non-wood industries and conservation 	(no information)

Laws & Regulations	Status	Related Pages
<p>Agriculture</p> <p>a) Agricultural Lands Act of 1960</p> <ul style="list-style-type: none"> • The Act also establishes the Agricultural Lands Board, and provides for its functions, which involve making recommendations to the Minister responsible for Agriculture, Food and Fisheries • The MAFF has been restructured and now includes the following Departments: <ul style="list-style-type: none"> - Economic and Marketing Department - Policy and Planning Division - Marketing and Development • Field Services <ul style="list-style-type: none"> - National Agricultural Information service - Agricultural Extension, - Fisheries Extension - Technical Services • Research Speciality and Administration <ul style="list-style-type: none"> - Soils and Crop Research, - Fisheries Research - Animal Health and Livestock Research • Human Resources Development and • Seed Control and Certification Institute • One of the major weaknesses of the Agricultural policy is that the Act does not address the issues of community participation, the roles if any traditional farming methods as well as the benefits accrue to the communities for environmentally sound farming practices and other aspects of equitable sharing of benefits. 	(no information)	(no information)
<p>Fisheries</p> <p>a) The Fisheries Act Cap 314 of 1974</p> <ul style="list-style-type: none"> • Provides for commercial fishing and registration of fishermen and their boats • Protects ecosystems, habitats and viable population species by controlling fishing methods in prescribed areas and commercial fishing areas. • Weaknesses of the Act include: <ul style="list-style-type: none"> - The Act has no specific provisions for the protection of species threatened with extinction - The Act does not provide for management plans for sustainable fishery management. - The Act regulates commercial fishing only. Non-commercial fishing areas are not regulated although they clearly affect fisheries management. - The Act does not specifically provide for the involvement of the communities in the management of the fisheries resources. 	(no information)	(no information)
<p>Water</p> <p>a) The Water Act ,Cap 312 of 1949</p> <ul style="list-style-type: none"> • Regulates the ownership, control and use of public and private water • Regulates the use, diversion and apportionment of all water in the country • The Act is administered by the Water Development Board • Weaknesses of the Act are: <ul style="list-style-type: none"> - The Act does not provide for water users committees to participate in the regulation of water resources - It does not provide for the regulation of water on International boundaries. - It has no water pollution standards for legal adherence. - It is not harmonized with customary water rights - It is not harmonized with other general policies and regulations for environmental protection <p>b) The Water Policy</p> <ul style="list-style-type: none"> • Aimed at promoting a sustainable water resources development with a view to facilitate equitable provisions of adequate quantity and quality of water for all competing users at acceptable costs and ensuring security of supply under varying conditions. <p>c) The Water Development Board</p> <ul style="list-style-type: none"> • A statutory body appointed under Cap 312 of the laws of Zambia 	(no information)	(no information)

Laws & Regulations	Status	Related Pages
<ul style="list-style-type: none"> • The Board is under the Ministry of Energy and Water Development (MEWD) and gets its technical support from the Department of Water Affairs (DWA) • The major function of the Board is to control the use of all surface water resources in the country by allocating water for different uses. <p>d) The Zambezi River Authority</p> <ul style="list-style-type: none"> • The Zambezi River Authority Act of 1987 ratified the agreement between Zambia and Zimbabwe for the development of Zambezi waters along the common boundary. The Act provides for 50:50 sharing of benefits and costs principally for hydropower and calls for consent before substantial quantities of water from the Zambezi river are abstracted for uses such as irrigation (GRZ 1994-Water policy). • Weaknesses of the act <ul style="list-style-type: none"> - The Zambezi River Authority is weak in that it has no by-laws to govern Environmental Impact Assessment for development projects being under taken in the Zambezi River common. - The Water Act Cap, 312 is under going review to bring it in line with the requirements of the water policy. 		
<p>International Cooperation</p> <ul style="list-style-type: none"> • The organ responsible for international cooperation is the Ministry of Foreign Affairs. Financial assistance is however, facilitated by the Ministry of Finance. The Ministry of Finance is responsible for the negotiation of funds and onward disbursement to organs responsible for implementation. Although the negotiations of international agreements are normally done through the Ministry of Foreign affairs and Ministry of Finance, once they are concluded, they become the responsibility of sector ministries or specialized departments or organs. Some times environmental projects are implemented by reputable local and international the NGOs such as IUCN, WWF, ECAZ and some CBOs. • The ECZ, a regulatory and advisory body of government on environmental issues is in most cases responsible for the implementation of environmental projects. 	(no information)	(no information)

Source: a)

4. STATE OF THE ENVIRONMENT

4.1 Air Pollution

Status

Air pollution in Zambia is largely restricted to the industrial urban centers on the Copperbelt and the City of Lusaka. The major pollutants are

- . Sulphur dioxide from copper processing and from vehicle exhausts
- . Carbon monoxide from incomplete combustion in vehicle exhausts and cement/lime production and oil refinery combustion processes.
- . Carbon dioxide from the burning of fossil fuel in industry and wide spread bush fires.
- . Particulate matter (dust) from quarrying activities and cement/lime production

Problems

The quality of air in the country is not known though emission standards have been set by the ECZ for the control of air pollution in industry to ensure that levels of air pollutants in the ambient environment does not exceed hazardous levels. This is not possible to achieve without information on the status of air quality in the country. No monitoring work has been done to establish the level of air pollution in the country.

The institutions responsible for environmental and pollution control have no capacity to implement the Air Pollution Control Regulations, 1996 Statutory Instrument No. 141 of 1996.

Related Agency
<p><i>National level</i></p> <p>① Ministry of Environment and Natural Resources (MENR)</p> <p>② The Environmental Council of Zambia (ECZ)</p> <p><i>Local / Sectoral level</i></p> <p>① ZCCM Group Environmental Services</p> <p>② City, Municipal and District Councils</p> <p>③ Roads Department – Environmental Management Unit (MEU)</p> <p>④ Company environmental management units</p>

Source: a)

Causes of Air Pollution Problems
<ul style="list-style-type: none"> • Sulphur dioxide is mainly produced from the roasting and smelting processes of sulphur bearing ores in the mining processes, cobalt and acid plants on the Copperbelt. The Zambia Consolidated Copper Mines (ZCCM) standards for sulphur dioxide levels in the ambient air as obtained from the AGL Samplers at Nkana is between 1.2 and 3mg/cubic meter / day, which is higher than the ECZ Statutory Instrument limit of 0.125 mg/cubic meter per day. • Particulate matter pollution is emitted by Chilanga Cement at the Ndola Works as dust from the cement kilns. This largely because the filter on one kiln is designed to clean up to 150 mg/ normal cubic meter when the ECZ Intermediate limit is 98 mg/normal cubic meter. At Ndola, lime dust is also emitted from the Ndola Lime Company kilns, which still do not meet the ECZ Statutory instrument (SI) limits. • Quarrying activities are also responsible for dust emissions during blasting and crashing processes. Quarrying is also responsible for noise and vibrations resulting from blasting operations. The quarries dotted along the major roads under construction is responsible for wide spread dust hazy in observed in the late afternoons. • Vehicle emissions are responsible for the production of carbon monoxide in the major urban centres particularly in Lusaka where motor vehicle numbers have increased tremendously over the years while there is no vehicle emission regulations at all yet. (Chipungu 1994).

