COMPENDIUM OF ENVIRONMENT STATISTICS, 2015

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P. O. Box 31908, Lusaka, Zambia.

Tel: 260-1-251377/253468
Fax: 260-1-253468

E-mail: info@zamstats.gov.zm

Website: www.zamstats.gov.zm

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PREAMBLE

Zambia has been implementing the Regional Integration Capacity Building Project funded by the European Union with technical assistance from the Common Market for Eastern and Southern Africa (COMESA). The implementing partners for the project are the Ministry of Commerce, Trade and Industry, the Ministry of Lands Natural Resources and Environmental Protection as well as the Central Statistical Office. The timeframe for the project is from August, 2015 to December, 2016. One of the major objectives of the project is to come up with a Country Status Report on Environment Statistics using the 2013 Framework for the Development of Environment Statistics (FDES). In this regard, COMESA Secretariat, the Ministry of Lands, Natural Resources and Environmental Protection and Central Statistical Office developed a Work Programme to arrive at the output. This involved identifying the major primary data producers in the country and engaging an International Consultant from Mauritius who provided the training on the Environmental Statistics Self-Assessment Tool (ESSAT) of the FDES.

The Consultant then developed data templates on five components of the Environmental Statistics Self-Assessment Tool (ESSAT) of the FDES which are covered in this report. The five components are; (a) Component 1: Environmental Conditions and Quality; (b) Component 2: Environmental Resources and their Use; (c) Component 3: Residues; (d) Component 4: Extreme Events and Disasters; and (e) Component 6: Environmental Protection, Management and Engagement. The objective of developing the data templates was to guide the data producers in submitting the current statistics being compiled. These statistics have to be comparable with the FDES statistics in other countries.

Independent experts and stakeholders who were not part of the data producers were invited to review and validate the data and associated statistics to provide an independent opinion that would help shape the environment statistics framework that reflects Zambia's circumstances. This process provided clear evidence that there is inadequate coordination in the way environment statistics are collected, compiled, analysed and disseminated in the country. Furthermore, the process revealed significant data gaps which are compounded by inadequate experts and finances in the production of environment statistics. This calls for more capacity building in the production of environment statistics at all levels which will inform policy and decision makers and will ultimately contribute to sustainable management of environment and natural resources leading to sustainable development.

ACKNOWLEDGEMENTS

The development of the Country Status Report on environment statistics could not have been a success without the priceless contribution of several individuals and institutions. The Ministry of Commerce, Trade and Industry, the Ministry of Lands and Natural Resources and the Central Statistical Office (CSO) wish to thank all individuals and institutions who, in one way or the other, played a role in helping complete this big task. This includes all Government line ministries, Non-Governmental Organisations, Civil Society Organizations and the Private Sector.

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ABBREVIATIONS AND ACRONYMS

CEEEZ	Center for Energy, Environment and Engineering of Zambia
CFC	Chlorofluorocarbon
CHWSC	Chambishi Water and Sewerage Company
CSO	Central Statistical Office
COMESA	Common Market for Eastern and Southern Africa
CO2	Carbon Dioxide
CUs	Commercial Water Utilities
CWRAS	Country Water Resources Assessment Study
DNPW	Department of National Parks and Wildlife
DoF	Department of Fisheries
DRC	Democratic Republic of Congo
ESSAT	Environment Statistics Self-Assessment Tool
EU	European Union
EWSC	Eastern Water and Sewerage Company
FDES	Framework for Development of Environment Statistics
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GHGs	Greenhouse Gases
GIS	Geographical Information System
GPS	Global Positioning System
GRZ	Government of the Republic of Zambia
HCFC	Hydro Chlorofluorocarbon
HFC	Hydro Fluorocarbon
ITCZ	Inter Tropical Convergence Zone
KWSC	Kafubu Water and Sewerage Company
LAI	Leaf Area Index
LAND-SAT	Land Remote Sensing Satellite
LGWS	Lukanga Water and Sewerage Company
LPWSC	Luapula Water and Sewerage Company
LULUCUF	Land Use, Land Use Change and Forestry
LVC	Low-Volume Consuming
LWSC	Lusaka Water and Sewerage Company
MCTI	Ministry of Commerce Trade and Industry
MLNR	Ministry of Lands and Natural Resources

MWSC	Mulonga Water and Sewerage Company
NAMA	Nationally Appropriate Mitigation Actions
NDVI	Normalised Deviation Vegetation Index
NR	National Rainfall Index
NWASCO	National Water Supply and Sanitation Council
NWSC	Nkana Water and Sewerage Company
NWWSC	Northwestern Water and Sewerage Company
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
PFC	Per Fluorocarbon
RFE	Rainfall Estimates
RISM	Regional Integration Support Mechanism
SF6	Sulphur Hexafluoride
Sq. km	Square Kilometers
SWSC	Southern Water and Sewerage Company
UNFCCC	United Nations Framework Convention on Climate Change
UNSC	United Nations Statistics Council
UNSD	United Nations Statistics Division
WARMA	Water Resources Management Authority
WSS	Water Supply and Sanitation
WWSC	Western Water and Sewerage Company
ZAFFICO	Zambia Forest and Forestry Industrial Corporation
ZARI	Zambia Agriculture Research Institute
ZEMA	Zambia Environmental Management Agency
ZMD	Zambia Meteorological Department

Chapter 1: BACKGROUND

1.0 Introduction

The demand for environmental statistics is increasing in step with continued environmental degradation and the challenges associated with better management of the environment. Globally, most people especially the poor depend on the exploitation of natural resources while on the other hand, industrialisation has led to a growing compounding list of environmental and development issues such as climate change, biodiversity loss and land degradation. Given the need for governments, businesses, households and other decision makers to deal effectively with these issues, the environment statistics informing them must be of the highest quality possible.

Compilation of environmental statistics has been a challenge in the past especially for a country like Zambia. This is mainly due to the fact that these types of statistics cover a wide range of information and are interdisciplinary in nature. They can be collected from a diverse range of sectors meaning numerous methods require to be applied in their compilation. To effectively produce environment statistics, a number of things must be in place. There must be specific statistical and environmental expertise, scientific knowledge, institutional development capacities and adequate resources. Many countries lag behind in the production of environment statistics because of the reasons already stated. Environment statistics therefore, require a proper framework to guide their development, coordination and organization at all levels. It is against the aforesaid background that the Framework for Development of Environment Statistics (FDES) was established.

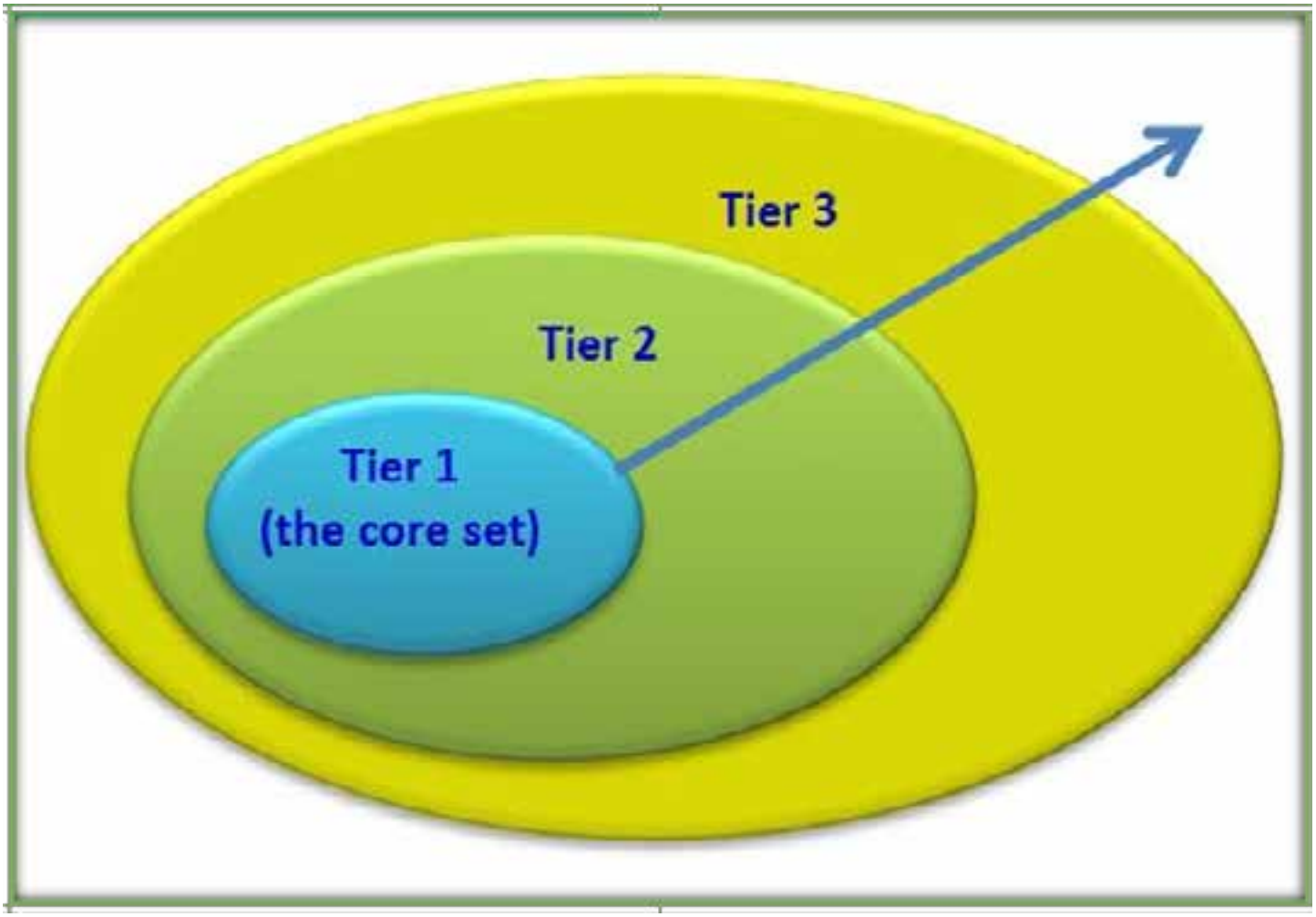
1.1 Background Information to FDES

The FDES is a multi-purpose conceptual and statistical framework that is comprehensive and integrative in nature and is designed to guide countries in compiling environment statistics. This means the FDES brings together data from various relevant subject areas and sources. It is broad and holistic in nature covering the issues of the environment that are relevant for policy analysis and decision making by applying it to cross cutting issues such as climate change. The FDES was first published in 1984 by the United Nations Statistics Division (UNSD). From that time until now, the FDES has been a useful tool in guiding countries to develop their environment statistics programs. The 1984 FDES was ready for revision when there were lessons being learned during its application coupled with improved scientific knowledge and emerging environmental concerns. The FDES has undergone a number of revisions, the latest of which was endorsed in New York at the 44th United Nations Statistics Council in 2013. At that same session, the UNSC also approved the development of the ESSAT for countries to use in assessing and diagnosing the state of environment statistics in the application of the FDES.

The ESSAT is a tool containing relevant information on environment statistics at the national level in consistence with the scope of the FDES. The ESSAT consists of a set of 492 statistics in total which is referred to as the basic Set of Environmental Statistics. The list of the basic set of environmental statistics is quite comprehensive, but not exhaustive. It is a set of statistics designed to support countries in developing environmental statistics programmes according to their national priorities for statistical development. It is flexible enough to be adapted to individual countries' environmental concerns, priorities and resources.

The Basic Set features a progression of three tiers, based on the level of relevance, availability and methodological development of the statistics, where Tier 1 corresponds to the Core Set of Environmental Statistics which are of high priority and relevance to most countries and have a sound methodological foundation. It is recommended that countries consider producing them in the short-term. Tier 2 includes environmental statistics which are of priority and relevance to most countries but require greater investment of time, resources or methodological development. It is recommended that countries consider producing them in the medium-term. Tier 3 includes environment statistics which are either of lower priority or require significant methodological development. It is recommended that countries consider producing them in the long-term.

Figure 1.1: The Basic Set of Environment Statistics



Source: (Adapted from FDES SADC report, 2016???)