Source: a)

Suggested solutions to air pollution
<ul style="list-style-type: none"> • ECZ to compile environmental audits on existing mines and develop a database on pollutants and degradation resulting from mining activities. • Strengthen the capacity of ECZ to monitor industrial pollution and enforcement of environmental standards specified in the EPPCA Air pollution control regulations of 1996. • Develop incentives for the adoption of clean technologies by polluters through use of appropriate economic instruments such as emission charges and tradable emission permits. • Development and implementation of improvement problems with strict deadlines

Source: a)

On-going activities for combating air pollution
<ul style="list-style-type: none"> • Monitoring of industrial emissions on the Copperbelt by the ECZ Air and noise Pollution unit for the development of a database on ambient air quality • Monitoring of dust emissions from quarrying activities by the ECZ • Establishment of Environmental units in major polluting companies such as the Group Environmental Services section in ZCCM, Technical services units at Chilanga Cement, Ndola Lime and Indeni Oil Refinery for the monitoring of environmental quality in the mining areas. • Issuing of air pollution permits to polluters by ECZ

Source: a)

Specific activities at some of the major polluters
<ul style="list-style-type: none"> • ZCCM: The monitoring of air pollution levels using samplers and monitoring weather patterns and production of reports on air quality to ECZ every six months • Indeni Oil Refinery: The monitoring of air pollution levels in the plant and reporting to ECZ on a quarterly basis, Energy use efficiency through energy recovery and reduction of fuel consumption in the furnaces and general routine maintenance of equipment for avoidance of fugitive emissions. • Ndola Lime: There is an on going improvement program to achieve an efficient and stable operation of dust cleaning equipment by the year 2002 through rehabilitation of Rotary Kiln Electrostatic Precipitator and rehabilitation of filters in the crushing plant. • Chilanga Cement-Ndola Works: Rehabilitation of a more efficient and effective kiln filter assistance from DANIDA and improved general housing keeping.

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Law on air pollution	?	
② Ambient air quality standard	?	
③ Emission standard (stationary and/or mobile sources)	○	
④ Environmental monitoring results	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.2 Water pollution

No data exists on a national level on the quality of water in Zambia. The major sources of water pollution are domestic waste, which is poorly or not treated at all, industrial effluent from mining activities, chemical contamination from waste disposal sites and agricultural chemical contamination.

Domestic waste

This refers to sewage wastewater and other municipal wastes flushed and washed into the river system in the rain season. Sewage treatment plants are either obsolete or just not operating in most of the urban centers of the country. This results in the flashing of untreated sewage into the rivers. In addition, chemical contamination of water from uncontrolled waste disposal sites and to the pollution of water in rivers near urban areas.

Industrial waste

Industrial waste especially from the mining activities on the Copperbelt leads to water pollution. The water pollution of surface water arises from run-off water from mining dumps, seepage from tailings dams and discharge of untreated wastewater. Heavy rainfall during the wet season may also cause tailings dams to overflow and there by polluting natural watercourses with heavy metals. During such occurrences copper content in natural waterways may be 23-120 times more than normal (NEAP 1994).

Agro-chemicals

Due to the relatively poor soils in the country, a lot of chemical fertilizers are used to increase crop production. The excessive use of the chemical fertilizers results into some of them being flushed into the river systems in run-off from agricultural areas. The use of pesticides too leads to the flushing of some of these into the rivers in run-off from agricultural areas. Similarly, eroded sediments from agricultural areas where there is poor soil conservation also lead to siltation and contamination of the water.

Problems

The major problems responsible for the water pollution situation in the country are:

- . Lack of capacity by ECZ to enforce the Water Pollution Control Regulations of 1993
- . No controls on the use of agro-chemicals
- . Lack of monitoring of water quality to establish the water quality status in the country
- . The inability of District Councils to maintain state of the art sewage treatment plants.

Source: a)

Related Agency
<p><i>National Level</i></p> <ul style="list-style-type: none"> ① Ministry of Energy and Water Development (MEWD) ② Ministry of Environment and Natural Resources (MENR) ③ Ministry of Local Government and Housing (MLGH) ④ Environmental Council of Zambia (ECZ) ⑤ The Water Development Board <p><i>Local / Sectoral</i></p> <ul style="list-style-type: none"> ① The District Councils ② Local industries ③ Water and sewerage Companies

Source: a)

Water Quality Problem in Zambia

- ① Drinking water quality is poor as evidenced by the recurrent gastroenteric diseases that plague the general population
- ② Sewage treatment and sanitation is generally poor leading to pollution of drinking water.
- ③ Pollution of water due to mining activities and industrial effluents especially on the Copperbelt and Kafue town.
- ④ Chemical contamination from waste disposal sites such as the big dumps of toxic waste, oil sludge from oil companies on the Copperbelt.
- ⑤ There is also the problem of Chemical contamination from the application of pesticides at application and disposal points.
- ⑥ The nutrient enrichment of the water in Lake Kariba and the Kafue river has led to the problem of the expanding aquatic weed, posed by the Hyacinth which is causing a number of ecological social and economic problems.
- ⑦ Deforestation especially in the watershed areas where most of the major roads in the country are routed through and as such most of the settlements and cultivated land are located there too (NEAP 1994; Chipungu and Kamanga 1994).

Source: a)

Suggested solutions for Water Quality Problem

- ① Establishment of a monitoring system to monitor water quality in the major rivers by ECZ (EINMS) and Water Affairs Department.
- ② The review and amendment of legislation relating to water quality, extraction and conservation.
- ③ Strengthening of the Water pollution Inspectorate of the Environmental Council of Zambia for effective water monitoring and enforcement of the Water Pollution (effluent & wastewater) Regulations of 1993.
- ④ Development and enforcement of integrated river basin management plans to rationalize utilization, conservation and management of water resources.
- ⑤ Strengthen local authorities and Water affairs Department to improve drinking water quality and supply.

Source: a) with referring the NEAP (1994); Chipungu and Kamanga 1994 and the Water policy include:

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Law on water pollution	?	
② Water quality standard	×	
③ Effluent standard	?	
④ Drinking water standard	?	
⑤ Water quality monitoring	?	
⑥ Guidelines on water quality	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.3 Other Pollution

(1) Radioactive substances

Although there is the Ionizing and Radiation Act, Cap 552, the lack of strict enforcement of the Act results in the uncontrolled disposal of deactivated radioactive substances. The disposal of used radioactive substances such as X-ray films is poor and largely uncontrolled. As a result the public is exposed to the dangers of disposed materials capable of producing ionizing radiation (Chipungu 1994).

Source: a)

Related Agency
① Ministry of Health
② Radiation Protection Board
③ Radioscope Advisory Committee
④ Radiation Protection Service
⑤ All radioactive substance using institutions

Source: a)

Solutions
<ul style="list-style-type: none"> • Improved implementation and enforcement of the Ionizing and Radiation Act Cap 552. • Amendment of the Act to provide for public participation or objection to the issuing of licenses relating to ionizing operations • Public awareness campaigns about the dangers of exposure to materials capable of producing ionizing radiation. • Improve control capacity of responsible institutions

Source: a)

(2) Noise and Vibrations

Noise and vibrations are associated with blasting operations of quarrying and construction works. In urban areas noise results from increasing volumes of vehicles especially along highways and uncontrolled music from pubs and open drinking areas. There is currently no controls on noise and vibrations in the country. The noise and vibrations control regulations are underway and will be implemented by the ECZ.

Source: a)

Related Agency
① Environmental Council of Zambia (ECZ)
② Noise generating industries

Source: a)

Solutions
<ul style="list-style-type: none"> • There is need to enact the Noise and Vibrations Regulations under the EPPCA to control the noise pollution. • Public awareness campaigns on the need to maintain acceptable ambient noise levels.

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Law on noise	X	
② Standard on noise level	X	

Note: ○ : Issued, X : None, △ : Under planning, ? : Unknown

(3) Offensive Odours

Offensive odours result from various industrial activities such as meat processing, tanneries, combustion of wastes that contain materials such as plastics and rubber and indiscriminate dumping of wastes in unauthorized dumping sites. In areas near such operations odours are a common problem which makes staying in such areas unpleasant.

There are no specific regulations for the control of odours in the country yet.