1.2 FDES in Zambia

Following the global endorsement of the revised FDES by the UNSC, COMESA secretariat carried out an assessment of environmental statistics in its member states in 2014. The results of the assessment revealed that environment statistics were inadequate and fragmented in several countries despite the availability of many of the indicators. The main challenges reported by the countries were: Lack of Financial resources, Lack of human resources, Lack of technical capacities, Lack of tools/instruments for data collections and Lack of institutional coordination. In this regard, COMESA Secretariat and the UNSD held a Workshop on Environmental Statistics in support of the implementation of the 2013 FDES. The workshop was held in Balaclava, Mauritius from 26th to 29th January, 2015.

Following the Mauritius workshop, the Ministry of Lands Natural Resources and Environmental Protection and Central Statistics Office, which are the two institutions that represented Zambia at the workshop, initiated the implementation of the FDES in the country. This was done with technical support from COMESA secretariat and funding by the European Union (EU) through the RISM project funds which are being disbursed by the Ministry of Commerce Trade and Industry (MCTI).

1.3 Overall Objective of the FDES

Although the FDES is relevant to, and recommended for use by countries at any stage of development, its primary objective is to guide countries at early stages in the development of their environment statistics programmes. The specific objectives are:

- To improve the capacity of countries to assess their national priorities and data availability at the topic and the statistic level;

- A means for countries to assess their current position and set a basis from which they may construct and/or strengthen their environment statistics programmes within the national statistical systems;

- Comparing the Basic Set of Environment Statistics with those collected in the country in order to identify where the two sets of statistics align and where there are gaps;

1.4 The Scope of Environmental Statistics

Environment statistics covers the biophysical aspect of the environment and those aspects of its human sub-system that directly influence or are influenced by, the state and quality of the environment, human activities and natural events. The FDES organises environment statistics in a simple and flexible manner. The FDES uses a multi-level approach. The first level of the structure defines the six fundamental components. Each component is further broken down into sub-components which are in the second level of the structure and the third level is the statistical topics. The statistical topics represent the measurable aspects of the components of the FDES. The components, sub-components, statistical topics and individual statistics of the FDES define the scope and boundaries of environment statistics. They provide an organizing structure for synthesizing and presenting the information in a comprehensive, consistent and coherent manner.

1.5 The Importance of Environmental Statistics

Governments, Civil Society, researchers, the international organizations, the media and others need a statistical basis to judge progress or lack of it. Statistics are also cardinal in assessing needs, anticipating problems and potential for conflicts, in designing major projects, etc. By measuring 'development' based on a broad set of indicators, political actors are enabled to identify problems, set priorities, discuss them on the basis of concrete figures, and eventually take informed decisions. And certainly, environmental issues play an important role in the overall 'development' of countries because environmental issues cut across every sphere of life. This is more reason why environmental statistics are needed to make sound decisions and formulate proper policies that are able to target issues and produce results. This calls for all planners, decision makers and the public at large to have a good understanding about the environment so that socio-economic development can be sustained and social equity can be improved by integrating environmental concerns in all development programs.

Environment statistics are therefore needed

- For understanding the status of the environment at a given point in time;

- For Retrospective and/or prospective analysis to track events and changes on the environment, etc.;

- For understanding the level of our progress towards sustainable development; and

- In the process of Natural Resources and environmental accounting.

Chapter 2: ENVIRONMENTAL CONDITIONS AND QUALITY

2.0 Introduction

This chapter presents information on environmental conditions and quality. This include physical conditions; Land Cover, Ecosystems and Biodiversity; and Environmental Quality. For all the chapters presented in this report, the sources of data for the information is secondary data from the institutions that produce environment data.

2.1 Physical Conditions

Zambia's total land area is about 752,614 km^2 and is administratively divided into ten (10) provinces namely: Central, Copperbelt, Eastern, Lusaka, Luapula, Muchinga, Northern, North-western, Southern and Western provinces. Zambia has four major biomes consisting of forest, woodland, grassland and aquatic systems. These encompass large parts of the Zambezi and Congo drainage systems and it is thus probably the best watered country in Africa. It is endowed with a wealth of natural resources in 17 ecosystems with landscapes that include extensive forests, grassy plains, hills and steep escarpments; huge lakes and rivers, deep valleys and ecologically rich wetlands together with areas of entropic origin such as cropland, plantation forests and urban settlements.

The land ownership in Zambia is held in trust for the nation by the president and people get it on lease for a period of ninety nine years through the Ministry of Lands. Few smallholders have land with title deeds; the majority have customary use rights; they access land through the customary tenure system by getting the approval of traditional rulers such as chiefs and headmen.

2.1.1 Atmosphere, Climate and Weather

The atmosphere is a thin layer of gases that surrounds the Earth; the blanket of gases not only contains the air that we breathe but also protects us from the blasts of heat and radiation emanating from the sun. It warms the planet by day and cools it at night. The Earth's atmosphere is about 300 miles (480 kilometers) thick, but most of it is within 10 miles (16 km) the surface. The gases in Earth's atmosphere include; Nitrogen - 78 percent, Oxygen - 21 percent, Argon - 0.93 percent, Carbon dioxide - 0.038 percent. It is divided into five main layers, the exosphere, the thermosphere, the mesosphere, the stratosphere and the troposphere. The atmosphere thins out in each higher layer until the gases dissipate in space. Earth is able to support a wide variety of living beings because of its diverse regional climates, which range from extreme cold at the poles to tropical heat at the Equator and the phenomena called weather occurs in the initial levels of the Atmosphere.

Weather is one important part of our lives which we cannot control; it often controls how and where we live, what we do, what we wear and what we eat. It is often described as the average conditions of a place at a specified time while on the other hand climate is the average weather condition at a particular place over a long period of time i.e. 30 years or more.

Zambia is situated in the tropics and has favorable weather conditions with seasonal extreme events. It has a dry season from May to the end of September and a wet season from November to April. The dry season is divided into the cool dry season (May to August) and the hot dry season (September and October). The annual rainfall ranges from less than 800mm to the south increasing northwards to above 1200mm further north. The hot dry season within the month of October usually gives the Country the highest temperature in a year with the cool dry season recording the lowest minimum temperature in June.

2.1.1.1 Temperature Information

Average temperatures are moderated by the height of the plateau with the maxima varying from 17°C to 27°C in the cool season; morning and evening temperatures as low as 6°C to 10°C and occasional frost on calm nights in valleys and hollows which are sheltered from the wind. In the cool season the prevailing wind, dry south easterlies come from the southern hemisphere belt of high pressure. Invasions of cold air from the south-east bring cloudy to overcast conditions. During the hot season maximum temperatures may range from 27°C to 35°C.

Table 2.2(a): Maximum and Minimum Monthly Temperature (Long - term 1971 - 2000), 1990 - 2006

Category	Unit	Long term average	1990	2000	2001	2002	2003	2004	2005	2006
Maximum temperature										
Jan			28.1	28.3	28.4	28.8	30.2	28.6	28.8	28.3
Mean	o C/month	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
Difference from long term average	o C/month		-0.5	-0.3	-0.2	0.2	1.5	0.0	0.2	-0.3
Feb			27.8	28.1	27.6	29.0	28.9	28.7	31.2	28.7
Mean	o C/month	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
Difference from long term average	o C/month		-1.0	-0.7	-1.1	0.3	0.1	-0.1	2.4	-0.1
Mar			30.2	27.8	28.0	29.2	29.1	29.2	30.7	27.5
Mean	o C/month	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
Difference from long term average	o C/month		1.3	-1.1	-0.9	0.3	0.2	0.3	1.8	-1.4
Apr			30.3	28.9	28.7	28.9	28.2	28.9	30.4	27.6
Mean	o C/month	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Difference from long term average	o C/month		1.4	0.1	-0.1	0.0	-0.6	0.1	1.6	-1.2
May			29.0	27.2	27.1	27.8	27.9	26.7	28.6	27.2
Mean	o C/month	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
Difference from long term average	o C/month		1.2	-0.6	-0.6	0.1	0.2	-1.0	0.9	-0.5
June			26.3	25.7	25.6	26.0	26.1	26.1	28.5	26.0
Mean	o C/month	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Difference from long term average	o 3C/month		0.0	-0.6	-0.7	-0.3	-0.2	-0.2	2.2	-0.3
July			26.0	25.5	25.8	27.8	25.7	26.6	26.2	26.3
Mean	o C/month	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
Difference from long term average	o C/month		-0.2	-0.7	-0.3	1.6	-0.5	0.4	0.1	0.1
August			28.4	27.9	29.1	28.6	29.4	29.9	28.7	29.6
Mean	o C/month	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
Difference from long term average	o C/month		-0.5	-1.0	0.2	-0.3	0.5	1.0	-0.2	0.7
September			32.2	32.0	32.6	31.0	32.5	32.4	31.2	30.7
Mean	o C/month	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8
Difference from long term average	o C/month		0.4	0.1	0.8	-0.8	0.7	0.6	-0.6	-1.1
October			32.4	33.2	32.5	32.9	33.4	33.1	32.9	30.1
Mean	o C/month	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7
Difference from long term average	o C/month		-0.3	0.6	-0.2	0.2	0.7	0.5	0.3	-2.5
November			32.9	30.0	30.5	31.6	32.4	31.7	31.9	31.0
Mean	o C/month	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
Difference from long term average	o C/month		1.5	-1.5	-0.9	0.2	0.9	0.3	0.5	-0.4
December			29.7	27.9	29.1	30.0	29.9	29.3	29.8	30.2
Mean	o C/month	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Difference from long term average	o C/month		0.3	-1.5	-0.3	0.6	0.5	-0.1	0.4	0.8
Minimum temperature										
Jan			17.5	17.3	17.4	16.9	17.5	17.9	17.8	17.9
Mean	o C/month		17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Difference from long term average	o C/month		0.0	-0.2	-0.1	-0.6	0.0	0.4	0.3	0.3
Feb	o C/month		16.9	17.2	17.7	17.2	17.6	17.0	17.8	17.5
Mean			17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3
Difference from long term average	o C/month		-0.4	-0.1	0.5	-0.1	0.4	-0.2	0.5	0.2
Mar	o C/month		15.6	17.3	17.2	16.7	17.0	17.4	17.4	17.4
Mean			17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3
Difference from long term average	o C/month			0.0	-0.1	-0.6	-0.2	0.1	0.1	0.2
Apr	o C/month		14.5	14.8	15.3	14.7	14.3	14.2	15.4	15.5
Mean			14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
Difference from long term average	o C/month			0.2	0.6	0.1	0.4	0.5	0.8	0.8
May	o C/month		10.7	11.8	11.5	9.6	10.8	10.5	12.0	11.8
Mean			11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
Difference from long term average	o C/month		-0.7	0.3	0.0	-1.8	-0.6	-0.9	0.5	0.3
June	o C/month		7.5	10.4	8.1	8.8	9.9	8.8	9.8	10.3
Mean			9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Difference from long term average	o C/month		-1.8	1.1	-1.2	-0.5	0.7	-0.5	0.6	1.0
July	o C/month		9.2	8.7	8.3	9.6	8.1	8.9	9.6	8.7
Mean			9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Difference from long term average	o C/month		0.1	-0.4	-0.8	0.6	-1.0	-0.1	0.5	-0.4
August	o C/month		11.0	10.6	10.5	12.3	10.3	12.3	11.6	10.0
Mean			11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
Difference from long term average	o C/month		-0.2	-0.6	-0.8	1.0	-1.0	1.0	0.4	-1.3

Table 2.2(a): Maximum and Minimum Monthly Temperature (Long - term 1971 - 2000), 1990 - 2006

Category	Unit	Long term average	1990	2000	2001	2002	2003	2004	2005	2006
September	o C/month		14.1	14.0	14.0	14.9	13.6	14.4	14.6	13.7
Mean			14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Difference from long term average	o C/month		-0.4	-0.5	-0.4	0.4	-0.9	0.0	0.1	-0.7
October	o C/month		15.9	16.5	15.9	17.3	15.8	16.8	17.1	17.1
Mean			16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Difference from long term average	o C/month		-0.9	-0.3	-1.0	0.4	-1.0	-0.1	0.2	0.2
November	o C/month		17.7	17.1	17.9	17.3	18.0	17.6	17.9	17.7
Mean			17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7
Difference from long term average	o C/month		0.1	-0.6	0.2	-0.4	0.4	-0.1	0.2	0.0
December	o C/month		17.8	17.6	17.8	18.0	17.9	18.1	17.8	17.5
Mean			17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Difference from long term average	o C/month		0.2	0.0	0.3	0.4	0.3	0.6	0.2	0.0

Source: Zambia Meteorological Department

Table 2.2(b): Maximum and Minimum Monthly Temperature (Long – term 1971 - 2000), 2007 – 2013

Category	Unit	Long term average	2007	2008	2009	2010	2011	2012	2013
Maximum temperature									
Jan			27.7	27.7	29.0	29.3	28.3	28.5	28.9
Mean	o C/month	28.6	28.6	28.6	28.6	28.6	28.6	28.6	28.6
Difference from long term average	o C/month		-0.9	-0.9	0.4	0.7	-0.3	-0.1	0.3
Feb			29.1	28.5	28.5	28.6	28.8	29.0	28.9
Mean	o C/month	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7
Difference from long term average	o C/month		0.4	-0.2	-0.3	-0.2	0.0	0.3	0.1
Mar			30.0	28.5	28.0	28.7	28.3	28.8	29.5
Mean	o C/month	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
Difference from long term average	o C/month		1.1	-0.4	-0.9	-0.2	-0.6	-0.1	0.6
Apr			29.4	28.5	27.8	29.1	28.9	27.6	29.3
Mean	o C/month	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Difference from long term average	o C/month		0.5	-0.3	-1.0	0.3	0.1	-1.2	0.5
May			28.5	27.2	27.3	28.3	28.1	27.9	27.4
Mean	o C/month	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7
Difference from long term average	o C/month		0.7	-0.6	-0.4	0.5	0.4	0.1	-0.4
June			26.4	26.0	26.5	25.8	27.1	26.7	26.0
Mean	o C/month	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Difference from long term average	o C/month		0.1	-0.4	0.2	-0.5	0.8	0.4	-0.4
July			26.1	26.6	26.6	25.7	26.8	26.3	24.8
Mean	o C/month	26.2	26.2	26.2	26.2	26.2	26.2	26.2	26.2
Difference from long term average	o C/month		-0.1	0.4	0.4	-0.5	0.7	0.2	-1.4
August			28.3	29.7	31.3	27.3	29.6	29.1	26.6
Mean	o C/month	28.9	28.9	28.9	28.9	28.9	28.9	28.9	28.9
Difference from long term average	o C/month		-0.5	0.8	2.4	-1.6	0.7	0.2	-2.3
September			31.8	33.3	32.3	31.1	32.0	32.5	30.0
Mean	o C/month	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8
Difference from long term average	o C/month		-0.1	1.5	0.5	-0.7	0.1	0.6	-1.8
October			32.3	33.4	30.3	34.0	32.6	34.0	32.6
Mean	o C/month	32.7	32.7	32.7	32.7	32.7	32.7	32.7	32.7
Difference from long term average	o C/month		-0.4	0.8	-2.3	1.4	-0.1	1.4	-0.1
November			31.0	31.5	29.7	32.1	30.9	32.3	31.7
Mean	o C/month	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
Difference from long term average	o C/month		-0.4	0.1	-1.8	0.7	-0.5	0.9	0.3
December			28.4	28.3	30.7	28.4	29.3	29.1	30.9
Mean	o C/month	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Difference from long term average	o C/month		-1.0	-1.1	1.3	-1.0	-0.1	-0.3	1.5
Minimum temperature									
Jan			17.4	17.5	17.5	17.9	17.3	17.3	17.4
Mean	o C/month	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Difference from long term average	o C/month		-0.1	-0.1	-0.1	0.4	-0.2	-0.2	-0.1
Feb	o C/month		15.9	17.3	17.3	18.1	16.8	17.1	17.0
Mean		17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3
Difference from long term average	o C/month		-1.4	0.0	0.0	0.8	-0.5	-0.2	-0.3

Table 2.2(b): Maximum and Minimum Monthly Temperature (Long – term 1971 - 2000), 2007 – 2013

Category	Unit	Long term average	2007	2008	2009	2010	2011	2012	2013
Mar	o C/month		16.0	16.0	16.0	17.5	16.9	17.3	16.7
Mean		17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3
Difference from long term average	o C/month		-1.3	-1.3	-1.3	0.2	-0.4	0.0	-0.6
Apr	o C/month		14.3	13.1	13.1	16.4	15.8	14.0	14.6
Mean		14.3	14.7	14.7	14.7	14.7	14.7	14.7	14.7
Difference from long term average	o C/month		0.4	1.5	1.5	1.7	1.1	0.7	0.0
May	o C/month		12.1	11.4	11.4	12.7	12.1	11.7	12.6
Mean		11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4
Difference from long term average	o C/month		0.6	0.0	0.0	1.2	0.6	0.2	1.1
June	o C/month		8.8	9.4	9.4	9.6	10.2	9.8	10.3
Mean		9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Difference from long term average	o C/month		-0.5	0.1	0.1	0.3	0.9	0.5	1.0
July	o C/month		8.6	9.5	9.5	10.0	9.2	10.2	
Mean		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Difference from long term average	o C/month		-0.4	0.5	0.5	0.9	0.1	1.1	-9.1
August	o C/month		10.8	11.0	11.0	11.0	10.0	12.8	12.0
Mean		11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
Difference from long term average	o C/month		-0.5	-0.3	-0.3	-0.3	-1.3	1.5	0.7
September	o C/month	13.3	13.3	15.3	15.3	14.8	13.8	15.9	15.1
Mean			14.5	14.5	14.5	14.5	14.5	14.5	14.5
Difference from long term average	o C/month		-1.2	0.8	0.8	0.3	-0.7	1.4	0.6
October	o C/month	16.9	16.9	17.3	17.3	17.5	17.2	17.5	16.5
Mean			16.9	16.9	16.9	16.9	16.9	16.9	16.9
Difference from long term average	o C/month		0.1	0.5	0.5	0.6	0.3	0.6	-0.4
November	o C/month		17.8	17.9	17.9	18.1	17.9	17.5	16.5
Mean		17.6	17.7	17.7	17.7	17.7	17.7	17.7	17.7
Difference from long term average	o C/month		0.1	0.2	0.2	0.4	0.3	-0.1	-1.2
December	o C/month		17.1	17.9	17.9	17.3	17.4	17.1	17.0
Mean		17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
Difference from long term average	o C/month		-0.5	0.3	0.3	-0.2	-0.1	-0.5	-0.6

Source: Zambia Meteorological Department

2.1.1.2 Precipitation and Rainfall Patterns

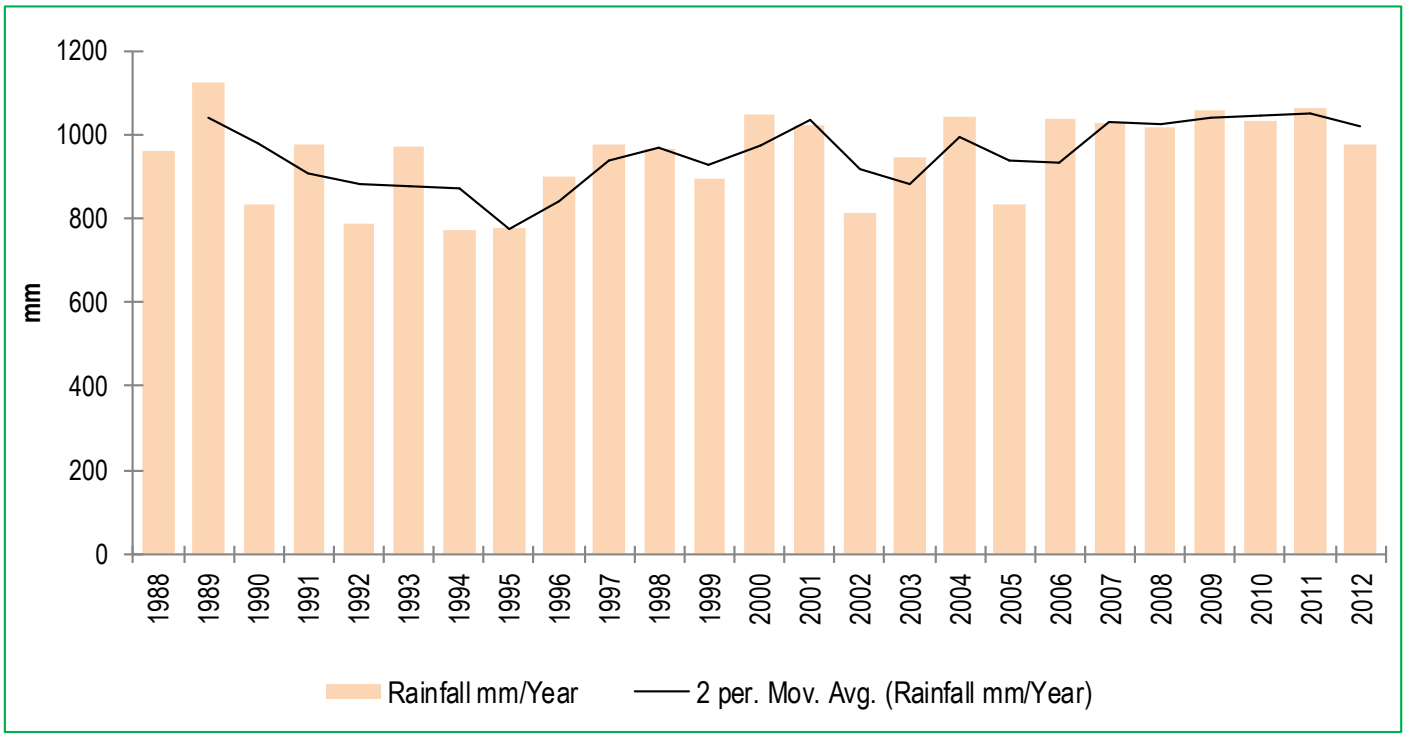
The rainfall pattern of Zambia is affected most by the movement of the Inter-Tropical Convergence Zone (ITCZ), which is the meeting place of the subtropical high pressure areas of northern and southern hemispheres. The zone moves southward with the apparent movement of the sun in the southern summer and brings rain to the greater part ofZambia. In the north of the country rainfall is 1000mm or more in a year, decreasing southwards to Lusaka the capital where it is about 800mm annually. South of Lusaka rainfall is dictated more by the east and Southeast trade winds, which have lost much of their humidity by the time they reach far inland; rainfall in this area is between 500 and 800mm. In exceptional years the influence of the Inter Tropical Convergence Zone is felt much farther to the south, resulting in excessive rain in the Southern Province. Much of the rainfall activities are confined to the wet season, which sometimes starts as early as October and finishes as early as March. At the height of the wet season it rains on seven or eight days out of ten.