Source: a)

4.4 Waste management

Zambia is increasingly facing problems of solid waste produced from mining operations, domestic and commercial activities, hospitals and industrial processing. The District councils have no means to collect, treat and dispose of solid waste in an environmentally acceptable manner as they are currently only able to collect about 10 % of garbage generated. There is also poor management of hospital waste as most of the incinerators available in the hospitals are rarely used and fall short of the basic requirements of a standard incinerator. Toxic and hazardous wastes are dumped together and treated like any other waste. This poses dangers to communities near the dumping sites, which is not uncommon. (Chipungu and Kamanga 1994) Source: a)

Related Agency
<p><i>National Level</i></p> <ul style="list-style-type: none"> ① Ministry of Environment and Natural Resources (MENR) ② Ministry of Local Government and Housing (MLGH) ③ Environmental Council of Zambia (ECZ) <p><i>Local Level</i></p> <ul style="list-style-type: none"> ① District Councils ② Hospitals ③ Specialized industries

Sources: a)

Suggested Activities for resolving the problem of solid waste management
<ul style="list-style-type: none"> • Regular monitoring of water quality in major rivers • Licensing of waste generating industries to maintain disposal sites and transport waste

Sources: a)

On-going activities
<ul style="list-style-type: none"> • Regular monitoring of waste management systems by ECZ • Licensing of waste generating industries by ECZ • Recycling of waste rock or overburdens by Ndola Lime by selling to Chilanga Cement, • Sale of used catalysts by Indeni to the suppliers • Planting of trees and grass at edges of the tailing dams in the mining areas.

Sources: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on waste	?	
② Laws on hazardous waste	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.5 Energy Conservation and Alternative Energy

The major sources of energy in Zambia are firewood, charcoal, petroleum, electricity and coal. As of 1990, the country required a total primary energy supply of about 5.85 million tons of oil equivalent. Of this amount, firewood accounted for 58 %, electricity 12 %, charcoal 11 % and coal 6% of the final energy consumption. Wind and solar energy are still under developed and insignificant (Chipungu 1994).

Petroleum

All the petroleum products used in the country are imported from the Middle East. The Zambia Oil Company handles all the oil petroleum products coming into the country.

Electricity

The country currently has a total installed electricity capacity of 1,778 MW 94 % of, which is hydro-power. Virtually all the electricity is generated and distributed by Zambia Electricity Supply Corporation (ZESCO) (Chipungu 1994).

Wood fuel

Wood fuel is the principal household fuel and the nation's largest source of energy. It is used as firewood in rural areas and as charcoal in 90 % of the urban households. Overall wood fuel accounts for about 66 % of the total energy consumption (Chidumayo 1998).

Alternative energy

There has lately been an increase in the use of solar energy in wilderness tourist areas and by retirees in rural areas for powering electrical appliances and lighting at night.

Problems

The increased demand for household wood fuel in urban areas has led to increased rates of deforestation in areas surrounding major towns. This is causing serious land degradation and also imposing high living cost to the majority of the urban dwellers as the prices for charcoal are increasing rather fast.

Source: a)

Related Agency
① Zambia Electricity Supply Corporation (ZESCO)
② Zambia Oil Company
③ The Forest Department
④ The Department of Energy

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on energy use and conservation	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.6 Water supply

The water resources of Zambia are adequate to meet both short term and long term requirements of the country (Chipungu 1994). The country receives substantial rainfall and is endowed with major perennial rivers, lakes, swamps and flood plains. Being a landlocked country, both surface and ground water sources are fresh water resources. The country's ground water supply rate is 42,468 m³/day (JICA 1995) while the total ground water storage is approximately 1,740,380 m³/year (Chipungu 1994).

Water use

Water use in the country is dominated by hydro-power generation, water supply for drinking, industrial purposes and irrigation. It is estimated that 427 million m³ of water will be required by the year 2000 of which 412 million m³ will be for urban use.

Current supply and consumption

- . About 75 % of the water supplies to urban areas is abstracted from surface sources
- . Urban consumption is on average 200 to 400 liters/day/person
- . Rural consumption is on average 100 to 400 liters/day/person
- . Only 33% of rural people have access to clean drinking water (Hachileka and Lungu 1998)

Problems

- . The persistent drought experienced in the recent past is leading to temporal isolated water supply problems especially in rural areas
- . The rampant sinking of bores without any controls is leading to ground water depletion in major cities
- . The lack of abstraction quota supervision is leading to over abstraction, over pumping and depletion of the water resources
- . The excessive pumping out of groundwater from mining activities is contributing to long term depletion of groundwater
- . Increased pollution of water is reducing the available portable water especially in rural areas

Source: a)

Related Agency
① Water Development Board
② Water Affairs Department
③ Water and Sewerage Companies
④ District Councils
⑤ Mining companies that pump out groundwater

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on water resources and supply	?	
② Laws on use of water resources	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.7 Waste Water Management

Wastewater includes water from domestic uses, commercial uses and industrial processes. Most of the industries in Zambia do not have or lack proper waste treatment facilities. As a result, untreated wastewater with loads of toxic and hazardous chemical residues end up into the rivers. Such activities include mining activities where heavy metals and end up in the natural river system.

Problems

- District councils have no resources to improve their treatment facilities most of which are using obsolete technologies
- There is no strict monitoring and control system on the discharge of untreated effluent into the natural watercourses by the ECZ despite having the Water Pollution (Effluent and Wastewater) Regulations of 1993
- Industries are not able to convert to cleaner technologies due to the prevailing economic problems in the country

Source: a)

Related Agency
<p><i>National Level</i></p> <p>① Ministry of Local Government and Housing (MLGH)</p> <p>② Department of Water Affairs</p> <p>③ Ministry of Environment and Natural Resources (MENR)</p> <p>④ Environmental Council of Zambia (ECZ)</p> <p><i>Local Level</i></p> <p>① District councils</p> <p>② Local industries</p>

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on wastewater management	○	• Water Pollution (Effluent and Wastewater) Regulations of 1993
② Laws and regulations on industrial effluent	○	• Water Pollution (Effluent and Wastewater) Regulations of 1993
③ Effluent standard	?	
④ Results of monitoring	×	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.8 Forest Conservation / Desertification

Zambia's forests represents a unique natural forest ecosystem and resource. Forests provide ash fertilizers for shifting cultivation, timber energy, household tools and construction materials, a number of plants are important sources of food, especially during famine. Below are some forest statistics:

- . Forests are estimated to cover 55 – 60% of the total land surface of the country
- . 10% of the total surface area of the country is Forest Reserves
- . Of the total forest area about 15% is Reserve Forest, 62 % Open Forest are just under 2 % is Afforestation. The rest of it is in National Parks and hills and escarpments.
- . The estimated standing stock is 3 million m³ with a growing rate of 1.5 to 2 m³/year/ha and a total volume of 100 to 150 m³/ha (Hachileka and Nkhata 1998).

The major problem faced is deforestation of the forests with an average annual deforestation rate of 0.5 % through indiscriminate clearing for:

- . Settlements
- . Cultivation especially shifting cultivation
- . Fuel wood and charcoal production
- . Infrastructure development such as roads and power transmission lines.
- . Commercial timber harvesting

It is estimated that about 200, 000 ha of forests are destroyed every year through out the country due to charcoal production and clearing for shifting cultivation (Chidumayo 1998).

The Forest Reserves are also threatened by encroachment of illegal settlers who in some cases have political backing. (Chipungu 1994).

The problems of forest conservation are due to the lack of capacity in the Forest Department to effectively manage the forest estate in the country. This is largely because of:

- . Poor funding
- . Lack of qualified manpower
- . Lack of forest inventories and consequently forest management plans.
- . The non-involvement of local communities in forest management and conservation.