Table 2.1: Annual Rainfall, 1988 - 2012

Year	Rainfall mm/Year	Year	Rainfall mm/Year
1988	960.4	2001	1,024.4
1989	1,125.2	2002	814.8
1990	836.3	2003	948.4
1991	976.4	2004	1,041.9
1992	788.5	2005	832.2
1993	971.0	2006	1,037.0
1994	771.0	2007	1,030.0
1995	779.2	2008	1,017.9
1996	899.4	2009	1,059.8
1997	978.1	2010	1,035.6
1998	964.8	2011	1,066.1
1999	895.9	2012	975.1
2000	1,051.2		

Source: Zambia Meteorological Department

Figure 2.1: Trend of Average Rainfall in Zambia (mm/Year)



Source: Zambia Meteorological Department

Table 2.3 (a): Total Annual, Annual Averageand Mean Monthly Rainfall (Long - Term 1971 - 2000), 1992 - 1996

Category	Unit	Long Term Annual Average	1992	1993	1994	1995	1996
Precipitation	mio m3/y						
Rainfall (total yearly)	mm/y	941.953	788.497	971.3	771	775.4	899
Rainfall variation from long term average	mm/y		153.45576	29.3154	-170.94	-166.51	-42.6
Jan			148.5	263.6	232.6	191.4	238
Mean	mm/y		245.7	245.7	245.7	245.7	246
Difference from long term average	%		-39.5	7.3	-5.3	-22.1	-3.3
Feb			121.9	251.5	200.7	191.6	212
Mean	mm/y		198.8	198.8	198.8	198.8	199
Difference from long term average	%		-38.7	26.5	1.0	-3.64	6.8
Mar			163.2	176.7	93.2	104	146
Mean	mm/y		153.2	153.2	153.2	153.2	153
Difference from long term average	%		6.5	15.3	-39.2	-32.1	-4.5
Apr			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
May			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
June			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
July			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
August			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
September			0.0	0.0	0.0	0	0
Mean	mm/y		0.0	0.0	0.0	0	0
Difference from long term average	%		0.0	0.0	0.0	0	0
October			25.3	8.3	46.8	22.37	7.3
Mean	mm/y		26.3	26.3	26.3	26.33	26
Difference from long term average	%		-4.1	-68.3	77.8	-15	-72
November			100.5	132.9	55.2	88.21	85
Mean	mm/y		104.0	104.0	104.0	104	104
Difference from long term average	%		-3.3	27.9	-46.9	-15.2	-18
December			229.1	138.2	142.6	177.9	246
Mean	mm/y		214.0	214.0	214.0	214	214
Difference from long term average	%		7.1	-35.4	-33.4	-16.9	15

Source: Zambia Meteorological Department

Table 2.3 (b): Total Annual, Annual Average and Mean Monthly Rainfall (Long – term 1971 - 2000), 2000- 2007

Category	Unit	Long term annual average	2000	2001	2002	2003	2004	2005	2006	2007
Precipitation	mio m3/y									
Rainfall (total yearly)	mm/y	941.953	1051	1024	814.8	948.4	1042	832.2	1037	1030
Rainfall variation from long term average	mm/y		109.25	82.4023	-127.13	6.49175	99.9944	-109.77	95.0365	88.0207
Jan			221.3	251.4	212.6	214.1	253.7	237.7	242.1	302.1
Mean	mm/y		245.7	245.7	245.7	245.7	245.7	245.7	245.7	245.7
Difference from long term average	%		-9.92	2.328	-13.5	-12.8	3.282	-3.25	-1.46	22.99
Feb			218.1	255.7	141.9	187.8	189.4	121.9	216.2	212.4
Mean	mm/y		198.8	198.8	198.8	198.8	198.8	198.8	198.8	198.8
Difference from long term average	%		9.691	28.63	-28.6	-5.51	-4.73	-38.7	8.768	6.849
Mar			223.9	193.3	119.7	210.6	185.5	121.8	200.4	115.1
Mean	mm/y		153.2	153.2	153.2	153.2	153.2	153.2	153.2	153.2
Difference from long term average	%		46.12	26.21	-21.8	37.49	21.09	-20.5	30.82	-24.8
Apr			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
May			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
June			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
July			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
August			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
September			0	0	0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0	0	0
October			15.13	25.83	33.18	32.32	31.9	11.2	16.15	29.53
Mean	mm/y		26.33	26.33	26.33	26.33	26.33	26.33	26.33	26.33
Difference from long term average	%		-42.5	-1.89	26.02	22.75	21.18	-57.6	-38.6	12.16
November			129.4	106.2	79.34	79.57	105.1	112.8	123.7	89.04
Mean	mm/y		104	104	104	104	104	104	104	104
Difference from long term average	%		24.45	2.146	-23.7	-23.5	1.063	8.478	18.95	-14.4
December			243.5	191.9	228	223.9	276.3	226.9	238.4	281.7
Mean	mm/y		214	214	214	214	214	214	214	214
Difference from long term average	%		13.78	-10.3	6.564	4.65	29.13	6.011	11.43	31.65

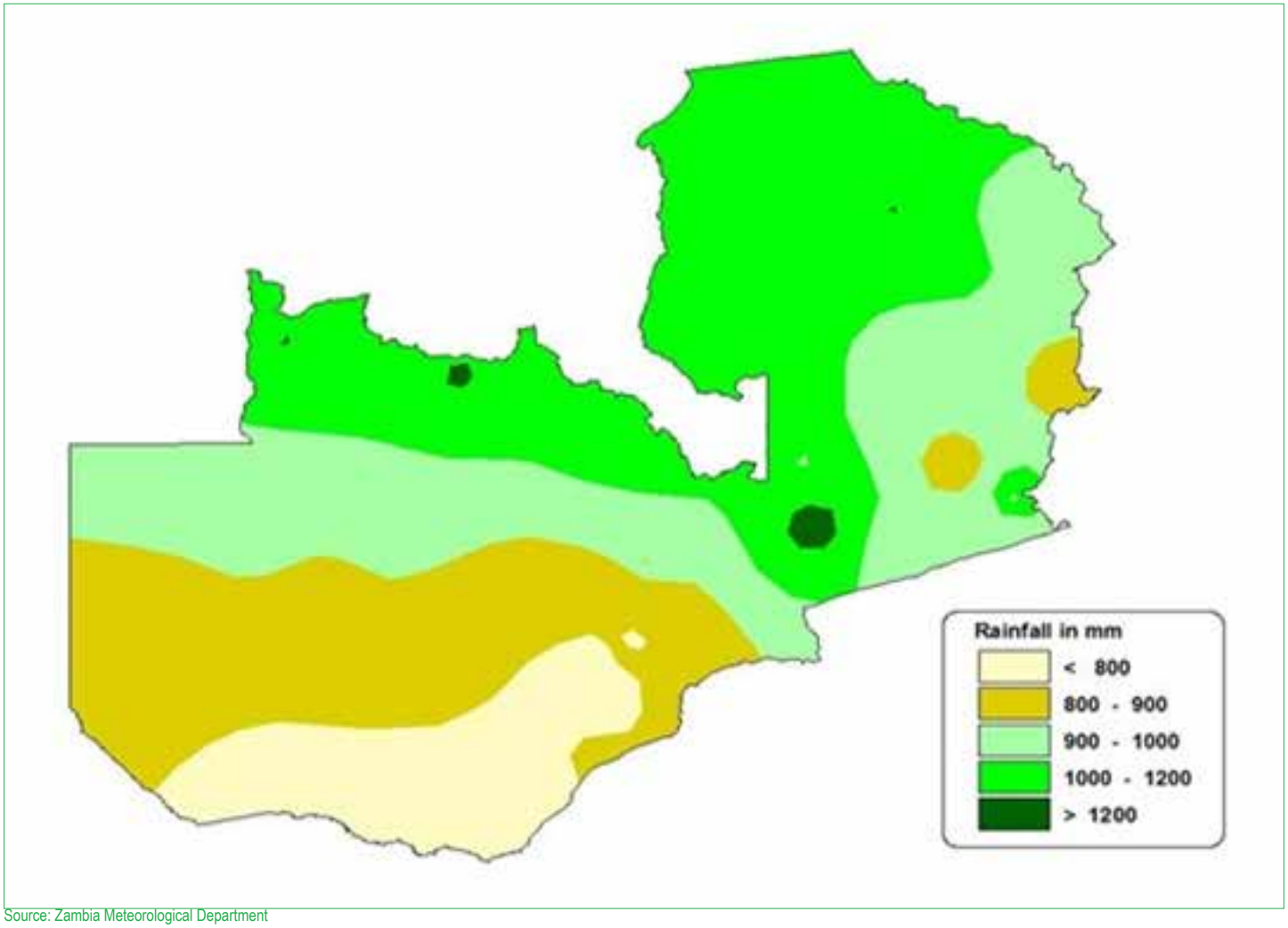
Source: Zambia Meteorological Department

Table 2.3 (c): Total Annual, Annual Average and Mean Monthly Rainfall (Long - term), 2008 - 2013

Category	Unit	Long term annual average	2008	2009	2010	2011	2012	2013
Precipitation	mio m3/y							
Rainfall (total yearly)	mm/y	941.953	1018	1060	1036	1066	975.1	919.5
Rainfall variation from long term average	mm/y		76.0	117.9	93.6	124.1	33.2	-22.4
Jan			304	238.6	207.6	201.1	241.8	243.1
Mean	mm/y		245.7	245.7	245.7	245.7	245.7	245.7
Difference from long term average	%		58.3	-7.1	-38.1	-44.6	-3.9	-2.6
Feb			177.8	196.6	257.9	-1.83	195.5	206.7
Mean	mm/y		198.8	198.8	198.8	170	198.8	198.8
Difference from long term average	%		-10.6	-1.12	29.71	198.8	-1.66	3.974
Mar			116.7	209.6	194.4	-14.5	174.4	131.3
Mean	mm/y		153.2	153.2	153.2	176.8	153.2	153.2
Difference from long term average	%		-23.8	36.84	26.89	153.2	13.83	-14.3
Apr			0	0	0	15.42	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
May			0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
June			0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
July			0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
August			0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
September			0	0	0	0	0	0
Mean	mm/y		0	0	0	0	0	0
Difference from long term average	%		0	0	0	0	0	0
October			20.91	15.13	10.26	0	16.47	18.7
Mean	mm/y		26.33	26.33	26.33	20.96	26.33	26.33
Difference from long term average	%		-20.6	-42.5	-61	26.33	-37.4	-29
November			160.3	175.4	106	-20.4	88.51	88.32
Mean	mm/y		104	104	104	130.4	104	104
Difference from long term average	%		54.19	68.65	1.971	104	-14.9	-15.1
December			238.1	224.6	259.4	25.38	258.5	231.4
Mean	mm/y		214	214	214	326.7	214	214
Difference from long term average	%		11.29	4.942	21.24	214	20.8	8.13

Source: Zambia Meteorological Department

Map 2.1: Mean Annual Rainfall in Zambia

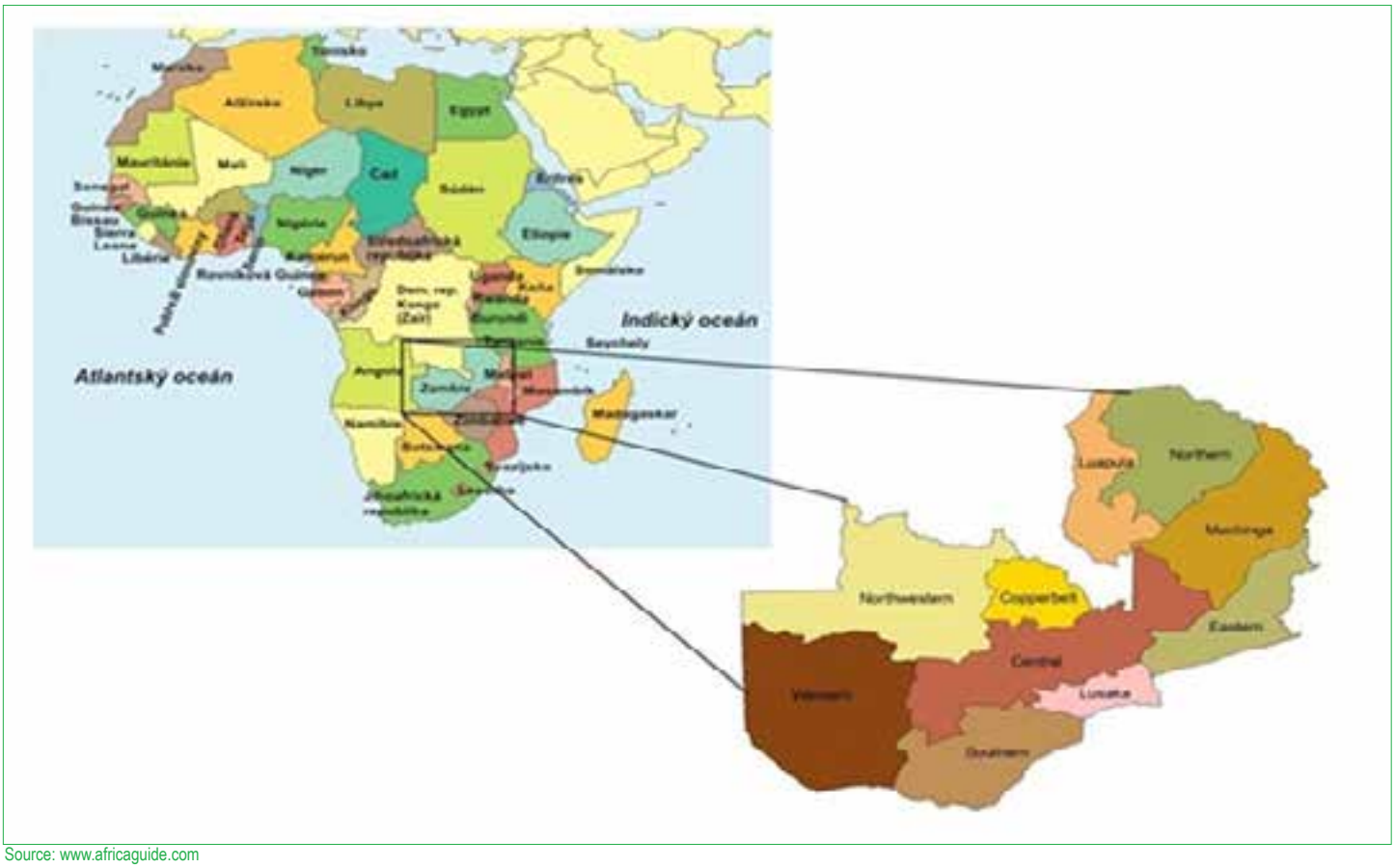


Source: Zambia Meteorological Department

2.1.2 Geographical Location

Zambia is a landlocked country located in Southern Africa, lying between latitude 8 and 18 degrees south and longitude 22 and 34 degrees east. It shares borders with the Democratic Republic of Congo (DRC) in the north, Tanzania in the north-east, Malawi and Mozambique in the east, Zimbabwe, Botswana and Namibia in the south and Angola in the west (See Map 2.2). Lusaka is the capital and largest city. The protruding south-eastern area of the DRC nearly bisects Zambia into two major geographic areas. The Copperbelt contains some of the world's largest proven copper deposits.

Map 2.2: Geographical Location of Zambia in Africa



Source: www.africaguide.com

2.1.3 Local Climatic Conditions

Zambia's general height of land gives it a more pleasant climate than that experienced in most tropical countries. It has three distinct seasons; cool and dry from May to August, hot and dry from September to November and warm and wet from December to April. Excess heating is only experienced in the Zambezi and Luangwa valleys particularly in October and in the warm wet season, frequent heavy showers and thunderstorms occur followed by spells of bright sunshine. During the cool dry season, night frosts may occur in places sheltered from the wind and the south-western districts if the winds are traversing over the dry Kalahari Desert of Botswana. Temperatures raise high during the hot, dry season but new leaves appear on the trees before the start of the rains and new grass brightens the countryside.

Zambia's vegetation is of the savanna type generally dominated by the Miombo vegetation type that covers over half the country with its characteristic trees pieces, varying from the more open conditions in the drier south to tall dense woodlands in the north and north-west. Most of the tree species are deciduous hence remain bare for a brief period only and the spring leaves appear before the start of the rains. Grass fires spread rapidly in the dry season but new blades of grass soon push through the blackened earth. Zambia's climate makes possible the cultivation of a wide range of crops; maize, tobacco, pineapples, mangoes, avocados and even grapes. The impact of climate change has become an increasing phenomenon especially in the recent years with increased variability and change in the seasonality and length of the rain season. Lichis are also a high potential export crop. Tea and coffee are cotton, rice, wheat and groundnuts. All kinds of vegetables can be grown, together with citrus fruit, bananas, also grown successfully in fact the coffee produced is of a very high quality with sugar cane grown both by villagers and commercially.

2.1.4 Configuration, Geology and Soils

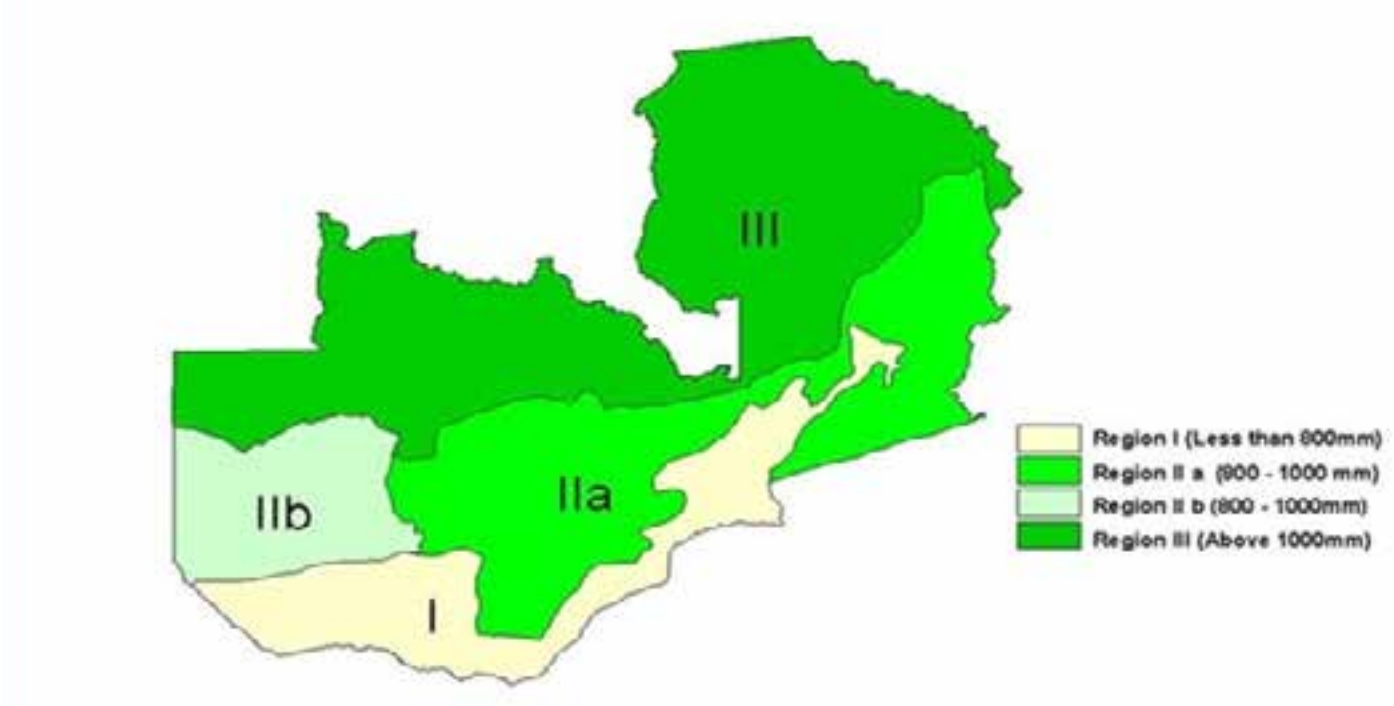
Zambia consists largely of a highland plateau, which rises in the east. Elevations range from 915 - 1,520m and higher altitudes are attained in the Muchinga escarpment, where Zambia's highest point, 2,170m, is located; the lowest point of 329m is at the Zambezi river. Also in East

Zambia are Lake Banguwelu, parts of lakes Mweru and Tanganyika and the Luangwa and Chambeshi rivers. The Zambezi River drains much of the west of the country (where the elevation is about 460 - 910m) and forms a large part of Zambia's southern boundary. The Victoria Falls and the huge Kariba Dam, both on the border with Zimbabwe, are part of the Zambezi in the south. The Kafue River drains west-central Zambia, including the Copperbelt in the north. Several large swamps, or flats, are noted for their concentration of wildlife. There are four major valleys: the Zambezi, the Kafue, the Luangwa and the Luapula. Zambia has several large lakes: man-made Kariba in the South, lakes Tanganyika and Mweru in the North and Lake Bangweulu in the interior.

Zambia is underlain by a wide range of rock types. Granites and gneisses of various composition occur widely, except in the Western Province. They range from biotite-rich gneisses, as in the south east of the Eastern Province, to the more widespread acidic gneisses, Schists and quartzites of the Basement Complex. While basic intrusives occur on a small scale, sedimentary rocks also occur widely. They include extensive areas of Katanga (Lower Palaeozoic) sandstones, shales and dolomitic limestones, metamorphosed to various degrees. The limestones are almost absent from the Northern and Luapula Provinces. Karroo (Upper Palaeozoic and Jurassic) sandstones and shales underlie the Luangwa valley and Kafue Flats, and outcrop widely in the middle and lower Zambezi valley, where they include basalt beds. Unconsolidated Barotse sands occupy most of the Western Province as well as adjoining parts of the North Western and Southern Provinces. Recent alluvium occurs widely on the upper Zambezi floodplain, the Kafue Flats, in the Luangwa valley and in the Bangweulu and Lukanga swamps (ZARI, 2001).

The importance of soils can never be over emphasised especially to a largely agrarian society like that of Zambia. It is therefore imperative that the characteristics and distribution of soils are known and documented. Zambian soils have been formed from a great diversity of parent materials. However, the characteristics and distribution of the soils are largely influenced by climate particularly rainfall. In the high rainfall zone (> 1000 mm rain/year) which corresponds to agro-ecological region III, the soils are generally highly weathered and leached. In the medium rainfall zone (region II, 800-1000 mm rain/year) the soils on similar parent materials as those in region III are moderately weathered and leached. In the low rainfall zone (region I, 00-800 mm rain/year) the soils are slightly weathered and moderately to non-leached. Generally, the influence of rainfall on soil formation decreases from region III to region I (ibid).

Map 2.3: Zambia's Agro-Ecological Zones



Source: Zambia Meteorological Department, 2016

Table 2.4: Mean Annual Rainfall by Region, 2005 - 2014

Region	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Region I	Mean (mm)	617	742	745	1,027	663	728	618	543	746	608
	% of LTM	-9.8	8.3	8.7	50.0	-3.2	6.3	-9.8	-20.7	9.0	-11.2
Region IIa	Rainfall (mm)	1091	1114	1489	907	1452	1271	670	1700	844	908
	% of LTM	21.6	24.2	66.0	1.1	61.8	41.7	-25.3	89.5	-5.9	1.2
Region IIb	Rainfall (mm)	682	843	1096	1580	1257	1203	947	1244	1001	695
	% of LTM	-27.0	-9.9	17.3	68.9	34.5	28.7	1.3	33.1	7.0	-25.7
Region III	Rainfall (mm)	995	1,712	1,030	1,631	1,374	1,032	1,372	1,639	1,851	1,454
	% of LTM	-26.4	26.5	-23.8	20.6	1.6	-23.7	1.4	21.2	36.8	7.5

Source: Zambia Meteorological Department

Mean annual rainfall for the four agro ecological regions for the period 2005 to 2014 for 2 stations for the small regions I, IIa and IIb and for the larger region III four stations were used. The Long Term Mean was calculated from 1971 to 2001, for the performance comparison, the difference between the annual rainfall for each year and the long term mean was expressed as a percentage to show the deviation from normal.