Source: a)

Related Agency
① Ministry of Environment and Natural Resources (MENR)
② Forest Department
③ Ministry of Agriculture, Food and Fisheries (MAFF)
④ Zambia Electricity Supply Corporation (ZESCO)
⑤ Roads Department

Source: a)

Six Ecosystems Under Forest
<p>① Dry evergreen forest</p> <p>This vegetation type is confined to the wetter northern parts of Zambia with annual mean rainfall of more than 1200 mm. The dominant trees include <i>Anisophyllea pomifera</i>, <i>Berlinia giorgii</i>, <i>Cryptosepalum pseudotaxus</i>, <i>Daniellia alsteeniana</i>, <i>Parinari excelsa</i>, <i>Entandrophragma delevoyi</i>, <i>Marquesia acuminata</i>, <i>Marquesia macroura</i>, <i>Podocarpus milanjanus</i> and <i>Syzygium guineense afroontanum</i> (Fanshawe 1971).</p>
<p>② Dry deciduous forest</p> <p>The dry deciduous forest is dominant in areas with 600-900 mm annual rainfall. The most extensive dry deciduous forest is the Mkusi (<i>Baikiaea</i>) forest on Kalahari sands in the southwest of the country. This forest type is composed of <i>Baikiaea plurijuga</i> and <i>Pterocarpus</i> species with <i>Entandrophragma caudatum</i> and <i>Richnodendron rautanenii</i> as local dominants.</p>
<p>③ Montane forest</p> <p>Montane forest is mainly in patches of less than 20ha restricted to the Nyika plateau range of 2150 – 2455 m above sea level(a.s.l) in the northern part of the country and lower altitude in ravines of higher hills (1840 m a.s.l) in Mbala district. The most abundant species are <i>Aningeria spp.</i>, <i>Cola greenwayi</i>, <i>Myrica salicifolia</i>, <i>Nuxia spp.</i>, <i>Olinia usambarensis</i>, <i>Parinari excelsa</i>, <i>podocarpus milanjanus</i>, <i>Rapanea melanophloea</i> and <i>Trichilia prcuriana</i>.</p>

Six Ecosystems Under Forest	
④	Swamp forest <i>Ilex mitis</i> , <i>Mitragyna stipulosa</i> , <i>Syzygium cordatum</i> , <i>Syzygium owariense</i> , <i>Xylopiya aethiopica</i> and <i>Xylopiya rubescens</i> characterize the swamp forest. This forest is restricted to seepage areas around stream heads on alluvial sites and estuaries.
⑤	Riparian forest The riparian forest is characterized by <i>Diospyros mespiliformis</i> , <i>Khaya nyasica</i> , <i>Parinari excelsa</i> and <i>Syzygium cordatum</i> with such associates as <i>Adina microcephala</i> , <i>Bridelia micrantha</i> , <i>Cleistanthus milleri</i> , <i>Faurea saligna</i> , <i>Homalium africanum</i> , <i>Ilex mitis</i> , <i>Minilkara obovata</i> and <i>Raphia palms</i> . It is concentrated along the major rivers of the country.
⑥	Thickets Various thickets occur scattered throughout the country but the most extensive one is the itigi in the Mweru-Wantipa and Tanganyika basins. Itigi thicket is a dense deciduous vegetation on well aerated and watered soils during the rainy season. The shrubs are interlaced and form a thick continuous canopy at 3-5m height. It is characterized by <i>Baphia massaiensis floribunda</i> , <i>Boscia angustifolia</i> , <i>Burtia pruniodes</i> , <i>Bussea massaiensis</i> , <i>Diospyros mweruensis</i> , <i>Euphorbia candelabrum</i> and <i>Grewia species</i> .

Six Distinct Ecosystems Under Woodland	
①	Chipya woodland There are four types of chipya vegetation: Lake basin Copperbelt, Limestone and Kalahari sand chipya. Chipya woodland is most extensive on alluvial soils of lake basins, especially the Lake Bangweulu system with its associated rivers. It is characterized by evergreen thickets and scattered emergents such as <i>Acacia albida</i> , <i>Azelia quenzensis</i> , <i>Albizia antunesiana</i> , <i>Burkea africana</i> , <i>Combretum mechowianum</i> , <i>Erythrophleum africanum</i> , <i>Ficus sycomorus</i> , <i>Parinari curatellifolia</i> , <i>Pericopsis angolensis</i> , <i>Pterocarpus angolensis</i> and <i>Terminalia sericea</i> . It also has a dense tall (2-3 m) layer of herbs.
②	Miombo woodland Miombo woodland is the most extensive vegetation type in Zambia and is dominated by species of <i>Brachystegia</i> , <i>Julbernardia</i> and <i>Isobertinia</i> . It grows on plateau and escarpments on well-drained soils though on hills and rocky areas it grows as a short and sparse hill miombo woodland or scrub.
③	Kalahari woodland This is a variant of miombo woodland which grows on the kalahari sands and is restricted to the western parts of the country.
④	Mopane woodland Mopane woodland occurs in valley areas and is most extensive in the Luangwa and Lower Zambezi valleys. It is characterized by low rainfall and high temperatures with variety of soils. The dominant species of vegetation is <i>Colophospermum mopane</i> in association with <i>Acacia nigrescens</i> , <i>Adansonia digitata</i> , <i>Combretum imberbe</i> , <i>Sclerocarrya caffra</i> and <i>Kirkia acuminata</i> .
⑤	Munga woodland Munga woodland occurs on flat topography in drier parts of the country and on lacustrine or riverine alluvial soils with a high base exchange. Munga woodland represents a degraded form or replacement of riparian forest. It is dominated by <i>Acacia</i> , <i>Combretum</i> , and <i>Terminalia</i> trees and shrubs.
⑥	Terminalia vegetation Terminalia vegetation is dominant in the transition zone between wetland grassland and plateau forest or woodland with trees growing on termite mounds and grassland on low ground with a variable species composition. It occurs in most of the vegetation types.

Two Main Categories Falling under the Grassland Ecosystem	
①	Dambo grassland Dambo grassland occurs in seasonally or perennially waterlogged shallow depressions, which form headwater reaches of watercourses with soils that tend to be acid. <i>Loudentia simplex</i> is the most characteristic vegetation.
②	Flood plain and swamp grassland This vegetation cover occurs on alluvium of the larger river valleys. The principle grasses belong to the genera <i>Aeroceras</i> , <i>Echinochloa</i> , <i>Leersia</i> , <i>Oryza</i> , <i>Panicum</i> , <i>Paspalum</i> , <i>Sacciolepis</i> and <i>Vossia</i> .

Source: a)

Areal Extent of the major ecosystems of Zambia

BIOME	ECOSYSTEM	APPROXIMATE EXTENT	
		km ²	%
FOREST	Dry evergreen	15,835	2.10
	Deciduous	6,735	0.90
	Thicket	1,900	0.25
	Montane	40	0.01
	Swamp	1,350	0.20
	Riparian	810	0.11
WOODLAND	Chipya	15,560	2.07
	Miombo	294,480	39.13
	Kalahari sand	84,260	11.20
	Mopane	37,010	4.92
	Munga	30,595	4.06
	Termitary	24,260	3.22
GRASSLAND	Dambo	75,760	10.07
	Floodplain/Swamp	129,075	17.15
AQUATIC	Lakes and rivers	10,500	1.40
ANTHROPIC	Cropland and fallow	24,210	3.21
	Forest plantations and Built-up areas		
Total Area		752,380	100

Source: a-4)

Causes of Deforestation

- ① The forest policy places too much responsibility on the Forest Department whose capacity is limited due to funding and manpower constraints.
- ② Increased clearing for cultivation and settlement driven by the high population growth and the subsistence shifting cultivation. Deforestation through shifting cultivation is on the increase due to the high prices of fertilizers.
- ③ The decline in social and economic situation and the general increase in poverty levels have enhanced the lack of options for earning income for the rural poor.
- ④ The high urban population in the country means that huge quantities of charcoal are required in the urban centers.

Source: a)

Suggested Solutions to the Deforestation

- ① Involvement of local communities and the private sector in sustainable utilization, development and management of forest resources
- ② Integrating agriculture, tree planting and natural forest management, especially in areas where deforestation has occurred due to agricultural activities.
- ③ Revising the forest produce fees upward to reflect real and environmental costs and improve forest revenue collection for better management of the forests.
- ④ Strengthening the management capacity of the Forest Department.
- ⑤ Reducing dependence for energy on wood fuel.
- ⑥ Capacity Building and Extension Services (CABES)
- ⑦ Implementation of research and data bank services (RDBS)
- ⑧ Conducting of a forest inventory to determine stocking rates, regeneration rates, species composition and distribution (Chisanga 1998).
- ⑨ Development of forest management plans

Source: a-24)

On-going activities for resolving deforestation
① The national tree planting project
② The soil conservation and agro-forestry program in agricultural regions.
③ Establishment of fuel wood plantations
④ Electrification of urban residential areas to reduce the demand on charcoal.
⑤ Soliciting for donors for funding to implement the Zambia Forest Action Plan and the Zambia Forest Products Projects (ZFAP 1997).

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on forest conservation	?	
② Laws and regulation on protection area	?	
③ Laws on desertification	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.9 Biodiversity

There are a total of 7,774 species of known organisms that occur in Zambia. Microorganisms constitute 7%, plants 49% and fauna 44% of this biodiversity.

There are 316 endemic, 174 rare and 31 endangered/threatened species of plants and animals. (Chidumayo, 1998). There are 408 known species of fish in Zambia. These belong to 21 taxonomic families. The family *Cichlidae* has the largest number of species with 162, followed by *Cyprinids* with 82, *Mormyridae* with 20, *Characidae* with 17, *Bagridae* with 18, and, *Clupeidae* and *Centropomidae* each with 5 species (Mudenda 1998).

Ecologically, biodiversity plays important roles in nutrient and water cycling, land protection from erosion, climate stabilization through carbon sequestration and many more. Biological resources support livelihoods of the majority of the rural population in Zambia.

The protected area system in Zambia consists of national parks, bird sanctuaries, Game Management Areas (GMA), forest reserves and world heritage sites. These areas cover at least 30.5 million hectares.

Source: a)

Related Agency
① Ministry of Environment and Natural Resources (MENR)
② Ministry of Agriculture, Food and Fisheries (MAFF)
③ Ministry of tourism (MOT) National Parks and Wildlife Services (NPWS)
④ Ministry of Energy and Water Development (MEWD)
⑤ Environmental Council of Zambia (ECZ)
⑥ The International Union for Conservation of Nature and Natural Resources / The World Conservation Union (IUCN)
⑦ World Wide Fund for Nature (WWF)
⑧ United Nations Development Programme (UNDP)

Source: a)

Problems which threats to biodiversity in the country		
• Deforestation,	• Wild fires,	• Population growth
• Increasing poverty levels	• Climate change	• Pollution
• Introduction of species	• Over-exploitation of biological resources	
• Poor management systems	• Lack of local community involvement	
• Uncoordinated conflicting legal, institutional and policy framework		

Source: a)

Current situation in statistics
• 20 % of the forest reserves are encroached
• 37 % of botanical reserves are also encroached
• Two thirds of the Game Management Areas are depleted
• 32 % of national parks are either encroached or depleted
• All major fisheries in the country are either fully exploited or overexploited
• Thirty animal species / subspecies in the are either endangered or vulnerable

Source: a-12)

Causes of wildlife depletion in Zambia
• Poaching or illegal off-take from National Parks and Game Management Areas (GMAs). The elephant population, which was estimated at 100,000 in 1980 were for example less than 22,000 in 1993. The population of rhino has declined from 15,000 in 1980 to near extinction today.
• Land use pressure leading to human settlement encroachment in areas around the National Parks and Unplanned settlements in GMA.
• Road construction projects cutting through National Parks.
• The absence of management plans for both National Parks and GMAs, which leads to landuse conflicts
• The lack of or limited community involvement in wildlife resource management
• Inadequate and /or absence of skilled well-motivated manpower in the National Parks and Wildlife Services for both law enforcement and wildlife research.

Suggested activities for resolving wildlife depletion
<ul style="list-style-type: none"> • Restructuring of National Parks and Wildlife Services • Improving community based wildlife initiatives by providing a legal framework for community participation. • Improve law enforcement by increasing manpower and resources and strengthening the law with greater deterrents. • Introduction of environmental standards for tourism development in National Parks • Develop management plans for National Parks and Game Management Areas.
On-going activities for resolving wildlife depletion
<ul style="list-style-type: none"> • Implementation of community based wildlife resource management initiatives such as the Administrative Management Design (ADMAD) and the Luangwa Integrated Resource Development Project (LIRD). • There are on-going efforts to develop National Parks and surrounding GMA Management Plans in the country funded by the European Development Fund (EDF) and JICA. • There is on-going restructuring of the Department of National Parks and Wildlife Services into a semi-autonomous body known as the Zambia Wildlife Authority (ZAWA) which is almost in place.

Source: a)

Causes of fish Depletion
<ul style="list-style-type: none"> • Overgrowing numbers of fishermen • Use of bad fishing methods and habits such as poisoning, use of small mesh nets and mosquito nets and fishing during the fish-breeding season. • Ever increasing demand for fish driven by the increasing human population. • Habitat changes such as caused by dam construction • Aquatic pollution arising from effluents and waste disposal from industries, large settlements, mining and agricultural activities. • Over reliance on the use of unsustainable regulatory fishing control methods such as prohibiting / restricting fishing in some fisheries, licensing of fishermen and fishing boats and regulation by law enforcement. • Inadequate management of fisheries by the Fisheries Department in the Ministry of Agriculture, Food and Fisheries (MAFF) • The lack of data on fish stocks and fish distribution
Suggested Activities for resolving the fish depletion problem
<ul style="list-style-type: none"> • Control of soil erosion, run off and sedimentation in riverine and lacustrine systems. • Maintenance of water quality • Identification of sites and fish habitats that may have high productivity or that are fragile for special protection or improvement • Promotion of aquaculture, particularly fish farming of Carp and Nile Tilapia) as an alternative to the over-exploited natural fisheries in the provision of a cheaper source of protein on which the majority of the people depend in the country through research and extension • Establishment of community based fisheries management in order to promote local participation in fish management • Carrying out fish inventories and monitoring the status and productivity of each major fishery to determine and enforce yield standards to forestall fish depletion. • Review of the effectiveness of fishing control measures • Development of a strong and comprehensive fish policy and an appropriate legislation to support fisheries development and management. • Redesigning fishery management plans • Enhancement of depleted water bodies
On-going initiatives for resolving the fish depletion problem
<ul style="list-style-type: none"> • Review of the fisheries policy under the Agricultural Sector Investment Program (ASIP) • Promotion of fish farming in suitable areas. • Development of the Zambia Biodiversity Strategy and Action Plan which includes measures for the conservation of the biodiversity of fish • A number of donor agencies are supporting aquaculture development in the country. These include NORAD in Northern Province, FAO in Southern Province and JICA in the Copperbelt Province

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on protection for fauna and flora	?	
② Laws and regulations for protection for specific species	?	
③ Laws and regulations on hunting	?	
④ Laws and regulations on protection area	?	
⑤ Listed species in the Red Data Book	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.10 Natural Resource Management

Zambia is well endowed with natural resources which include Agricultural land, abundant Water resources, Wildlife resources, Forest resources, Fisheries resources, Minerals, Hydro-power potential, and spectacular landscapes such as the Victoria Falls and a Rich and diverse cultural heritage.