Table 2.5 (a): Mean Temperature, Zambia 2005 - 2014 (Region I)

Year	Month																						Mean annual temperature	
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec			
	LTM [1] (24.8)		LTM (24.5)		LTM (24.3)		LTM (22.5)		LTM (19.6)		LTM (16.7)		LTM (16.3)		LTM (19.5)		LTM (23.9)		LTM (26.6)		LTM (26.4)		LTM (25.1)		LTM (22.6)	
	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM
2005	25.7	0.9	25.7	1.2	25.4	1.1	24	1.5	21.6	2	18.9	2.2	16.6	0.3	22.5	3	24.4	0.5	28	1.4	26	-0.4	24.3	-0.8	23.5	0.9
2006	24.1	-0.7	24.3	-0.2	24	-0.3	22.6	0.1	19.6	0	16.8	0.1	16.9	0.6	20	0.5	22.4	-1.5	28	1.4	26	-0.4	24.3	-0.8	22.2	-0.4
2007	24.9	0.1	25.6	1.1	24.2	-0.1	21.2	-1.3	19.8	0.2	16.3	-0.4	16.8	0.5	26.3	6.8	20.7	-3.2	25.8	-0.8	26.5	0.1	23.2	-1.9	22.6	0
2008	23.1	-1.7	24.7	0.2	23.5	-0.8	21.9	-0.6	20.1	0.5	17.2	0.5	18.1	1.8	20.6	1.1	25.4	1.5	28.7	2.1	26.1	-0.3	24.8	-0.3	22.7	0.1
2009	24.8	0	24.3	-0.2	23.3	-1	22	-0.5	20.6	1	18.5	1.8	16.9	0.6	19.5	0	25.8	1.9	27.4	0.8	26.3	-0.1	25.5	0.4	22.8	0.1
2010	25.7	0.9	25.2	0.7	27.2	2.9	22	-0.5	20.1	0.5	18.3	1.6	18.2	1.9	20.1	0.6	25.6	1.7	24.3	-2.3	23.3	-3.1	22.6	-2.5	22.7	0.1
2011	24.8	0	25.5	1	27.4	3.1	21.4	1.1	20.3	0.7	17.8	1.5	17.4	1.1	21.5	2	23.9	0	24.3	-2.3	23.3	-3.1	22.6	-2.5	23.1	0.5
2012	24.1	-0.7	26.7	2.2	28	3.7	23.7	1.2	20.7	1.1	18.6	1.9	19.3	3	21.2	1.7	23.6	-0.3	25.6	-1	25.4	-1	23.6	-1.5	23.4	0.8
2013	24.3	-0.5	26.3	1.8	26.3	2	19.9	-2.6	19.8	0.2	18.4	1.7	18.2	1.9	21.3	1.8	23.4	-0.5	26.7	0.1	28.2	1.8	27	1.9	23.2	0.6
2014	25.4	0.6	26.5	2	26.5	2.2	21	-1.5	19.9	0.3	18.3	1.6	17.4	1.1	21.1	1.6	24.6	0.7	26.5	-0.1	25.7	-0.7	24.3	-0.8	22.8	0.2

[1] LTM: Long Term Mean, 1971 - 2001

Source :Zambia Meteorological Services

Table 2.5 (b): Mean Temperature, Zambia 2005 - 2014(Region IIa)

Year	Month																						Mean annual temperature	
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec			
	LTM [1](23.2)		LTM (23.2)		LTM (23.2)		LTM (22.6)		LTM (21.0)		LTM (19.1)		LTM (18.9)		LTM (21.1)		LTM (24.3)		LTM (26.2)		LTM (26.1)		LTM (24.3)		LTM (22.8)	
	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM
2005	23.8	0.6	24.5	1.3	23.5	0.3	23.8	1.2	21.7	0.7	20.8	1.7	19.5	0.6	23.1	2	25.1	0.8	26.9	0.7	26	-0.1	25.6	1.3	23.5	0.7
2006	24	0.8	24	0.8	23.4	0.2	22.9	0.3	21.2	0.2	19.6	0.5	19.7	0.8	22.1	1	23.3	-1	27.5	1.3	26.4	0.3	24.3	0	23.2	0.4
2007	23.2	0	23.6	0.4	23.9	0.7	23.8	1.2	21.7	0.7	20.3	1.2	19.2	0.3	22	0.9	23.9	-0.4	26.5	0.3	27.3	1.2	24	-0.3	23.3	0.5
2008	23.2	0	23	-0.2	22.9	-0.3	22.7	0.1	21.6	0.6	19.2	0.1	19.3	0.4	21.9	0.8	24	-0.3	26.8	0.6	26.9	0.8	26.2	1.9	23.1	0.3
2009	23.7	0.5	23.6	0.4	23.6	0.4	22	-0.6	21.1	0.1	20.5	1.4	20.1	1.2	20.2	-0.9	24.1	-0.2	26.7	0.5	26.7	0.6	25.7	1.4	23.2	0.4
2010	25	1.8	24.6	1.4	23.9	0.7	24	1.4	22.8	1.8	21.4	2.3	20.5	1.6	20	-1.1	22.4	-1.9	26.9	0.7	28.6	2.5	26.5	2.2	23.9	1.1
2011	24	0.8	23.4	0.2	23	-0.2	23.1	0.5	22.4	1.4	21.2	2.1	20	1.1	20.6	-0.5	23.4	-0.9	26.8	0.6	26.4	0.3	26.4	2.1	23.4	0.6
2012	25.1	1.9	22.8	-0.4	23.9	0.7	22.3	-0.3	20.7	-0.3	20.8	1.7	19.8	0.9	20	-1.1	23.1	-1.2	26.5	0.3	26.5	0.4	25.2	0.9	23.1	0.3
2013	23.5	0.3	23.2	0	23.5	0.3	23.1	0.5	21.7	0.7	20.5	1.4	19.8	0.9	21.2	0.1	23.7	-0.6	26.8	0.4	26.9	0.8	25.5	1.2	23.4	0.6
2014	23.9	0.7	23.6	0.4	23.4	0.2	23.3	0.7	20.9	0.1	20.3	1.2	20.1	1.2	20.4	-0.7	23.2	-1.1	26.4	0.2	26.6	0.5	25.3	1	23.3	0.5

[1] LTM: Long Term Mean, 1971 - 2001

Source:Zambia Meteorological Services

Table 2.5 (c): Mean Temperature, Zambia 2005 - 2014 (Region IIb)

Year	Month																						Mean annual temperature	
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec			
	LTM [1] (24.2)		LTM (24.1)		LTM (24.2)		LTM (23.3)		LTM (21.1)		LTM (18.8)		LTM (18.7)		LTM (21.7)		LTM (25.3)		LTM (26.4)		LTM (25.3)		LTM (25.3)		LTM (24.4)	
	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM
2005	25	0.8	25.4	1.3	25.1	0.9	24.1	0.8	22.3	1.2	20.4	1.6	18.9	0.2	28	6.3	24.1	-1.2	26.8	0.4	26.2	0.9	24.9	-0.4	24.2	-0.2
2006	24.6	0.4	24.5	0.4	24.3	0.1	23.7	0.4	21.3	0.2	18.8	0	19.3	0.6	21.9	0.2	24.4	-0.9	27	0.6	25	-0.3	25.2	-0.1	23.2	-1.2
2007	24.5	0.3	24.6	0.5	25.3	1.1	23.7	0.4	21.5	0.4	19.8	1	18.4	-0.3	22.4	0.7	26.1	0.8	27	0.6	26	0.7	24.3	-1	23.6	-0.8
2008	23.7	-0.5	24.4	0.3	23.8	-0.4	23.1	-0.2	22.1	1	18.8	0	19.1	0.4	22	0.3	26.1	0.8	28.2	1.8	24.9	-0.4	24	-1.3	23.3	-1.1
2009	24.5	0.3	24.3	0.2	24.1	-0.1	23.3	0	22.4	1.3	21.4	2.6	22.8	4.1	23.9	2.2	24.6	-0.7	25.1	-1.3	24.8	-0.5	24.9	-0.4	23.7	-0.7
2010	24.8	0.6	25.8	1.7	25.2	1	22.5	-0.8	21.4	0.3	20.4	1.6	23.4	4.7	24.6	2.9	25.2	-0.1	24.9	-1.5	24.1	-1.2	24.4	-0.9	23.8	-0.6
2011	24.6	0.4	25.7	1.6	24.5	0.3	23.1	-0.2	21.3	0.2	20.6	1.8	22.6	3.9	24.1	2.4	25	-0.3	24.4	-2	25.1	-0.2	23.5	-1.8	23.7	-0.7
2012	25	0.8	25	0.9	24	-0.2	23	-0.3	20.7	-0.4	21.5	2.7	22.8	4.1	25.2	3.5	25	-0.3	24.5	-1.9	24.4	-0.9	24.5	-0.8	23.7	-0.7
2013	25.9	1.7	25.8	1.7	24.4	0.2	22.1	-1.2	20.5	-0.6	21.4	2.6	23.2	4.5	25	3.3	24.8	-0.5	24.2	-2.2	25	-0.3	24.5	-0.8	23.8	-0.6
2014	24.7	0.5	25.1	1	24.5	0.3	23.2	-0.1	21.5	0.4	20.3	1.5	21.2	2.5	24.1	-1.2	25	-0.3	25.8	-0.6	25.1	-0.2	25.4	0.1	24.3	-0.1

[1] LTM: Long Term Mean, 1971 - 2001

Source:Zambia Meteorological Services

Table 2.5 (d): Mean Temperature, Zambia 2005 - 2014 (Region III)

Year	Month																						Mean annual temperature	
	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sept		Oct		Nov		Dec			
	LTM [1] (21.7)		LTM (21.9)		LTM (21.7)		LTM (20.5)		LTM (18.3)		LTM (16.7)		LTM (16.1)		LTM (18.5)		LTM (21.2)		LTM (22.7)		LTM (21.9)		LTM (21.5)		LTM (21.2)	
	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM	Mean	Difference from LTM
2005	23.1	1.4	24.6	2.7	24	2.3	21.4	0.9	18.2	1.5	17.1	1	18.6	2.5	19.6	1.1	20.9	-0.3	21.9	-0.8	21.6	-0.3	21.1	-0.4	21	-0.2
2006	22.9	1.2	23.8	1.9	23.5	1.8	21.6	1.1	18.7	2	17.4	0.7	16.9	0.8	16.7	-1.8	20.4	-0.8	21.6	-1.1	21.2	-0.7	21.4	-0.1	19.9	-1.3
2007	22.3	0.6	23.9	2	22.5	0.8	20.7	0.2	16.5	-1.8	18.2	2.1	18.2	2.1	19.9	1.4	19.9	-1.3	21.2	-1.5	21	-0.9	22.8	1.3	20.5	-0.7
2008	24.2	2.5	23.4	1.5	22.2	0.5	20.3	-0.2	18.6	1.9	18.1	1.4	17.6	1.5	19.1	0.6	19.7	-1.5	20.9	-1.8	21.3	-121	22.5	1	20.4	-0.8
2009	24.5	2.8	24	2.1	21.6	-0.1	20.4	-0.1	19.9	3.2	17.6	1.9	17.2	1.1	17.9	-0.6	20.1	-1.1	21.6	-1.1	21	-0.9	22.3	0.8	20.7	-0.5
2010	24.3	2.6	24.7	2.8	22.4	0.7	21.7	1.2	19.5	2.8	17.8	1.7	18.5	2.4	18.9	0.4	20.3	-0.9	20.6	-2.1	21.1	-0.8	22.2	0.7	21	-0.2
2011	24.1	2.4	25.2	3.3	23	1.3	20.7	0.2	19.1	2.4	18.4	2.3	17.4	1.3	18.3	-0.2	20.1	-1.1	21.7	-1	21.5	-0.4	23.1	1.6	21.1	-0.1
2012	24.2	2.5	24.4	2.5	22.6	0.9	20.6	0.1	18.6	1.9	18.2	2.1	17.5	1.4	19.6	1.1	20.9	-0.3	22.3	-0.4	23.4	1.5	22	0.5	21.2	0
2013	22.3	0.6	24.6	2.9	22.6	0.9	20.8	0.3	19	0.7	17.6	0.9	17.4	1.3	18.9	0.4	20.3	-0.9	21.8	-0.9	21.5	-0.4	22.1	0.6	20.7	-0.5
2014	22.4	0.7	24.3	2.4	23.1	1.4	21.3	0.8	19.3	1	18.5	1.8	18.1	2	18.6	0.1	20.6	-0.6	21.6	-1.1	22.2	0.3	21.9	0.4	21.3	0.1