Source: a)

Related Agency
① Ministry of Environment and Natural Resources (MENR)
② Ministry of Agriculture, Food and Fisheries (MAFF)
③ Ministry of Energy and Water Development (MEWD)
④ Ministry of Tourism (MOT)
⑤ Ministry of Mines and Mineral Development (MMMD)
⑥ Ministry of Lands
⑦ Ministry of Local Government and Housing (MLGH)
⑧ World Wide Fund for Nature (WWF)

Source: a)

Problems
<ul style="list-style-type: none"> • Natural resource degradation through over-exploitation and mismanagement • Conflicting natural resources legal framework and policy • Lack of institutional capacity and resources for effective management of natural resources • Lack of legal framework for community involvement in the management of most of the resources • Limited application of economic instruments for sustainable natural resource management policy

Source: a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on conservation of natural resources	?	
② Laws on use and conservation of mining resources	?	
③ Laws on underground resources	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.11 Natural Disasters

The most common natural disasters in Zambia are droughts, floods, and disease outbreaks for humans, livestock, wild animals and plants/crops.

Droughts

Zambia has recently experienced severe droughts in the 1980s and 1990s particularly in 1990/91 and 1991/92 farming seasons (Tiffen and Mulele 1994). The recent frequent droughts are thought to be related to the Global Climate Change and sometimes the El-nino phenomenon. Droughts lead to failure in crop production, available water for human consumption and livestock as well as vegetation growth, which in turn affects the quality of pastures for both wildlife and livestock.

Floods

Floods are not common in Zambia but when they occur they tend to cause serious damage to property, wildlife and human lives. Floods occur when the rainfall is beyond the normal received and is largely a result of intensive short storms, which catch the communities unprepared to the non-availability of reliable early warning meteorological systems. Floods lead to submerging of crops in rural areas, damage roads, which tend to have poor drainage devises. In urban areas, floods occur largely as a result of poor drainage provisions amid expanses of concrete pavements. The most recent flood was experienced in the 1997/98 rainy season.

Disease outbreaks

Disease outbreaks tend to be closely related to occurrence of droughts and floods. Out breaks of cholera and other poor sanitation related diseases occur whenever floods are experienced. This occurs because of the worsened sanitation situation and lack of clean drinking water by affected populations. On the other hand outbreaks of Cattle Corridor Disease and Anthrax for wildlife are associated with severe droughts.

Corridor Disease has been persistent in Southern Province over the last decade resulting in loss of thousands of traditional cattle in the province. This loss of cattle on which the Tonga livelihoods are traditionally based has led to a deplorable socio-economic situation among the Tonga rural communities.

Anthrax is common to wildlife when there are droughts. In 1990/91 and 1991/92 rainy seasons when rainfall received was far much lower than normal, a lot of Hippos in the Luangwa River were lost through an outbreak of Anthrax. (LIRD 1993).

Susceptibility

Zambia as a country is highly susceptible to natural disaster occurrences of droughts, floods or disease outbreaks due to the lack of preparedness for such eventualities. This is largely because of the lack of early warning systems by for example the Meteorological Department or Ministry of Health. The required monitoring systems and technologies that can facilitate early warning are not available. The responsible institutions have no capacity to perform the early warning activities or respond quickly and effectively to reduce the effects of such disasters once they have occurred.

Source a)

Related Agency
① Ministry of Agriculture, Food and Fisheries (MAFF)
② Zambia Early Warning Unit (ZEWU)
③ Meteorological Department
④ Zambia Wildlife Authority (ZAWA)
⑤ Ministry of Health.

Environmental problems of copper mining in Zambia

Principal Cause	Primary Environmental Problem
Under ground mining	<ul style="list-style-type: none"> • Subsidence and caving • Loss of land use • Contamination of ground water
Open Pit Mining	<ul style="list-style-type: none"> • Long term stability of pit wall • Changes to ground and surface water regimes • Leachates off pit walls affecting water quality
Tailings Facilities	<ul style="list-style-type: none"> • Long term stability of dump walls • Safety and integrity of water management structures • Quality of seepage from dumps • Wind blown dust from bare surfaces
Other mining activities	<ul style="list-style-type: none"> • Streams and rivers contaminated by heavy metals and sediments from mining activities • Soil and ground water contamination • Air pollution from Sulphur emissions.

Source: a-23)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on natural disaster	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

4.12 Environmental Education

The provision of environmental education has long been recognized by government as a prerequisite to sustainable environmental and natural resources management. Environmental education has since been introduced in the school curricula as early as from primary school up to the university level. The Zambia Environmental Education Program (ZEEP) funded by WWF is involved in the development of primary and secondary school environmental education curricula. Source a)

Responsible Institutions
① The University of Zambia in Lusaka ② The Copperbelt University in Kitwe ③ Zambia Forestry College (ZFC) – Mwekera, Kitwe. ④ Natural Resources Development College (NRDC) ⑤ Pan African Institute for Development in Eastern and Southern Africa (PAIDESIA)

Source a)

Laws and Regulations	Presence	Name of Laws or Regulations (Reference)
① Laws on education	?	
② Guidelines on environmental education	?	

Note: ○ : Issued, × : None, △ : Under planning, ? : Unknown

5. INTERNATIONAL RELATIONSHIP

Environmental issues transcend national boundaries. To this effect Zambia is committed to a number of trans-boundary environmental issues. Some of these are:

- Biodiversity conservation
- Climate change
- Trade in endangered species of fauna and flora
- Desertification
- Wetlands conservation
- Cultural and natural heritage
- International water bodies management and utilization

Zambia through the Ministry of Environment and Natural Resources cooperates with the international community on environmental and other related issues.

Zambia is a signatory to over 25 international and regional conventions related to the environment. Thirteen of these conventions signed and ratified by Zambia are focused specifically on the environment.

Source: a)

5.1 International Convention

Conventions and agreements on environmental issues	Year
1) Convention on Biological Diversity	1993
2) The UN Framework Convention on Climate Change	1993
3) Convention on International Trade in Endangered Species of Flora and Fauna (CITES)	1981
4) Ramsar Convention on Wetlands of International Importance Especially as a Waterfowl	1991
5) Convention on the Protection of World Cultural and Natural Heritage (WCNH)	1984
6) Convention to Combat Desertification	1992 (署名のみ)

Source: a)

5.2 International Cooperation Project

Project	Donor
<ul style="list-style-type: none"> • Funding of the Zambia Biodiversity Strategy and Action Plan through the GEF in collaboration with MENR and IUCN • The development of the Zambia Forestry Action Plan (ZFAP) in cooperation with the Forest Department in the MENR • Funding of the NEAP and ESP process 	UNDP
<ul style="list-style-type: none"> • The funding for the development of the NEAP and the ESP programs in collaboration with the NORDIC Fund • Funding for the Agriculture Sector Investment Program (ASIP) in the MAFF • Setting up and funding the activities of the Environmental Management Unit in the Roads department in cooperation with the Ministry of Transport and Communications and the Roads Board of Zambia. 	World Bank
<ul style="list-style-type: none"> • The development of the Lower Zambezi National Park Management Plan • The development of the South Luangwa National Park Management Plan • The restructuring of the Department of National Parks and Wildlife Services • Funding of the study on the status and prospects for game ranching in Zambia 	EU-EDF
<ul style="list-style-type: none"> • The funding of the Luangwa Integrated Resource Development Project (LIRDPA) • Support for the Industrial Pollution Control Unit of ECZ • The Water Sector Reform Project under the Ministry of Energy and Water Development 	NORAD
<ul style="list-style-type: none"> • The Zambia Forest Action Plan • The establishment of the Wildlife Monitoring Unit at ECZ 	Netherlands
<ul style="list-style-type: none"> • Funding of the Zambia Country Study on Climate Change • The water sector reform program in the Ministry of Energy and Water Development • Funding of several agricultural projects 	GTZ
<p>JICA has supported and is undertaking a number of environmental related activities in Zambia. Some of these are:</p> <ul style="list-style-type: none"> • Development of the Kafue National Park Management Plans • Human Resources development through elaborate environmental management related training programs 	JICA