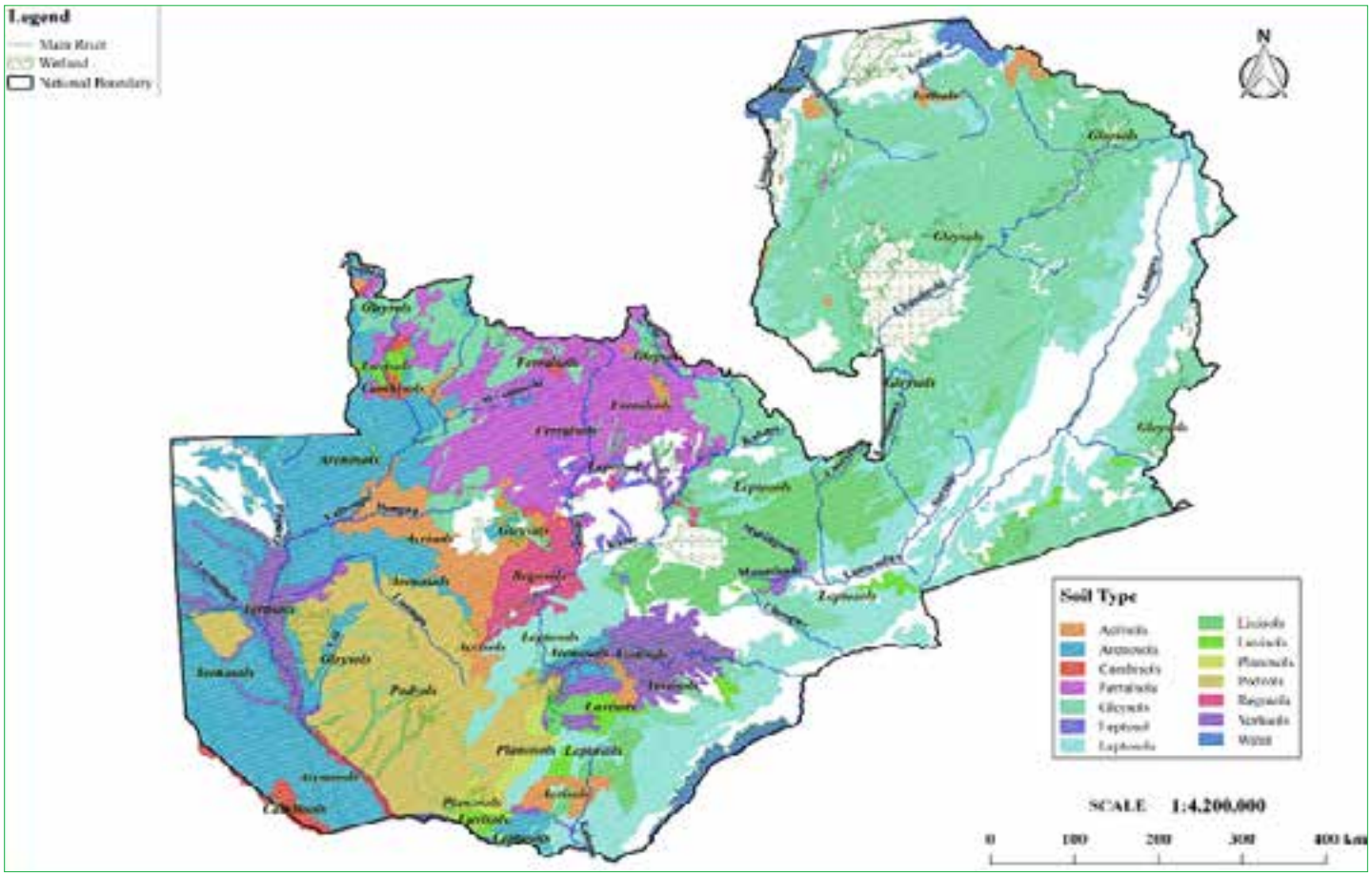
[1] LTM: Long Term Mean, 1971 - 2001

Source: Zambia Meteorological Services

2.1.5 Average Temperature

The mean temperature was derived from the standard meteorological formula of getting the average for the minimum and the maximum temperature for the day and later averaged to get the mean monthly temperature for the month. Long term mean was calculated for each month for the period 1971 to 2001 for the two stations used for each Agro ecological zone. Challenges associated with missing data as the mean daily temperature is derived from two variables minimum and maximum temperature and if one is missing it affects the daily temperature mean.

Map 2.4: Soil Map of Zambia



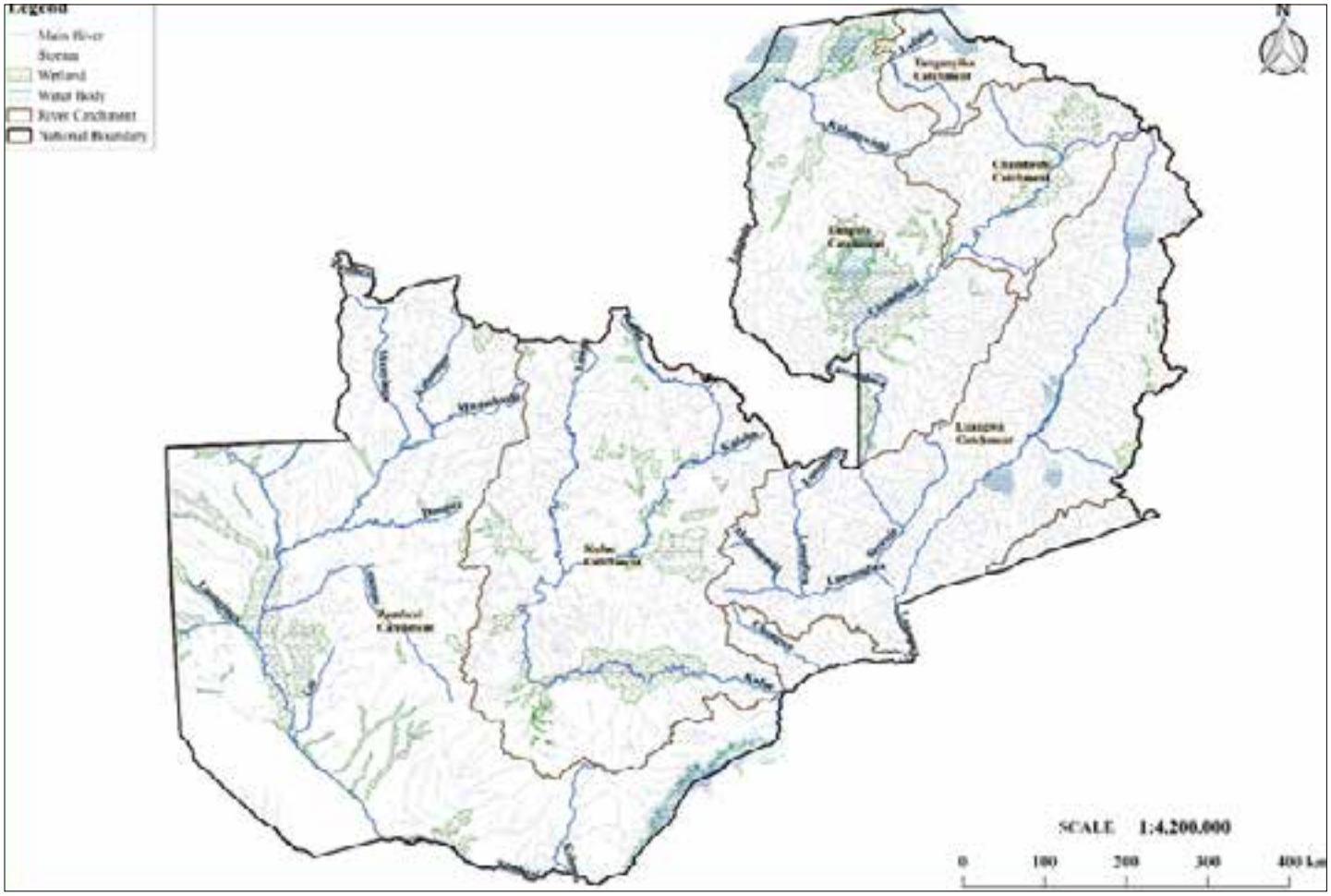
Source: Zambia Meteorological Department

Most part the country is covered by Acrisols and Ferralsols. While occurrence of Ferralsols is limited to region III, Acrisols are found in both regions III and II. Lixisols, Alisols and Luvisols soil types together with Acrisols predominate region II. Soils commonly found in both regions II and I, and are relatively fertile are Phaeozems, Nitosols and Cambisols. There are minor occurrences of Cambisols in region III. Arenosols and Podzols are restricted to Western Province of Zambia and some parts of north western province.

2.1.6 The Drainage Systems

The Zambezi and Congo River Basins are the main surface water contributors. The Zambezi Basin covers three-quarters of the country and comprises three sub-basins - Zambezi, Kafue and Luangwa. 40.7 percent of the Zambezi catchment lies in Zambian territory. Zambia lies within two of Africa's great river basins. Seventy-two percent of Zambian territory falls within the Zambezi Basin which includes the Kafue and Luangwa sub-basins. The remaining 28 percent of the country falls within the upper reaches of the Congo River Basin, covering the Luapula, Chambeshi and Tanganyika catchments.

Map 2.5: Drainage Map of Zambia



Source: WARMA, 2016

The Zambezi River, which emanates from the Kalene Hills in the North-western part of Zambia has the longest inland river stretch among the Zambian rivers (See Table 2.6) covering as prawling 1,700km and is followed by Kafue at 130km^2. Annual runoff ranges from 130km in a peak rainfall year to as low as 68km^2 in a severe drought year.

Table 2.6: Length, Percent Contribution to Surface Water Potential and Annual Run-Off within Zambia and Area

(Total, Within and Outside Zambia)

Sub Basin	Length in Zambia (Km)	Basin Area (Km2)			% contribution to surface water	Annual runoff (Km3)
		Total Basin Area	Area in Zambia	Outside Zambia		
Zambezi	1,700	687,049	268,235	418,814	36.36	41.75
Kafue	1,300	156,995	156,995	-	8.4	9.88
Luangwa	850	147,622	144,358	3,264	19.44	22.32
Chambeshi	560	44,427	44,427	-	7.62	8.75
Luapula	615	173,396	113,323	60,073	26.25	30.14
Lake Tanganyika	250	249,000	15,856	233,144	1.73	1.44
Total	5,275	1,458,489	743,194	715,295	99.8	114.28

Source: JICA-MEWD, 1995

2.1.7 Freshwater Quality

The United Nations has adopted 17 sustainable development goals. Goal number 6 aims to 'Ensure availability and sustainable management of water and sanitation for all' all". Specifically, Goal 6.1 states that by 2030, achieve universal and equitable access to safe and affordable drinking water for all.

Water availability in the environment is determined by the climate. High temperatures can lead to evaporation rates which can deplete the already low rainfall. It is reported in the "Caricom Environment in figures 2002" that clean and adequate water is vital for human health but water is often the main cause of many fatal diseases such as diarrhoea, malaria or typhoid fever. It is further reported that in most developing countries people do not have access to safe drinking water and drinking water has often been contaminated because of pollution from human activities.

Water quality standards are designed to provide us with understanding the critical importance of adequate supplies of clean, available fresh water for the environment, the country's economy and the quality of life. This section will provide a national and international perspective of water availability and the challenges faced by Water Suppliers in addressing water quality issues. Without water human survival is at risk and the economy cannot survive without sufficient supplies of clean water.

Drinking water quality is an issue of concern for human health in developing and developed countries worldwide. The risks arise from contaminating agents which include toxic chemicals.

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Guidelines for drinking water quality are used as the basis for regulation and standard setting to ensure the safety of drinking water. Zambia Bureau of Standard (ZABS) is the only organization in Zambia responsible for setting water quality standards, their standards have been compared with World Health Organization guidelines in Table 2.6 which shows the selected water quality parameters. It is the mandate of ZABS to make provision for amendments of drinking water quality standard and guidelines. Water sources are monitored on a regular basis to assess its quality. Effluent quality is also monitored at source to ensure that it is compliant with the effluent quality standards.

ZABS has established maximum permissible limits and ranges for chemical levels allowable in drinking water. Most of these levels allow a sufficient margin of safety; it must be remembered that acceptable contaminant levels vary widely among individuals for example high sodium, which may be harmless for many people, can be dangerous for the elderly, hypertensive, pregnant women, and people having difficulty in excreting sodium.

It is believed that if these contaminants are present in your water at levels above these standards, the contaminants may cause the water to appear cloudy or colored, or to taste or smell bad. This may cause a great number of people to stop using water from their public water system even though the water is actually safe to drink.

The effect of toxic contaminants on human health can be classified as either acute or chronic. The reaction to a substance causing serious illness or death in an individual within 48 hours after exposure is considered acute toxicity. Chronic toxicity is a longer term effect on health due to frequent exposure to small amounts of a toxic substance. Examples of chronic health effects are kidney and liver disease, cancer, mental illness, etc. Possible effects of contaminants are also shown on table 2.7.