Project	Donor
through technical cooperation • Resource management study for Zambia Teak Forest in South -Western Zambia • School of Veterinary Education Project at UNZA • The Coal Briquette and Claystove Development Project • The study on the National Water Resources Master Plan in the Republic of Zambia	
• Funding of part of the country study on climate change • Funding of the ADMADE wildlife program • Funding of the Conservation Farming Project	USAID

Source: a)

6. SOURCES OF INFORMATION

6.1 Governmental Agency

Name of agency	Department	Contact address
1) Meteorological data		
a) Ministry of Communications and Transport	• Meteorological Department	• P.O. BOX 30200, Longacres, LUSAKA. Tel: 253656; Fax: 252728
2) Land use data		
a) Ministry of Agriculture, Food and Fisheries (MAFF)	• Policy and Planning division	• P.O. BOX RW 50291, Mulungushi House, LUSAKA Tel: 250532; Fax: 250349.
b) Ministry of Agriculture, Food and Fisheries (MAFF)	• Field Services Department	• P.O. BOX RW 50291, Mulungushi House, LUSAKA Tel: 250532; Fax: 250349.
3) Demographic data		
a) Ministry of Finance, Central Statistics Office (CSO)	•	• BOX RW 50062, Lusaka
b) The University of Zambia	• Department of Demography	• P.O. BOX 32379, Lusaka. Tel: 293671-9, Fax: 253952
4) Environmental Legislation and Regulations		
a) Ministry of Legal Affairs	•	• P.O. BOX 50106, LUSAKA Tel: 251301, Fax:
b) ECZ	•	• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
5) International Cooperation		
a) Ministry of Foreign Affairs	•	• P.O. BOX 50069, LUSAKA Tel: 252666,
b) Ministry of Finance	•	• P.O. BOX ---
6) Air pollution		
a) ECZ	• Air Pollution Control and Noise Abatement Unit	• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
b) ZCCM	• Environmental Services	• P.O. BOX 260071, KALULUSHI Tel: 749108/9, Fax: 733697/213 Email: masinjaj@opcnet.zccm.zm
7) Water Pollution		
a) ECZ	• Pollution Control Unit	• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
b) Ministry of Energy and Water Development	• Department of Water Affairs	• P.O. BOX 50288, LUSAKA. Tel: 252011/252326
8) Waste Management		
a) ECZ	• Management	• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
b) Ministry of Local Government and Housing (MLGH)	• District Health	• P.O. BOX 34204, Church Road, LUSAKA. Tel: 253190
9) Energy Conservation and Alternative energy		
a) ZESCO	• Environmental and Social Affairs Unit	• P.O. BOX 33304, LUSAKA. Tel: 228084/98, 229114/78/80/85; Fax: 222758
b) Physics Department -UNZA	• Environment and Solar Energy Resource Center-UNZA	• P.O. BOX 32379, Great East Road, LUSAKA. Tel: 293671-9; Fax: 253952.
c) National Council for Scientific Research (NCSR)	• Secretary General-NCSR	• P.O. BOX 31058, Chelston, LUSAKA. Tel: 750581 cell.
10) Water Supply		
a) Water and Sewerage Companies	•	• Kariba House, P.O. BOX 30233, Chacha Cha RD, LUSAKA. Tel: 228402; Fax: 227498
b) Zambezi River Authority	•	• Kariba House, P.O. BOX 30233, Chacha Cha RD, LUSAKA. Tel: 228402; Fax: 227498
c) Water Sector Reform Support Unit (WSRSU)	•	• P.Y.B RW 291X, INDECO House, Cairo Road, LUSAKA. Tel: 226941/2 Email: wsdg@zamnet

Name of agency	Department	Contact address
d) MLGH	• District Secretaries and Town Clerks	• All District Councils
e) Ministry of Energy and Water Development	• Department of Water Affairs	• P.O. BOX 50288, LUSAKA. Tel: 252011/252326
11) Forest Conservation and Desertification		
a) Ministry of Environment and Natural Resources (MENR)	• The Forest Department	• P.O. BOX 50042, Sido House, LUSAKA. Tel: 252952; Fax: 252952.
b) Ministry of Environment and Natural Resources (MENR)	• Planning and Information Department (PID)	• P.O. BOX 34011, Kwacha House, LUSAKA. Tel: 252952/238772; Fax: 525952 Email: menr@zamnet.zm:
c) Ministry of Environment and Natural Resources (MENR)	• Planning and Information Department (PID)	• P.O. BOX 34011, Kwacha House, LUSAKA. Tel: 252952/238772; Fax: 525952
d) Environmental Conservation Association of Zambia (ECAZ)	•	• P.O. Box 30395, LUSAKA. Tel: 223222/222797; Fax: 222736/223249
e) Zambia Alliance of Women (ZAWA)	•	• P.O. BOX 50266 Lusaka. Tel/ Fax: 253203
12) Biological Diversity		
a) Ministry of Environment and Natural Resources (MENR)	• Planning and Information Department (PID)	• P.O. BOX 34011, Kwacha House, LUSAKA Tel: 252952/238772 Fax: 525952
b) Ministry of Environment and Natural Resources (MENR)	• Planning and Information Department (PID)	• P.O. BOX 34011, Kwacha House, LUSAKA Tel: 252952/238772; Fax: 525952
c) Ministry of Environment and Natural Resources (MENR)	• Planning and Information Department (PID)	• P.O. BOX 34011, Kwacha House, LUSAKA Tel: 252952/238772; Fax: 525952
d) Department of Fisheries (MAFF)	•	• P.O. BOX 350100, Chilanga Tel: 250996; Fax: 278457
e) UNZA	• Department of Biological Sciences	• P.O. BOX 32379, Graet East Road, LUSAKA Tel: 293671-9; Fax: 253952.
f) Environmental Council of Zambia (ECZ)	•	• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
g) Ministry of Agriculture, Food and Fisheries (MAFF)	• Policy and Planning Department	• P.O. BOX Rw 50291, Mulungushi House, LUSAKA Tel: 250532; Fax: - 250349.
h) National Parks and Wildlife Services (NPWS)	• Department of National Parks and Wildlife Services	• P/B 1, Chilanga, LUSAKA. Tel: 278042
i) SADC Plant Genetic Resources Centre	•	• Private Bag CH6, LUSAKA Tel: 611114/5; Fax: 611031
j) Wildlife Environmental Conservaton Association of Zambia	•	• P.O BOX 30255, LUSAKA Tel: 254226 Email: wesz@zamnet.zm
k) Mt. Makulu Agric. Research Centre	•	• Private Bag 7, Chilanga Tel: 278008; Fax: 278390 Email: Genetic@zamnet.zm
l) The International Union for Conservation of Nature and Natural Resources / The World Conservation Union (IUCN)	•	• Off Lake Road, Woodlands, P/B W356, LUSAKA. Tel: 265854; Tel/Fax 265853
13) Natural Disasters		
a) Office of the Vice President	•	• P.O. 30208, LUSAKA. Tel: 229577
b) Programme Against Malnutrition	•	• P.O. BOX 30599 Tel: 235941-2; Fax: 235939 Email: pam@zamnet.zm
14) Environmental Education		
a) The University of Zambia School of Natural Sciences	•	• P.O. BOX 32379, Great East Road, LUSAKA. Tel: 293671-9; Fax: 253952;
b) Natural Resources Development College (NRDC)	•	• Great Road
c) World Wide Fund for Nature (WWF) Zambia Office	• Zambia Environmental Education Project (ZEEP)	• P.O BOX 50551, Anglo-American House, Independence Ave. Lusaka Tel: 250404. Email: wwzam@zamnet.zm

Name of agency	Department	Contact address
d) Zambia Environmental Education and Public Awareness (EEPA) ECZ		• P.O. BOX 35131, LUSAKA, Tel: 254130 /31; Fax: 254164 E-mail: necz@zamnet.zm
c) Wildlife and Environmental Conservation Society of Zambia (WECSZ)		• Longacres, LUSAKA Tel: 254226

Source: a)

6.2 Non-governmental Organization (NGO)

Name of organization	Contact address
IUCN	Woodlands, Mwinilunga Road, Off Lake road, Plot No. 8465, Private Bag W 356, Lusaka, Zambia Tel: 260-1-265853 Email: icn@zamnet.zm
WWF	P.O. BOX 50551, Anglo-American House, Independence Avenue, Lusaka, Zambia. Tel:250404 Email: wwfzam@zamnet.zm
Environmental Conservation Association of Zambia (ECAZ)	Show Grounds, Great East Road, P.O BOX 30395, ,Lusaka Tel: 223222 / 222797, Fax: 222736 / 223249
Wildlife and Environmental Conservation Society of Zambia (WECSZ)	P.O. BOX 30255, Longacres, Lusaka Tel: 254226 Email: wesz@zamnet.zm
Professional Hunters Association of Zambia	P.O. BOX 30106, Lusaka Tel: 227659
Ornithological Society of Zambia	P.O. BOX 33944, Lusaka Tel: 213611 Email: mbingham@zamnet.zm
Enviro-Green Care Association of Zambia	P.O BOX 51070, Lusaka Tel: 264035
Zambia Environmental Education Programme	C/o WWF- Zambia Office, P.O. BOX 50551, Anglo-American House, Independence Avenue, Lusaka, Zambia. Tel:250404, Fax: 212077 Email: wwfzam@zamnet.zm
Zambia National Farmers Union	P.O. BOX 30395, Lusaka Tel: 252649/233309; Fax: 252648 / 228882 Email: znfu@zamnet.zm
Zambia Alliance of Women	P.O. BOX 50266, Lubu Road, Lusaka Tel / Fax: 253203
KANTIPO	C/o National Parks and Wildlife Services, Private Bag 1, Chilanga Tel: 278042

Source: a)

6.3 Private Sector

Name of organization	Environmental field	Contact place
TAZCORR Services	Environmental issues in Agriculture	P.O. Box 34465, Lusaka.
PMTC (Z) Ltd	Project appraisal and management training	ZNPF Building, Ben Bella Road P.O. BOX 34483, Lusaka Tel: 224281; Fax: 224791; Email: jwoolner@zamnet.zm
ASCO (Z) Ltd	Urban and rural development, Tourism and environmental issues in road transport	ASCO House, Luanshya Road P.O. BOX 31340, Lusaka
Knight Piesold (Z) Ltd	Environmental issues of mining, quarrying and Hydro-Electricity Power generation and waste management.	24 Enos Chombe Avenue P.O. BOX 22496, Kitwe Tel: 228466; Fax: 223649
PIP Associates Ltd	Socio-economic and environmental issues in general, and architectural works	Development Consultants P.O. BOX 50817, Lusaka. Tel: 255384; Fax: 255385; Email: pjp@zamnet.zm
Agri-Business Development Corporation Ltd	Environmental issues in agriculture	P.O. BOX 34641, Lusaka Tel/Fax: 611154; Email: castle@zamnet.zm

Name of organization	Environmental field	Contact place
DENAMS (DEC)	Integrated fish farming / aquaculture, EIAs, CBNRMPs development and management, and project monitoring and evaluation	Environmental Consultants, No. 8116 Bombay Road, Kamwala P.O. BOX 32750, Lusaka Tel: 224060
Rent -a- Drum	Domestic garbage collection	Garbage Collectors P.O. BOX 34611, Lusaka Tel: 260218
Chalo Environmental and Sustainable Development Consultants	Project appraisal, EIAs, Environmental audits, Project monitoring and evaluation, and Participatory Rural Appraisal	P.O BOX 35297, Lusaka Tel: 23840, Email: jchileshe@zamnet
Global Agri-consult	Agronomic environmental issues and ecological farming	P.O. BOX 32339, Lusaka Tel: 236943; Fax: 231403

Source: a)

6.4 Embassy

Name of agency	Person in charge	Contact address
Embassy of Japan	no information	• No. 5218, Haile Selassie Avenue, Lusaka, Zambia
Embassy of Zambia	no information	• 1-10-2 Ebara Shinagawa-ku, Tokyo 142 Tel: 03-3491-0121

Source: d)

Table of Abbreviations

ADMADE	Administrative Management Design	MMMD	Ministry of Mines and Minerals Development
ASIP	Agriculture Investment Programme	MOT	Ministry of tourism
CABES	Capacity Building and Extension Services	NAPCD	National Action Plan to Combat Desertification
CBNRM	Community Based Natural Resource Management	NBSAP	National Biodiversity Strategic Action Plan
CBO	Community Based Organization	NCS	National Conservation Strategy
CBWRMP	Community Based Wildlife resource Management Programme	NCSR	National Council for Scientific Research
CEMP	Community Environmental Management Programme	NEAP	National Environmental Action Plan
CITES	Convention on International Trade in endangered Species of Fauna and Flora	NGO	Non-Governmental Organization
CSO	Central Statistical Office	NPWS	National Parks and Wildlife Services
DANIDA	Danish Volunteer Service	ODA	Overseas Development Agency
ECAZ	Environmental Conservation Association of Zambia	PAIDESIA	Pan African Institute in Eastern and Southern Africa
ECZ	Environmental Council of Zambia	PEF	Pilot Environmental Fund
EDF	European Development Fund	PPAF	Provincial Forest Action Programme
EEPA	Environmental Education and Public Awareness	PID	Planning and Information Department
EIA	Environmental Impact assessment	RDBS	Research and Data Bank Services
EINMS	Environmental Information Network and Monitoring System	SADC	Southern African Development Community
EPPCA	Environmental Protection and Pollution Control Act	SCAFE	Soil Conservation and Agroforestry Extension
ESP	Environmental Support Programme	SI	Statutory Instrument
GEF	Global Environmental Fund	UNDP	United Nations Development programme
GMA	Game Management Area	UNEP	United National Environmental Programme
ICRAF	International Center for Research in Agroforestry	USAID	United States Agency for International Development
IUCN	The International Union for Conservation of Nature and Natural Resources / The World Conservation Union	WECSZ	Wildlife and Environmental Conservation Society of Zambia
JICA	Japan International Development Cooperation Agency	WSRSU	Water Sector Reform Support Unit
JOVC	Japan Overseas Cooperation Volunteers	WWF	World Wide Fund for Nature
LIRD	Luangwa Integrated Resources Development Project	ZAWA	Zambia Wildlife Authority
MAFF	Ministry of Agriculture, Food and Fisheries	ZEEP	Zambia Environmental Education Project
MENR	Ministry of Environment and Natural Resources	ZEWU	Zambia Early Warning Unit
MEWD	Ministry of Energy and Water Development	ZCF	Zambia Forestry College
MLGH	Ministry of Local Government and Housing	ZCCM	Zambia Consolidated Copper Mines
		ZESCO	Zambia Electricity Supply Corporation
		ZFAP	Zambia Forest Action Plan
		ZRA	Zambezi River Authority

Source: a)

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