Table 2.7 below explains the various variables monitored by the Water Resources Management Authority, Water Utility Companies and other Agencies to measure the level of contamination in water.

Table 2.7: Specification for Drinking Water Quality

VARIABLES		Zambia Bureau of Standards	
(in milligrams/litre where applicable)	WHOGuidelines	Maximum Permissible Limit	Possible effects
PHYSICAL REQUIREMENTS			
Turbidity[3] NTU	5	5	High turbidity levels can cause Nausea, cramps, diarrhoea and headaches
Colour TCU	15	15	It makes water unpleasant for drinking and cooking and it causes staining and is corrosive to plumbing metals
Taste & Odour	Not objectionable	Not objectionable	Water can rapidly tarnish silver
CHEMICAL REQUIREMENTS			
Chlorine Residual CL_2	0.6	0.2 – 0.5	Several epidemiological studies have indicated a possible association between chlorinated drinking water and increased risks from a variety of cancers, mainly to do with the bladder, colon and rectum. However, other studies have not found such associations. Therefore, because of the limitations of the data, no definite conclusions canbe based on these studies www.waterquality.crc.org.au.htm
pH [4] (potential Hydrogen)	6.0 - 9.0	6.5 – 8.0	Low pH can be acidic, soft and
			Corrosive. It can also cause damage to metal pipes. High pH can cause Scaling of metals, cause Coffee to taste bitter and can also Lower the efficiency of electric water heaters
Conductivity (uS/cm)		1500	
Total Hardness (as $CaCO_3$)	20 - 200	500	Same as pH properties
Total Dissolved Solids (TDS)	500	1000	High TDS concentrations can produce laxative effects and can give an unpleasant mineral taste to water.
Sulphate (SO_4)	250	400	Taste affected, laxative effect, gastro intestinal irritation
Calcium (Ca)	75	200	Poor lathering and deterioration of the quality clothes, incrustation in pipes, scale formation
Nitrite(NO_2)	3		Forms nitrosamines which are carcinogenic
Phosphorous (PO_4)	0.3		Toxic, bio-accumulation, central nervous system affected, carcinogenic
Chloride(CL)	250	250	Taste affected, corrosive
Sodium (Na)	200	200	
Magnesium (Mg)	100	150	Same as calcium
Iron(Fe)	0.3	0.3	Poor sometimes bitter taste, colour and turbidity, staining of clothes materials, iron bacteria causing slime
Manganese (Mn)	0.1	0.1	Poor taste, colour and turbidity, staining, black slime
Ammonium (NH_4)	1.5		Indicates pollution, growth of algae
Aluminium (Al)	0.2	0.2	
Copper (Cu)	1	1	Liver damage, mucosal irritation renal damage and depression, restricts growth of aquatic plants
Zinc(Zn)	5	3	Astringent taste, opalescence in water, gastro intestinal irritation, vomiting, dehydration, abdominal pain nausea and dizziness
Toxic Substances			
Nitrate (NO_3)	45	10	Blue baby disease (methemologlobineamia), algal growth
Nitrite (NO_3)		1	
Selenium (Se)		0.01	
Silver (Ag)		0.05	
Fluoride (F)	0.7 - 1.5	1.5	Dental and skeletal florosis, non skeleton manifestations
Lead(Pb)	0.05	0.01	Too much lead in the human body can cause serious damage to the brain, kidneys, nervous system, and red blood cells.
Cadmium (Cd)	0.05	0.003	Highly toxic causes “minamata” disease- painful rheumatic condition, cardio vascular system affected, gastro intestinal upset and hypertension
Mercury (Hg)		0.001	
Arsenic (As)		0.01	
Cadmium		0.003	
Barium		0.7	

Table 2.7: Specification for Drinking Water Quality

VARIABLES		Zambia Bureau of Standards	
(in milligrams/litre where applicable)	WHOGuidelines	Maximum Permissible Limit	Possible effects
Chromium (Cr)		0.05	
Cobalt (Co)		0.5	
Cyanide (CN)	0.01	0.01	
Microbiological Variables			
Faecal Coliforms / 100 ml	0	0	High levels of causes risk of water borne gastro-enteritis such as ear infections, dysentery, typhoid fever, viral and hepatitis A
Total Coliforms / 100 ml	0	10	Same as above
Organic Constituents			
Phenols	0.01	0.002	
Total Organic Carbon	8		
Detergents (alkyl benzene sulphonates)		1	
Trihalomethanes THM	100		
Total Pesticides	0.0005		Affects central nervous system
Poly Aromatic Hydrocarbons	0.001		
Disinfection by-products	0.6 - 1		
Toluene	0.02 – 0.2		
Chlorophyll A	0 - 5		

Source: Zambia Bureau of Standards-Water Quality Standards (Drinking Water)

The data was last revised in February 2010

[3]Turbidity is a measure of cloudiness of water. Turbidity can come as a result of suspended sediments in the water or from high levels of disease causing organisms.

[4]pH refers to the amount of hydrogen mixed with water.

2.1.8 Physical and Organoleptic Requirements

2.1.8.1 Turbidity

It is a measure of the degree to which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids in the water, the murkier it seems and the higher the turbidity. It is considered as a good measure of the quality of water. Turbidity is caused by various variables such as-:

- Sediments from erosion
- Resuspended sediments from the bottom
- Waste discharge
- Algal growth
- Runoff

2.1.8.2 Total Dissolved Solids - TDS

- "Dissolved solids" refer to any minerals, salts, metals, anions[1] or cations[2] dissolved in water. This includes anything present in water other than the pure water molecule and suspended solids. (Suspended solids are any particles/substances that are neither dissolved nor settled in the water, such as wood pulp).
- Some dissolved solids come from organic sources such as leaves, silt, plankton, and industrial waste and sewage. Other sources come from runoff from urban areas, road salts used on street during the winter, and fertilizers and pesticides used on lawns and farms.

The TDS levels for the sampled surface water of the upper Kafue sub catchment were within the acceptable levels of ZABS.

2.1.8.3 pH

The balance of positive hydrogen ions (H+) and negative hydroxide ions (OH-) in water determines how acidic or alkaline the water is.

pH levels for the surface water of the upper Kafue sub catchment were within acceptable levels of both WHO and ZABS apart from Solwezi River at pump house that recorded pH of 8.34, which is beyond the maximum permissible limit. Measurements for pH were done in December 2012.

Table 2.8: pH Statistics as compared to the ZS 190:2010 Standards

PH Statistic value at 25oC and ZS	Surface Water quality for upper Kafue Catchment				
190:2010	Solwezi River@ pump House	Mushishima@TLP	Kafue@wusakile roadbridge	Kafubu@itawa	Kafulafuta@lbenga
Average	8.34	7.22	7.13	7.76	7.82
Maximum Permissible Limit	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0	6.5-8.0
Average - is calculated for the whole data, taking 'the not analyzed' data into the total count					

2.1.9 Physical Chemical Requirements: Inorganic Macro- Determinants

2.1.9.1 Calcium

Table 2.9 shows calcium concentration in mg/l as compared to WHO and Zambia Bureau of Standards (Water Quality Standard ZS 190:2010). This is for 12th December 2012. All Calcium assays fall within acceptable standards.

Table 2.9: Calcium Concentration Data in mg/l for the Different Stations, December 2012

Calcium Statistic and ZS 190:2010	Surface Water quality for upper Kafue Catchment				
	Solwezi River@ pump House	Mushishima@TLP	Kafue@wusakile roadbridge	Kafubu@itawa	Kafulafuta@lbenga
Average	48.8	41.6	67.2	52	39.2
Maximum Permissible Limit	200	200	200	200	200

[1]An ion is an atom or molecule which has lost or gained one or more valence electrons, making it positively or negatively charged. A negatively charged ion, which has more electrons in its electron shells than it has protons in its nuclei, is known as an anion

[2]Conversely, a positively-charged ion, which has fewer electrons than protons, is known as a cation

2.1.9.2 Hardness as CaCO3 in mg/l

Hardness is measure of polyvalent cations (ions with a charge greater than +1) in water. Hardness affects the amount of soap that is needed to produce foam or lather. Hard water can leave a film on hair, fabrics, and glassware. Hardness of the water is very important in industrial uses, because it forms scale in heat exchange equipment, boilers, and pipe lines. Some hardness is needed in plumbing systems to prevent corrosion of pipes.

The results in table 2.10 indicate all Calcium Carbonate assays falling within acceptable standards.

Table 2.10: Hardness as CaCO3 against ZS 190:2010 Standards

Hardness as Calcium Carbonate Statistic and ZS 190:2010	Surface Water quality for upper Kafue Catchment				
	Solwezi River@ pump House	Mushishima@TLP	Kafue@wusakile roadbridge	Kafubu@itawa	
	Kafulafuta@Ibenga				
Average	53.6	16.1	17.1	37.1	26.2
Maximum Permissible Limit	500	500	500	500	500
Average - is calculated for the whole data, taking 'the not analysed' data into the total count					

2.1.9.3 Chlorine

Many of the most common diseases found in traumatized communities after a disaster or emergency are related to drinking contaminated water. The contamination can be from microorganisms or natural and man-made chemicals.

People who live in the same place all their lives and regularly drink contaminated water may develop some resistance to the contaminants and suffer little or no health problems. Communities affected by an emergency, however, are very different. Emergencies have three relevant effects on people, they:

- force people to move to new places where the water quality is different from what they usually drink and for which they have no immunity;
- force people to live in poor conditions such as tents or temporary buildings which make it difficult to retain good hygiene practices; and
- Affect their diet, often lowering their nutritional level and making them more vulnerable to disease.

The results in table 2.11 indicate all Chloride results falling within acceptable limits.

Table 2.11: Chlorine Content for f Surface Water Quality for Upper Kafue against ZS 190:2010 Standard

Chloride Statistic and ZS 190:2010	Surface Water quality for upper Kafue Catchment				
	Solwezi River@ pump House	Mushishima@TLP	Kafue@wusakile roadbridge	Kafubu@itawa	Kafulafuta@Ibenga
Average	21.5	36.25	25.5	32.25	46
Maximum Permissible Limit	250	250	250	250	250
Average - is calculated for the whole data, taking 'the not analysed' data into the total count					

2.1.9.7 Sodium

When sodium levels increase, in high purity or ultra-pure waters, it indicates the presence of unwanted dissolved impurities. In power plants, these impurities can have catastrophic effects when deposits occur on turbine blades or on the heat exchange surfaces of the boiler. All the dams have the right amounts of sodium in their waters; this is shown in Table 2.12.

The results in Table 2.12 indicate all Sodium results being within acceptable limits.

Table 2.12: Sodium Content for Surface Water Quality for Upper Kafue Catchment against ZS 190:2010 Standard

Sodium Statistic and ZS 190:2010	Surface Water quality for upper Kafue Catchment				
	Solwezi River@ pump House	Mushishima@TLP	Kafue@wusakile roadbridge	Kafubu@itawa	Kafulafuta@Ibenga
Average	3	4	6.8	3.7	4.2
Maximum Permissible Limit	200	200	200	200	200
Average - is calculated for the whole data, taking 'the not analysed' data into the total count					

2.2 Land Cover, Ecosystem and Biodiversity

2.2.1 Land Cover

Land cover refers to the surface cover on the ground, whether vegetation, urban infrastructure, water, bare soil or other; it does not describe the use of land, and the use of land may be different for lands with the same cover type. For instance, a land cover type of forest may be used for timber production, wildlife management or recreation; it might be private land, a protected watershed or a popular state park.

2.2.2 Ecosystem and Biodiversity

The total number of ecosystems that exist in Zambia based on vegetation types is seventeen. These fall into four main divisions:

(a) Forest – this consists of a continuous stand of trees, usually over 10m tall, with overlapping crowns;

(b) Thickets – a low forest of bushes and climbers, usually under 7m tall;

(c) Woodland – an open stand of trees, usually over 7m tall, with an open canopy and a field layer dominated by grasses and herbs; and

(d) Grassland – land covered with grasses and other herbs in which woody plants are either absent or if open stand of trees, usually over 7m tall, with an open canopy.

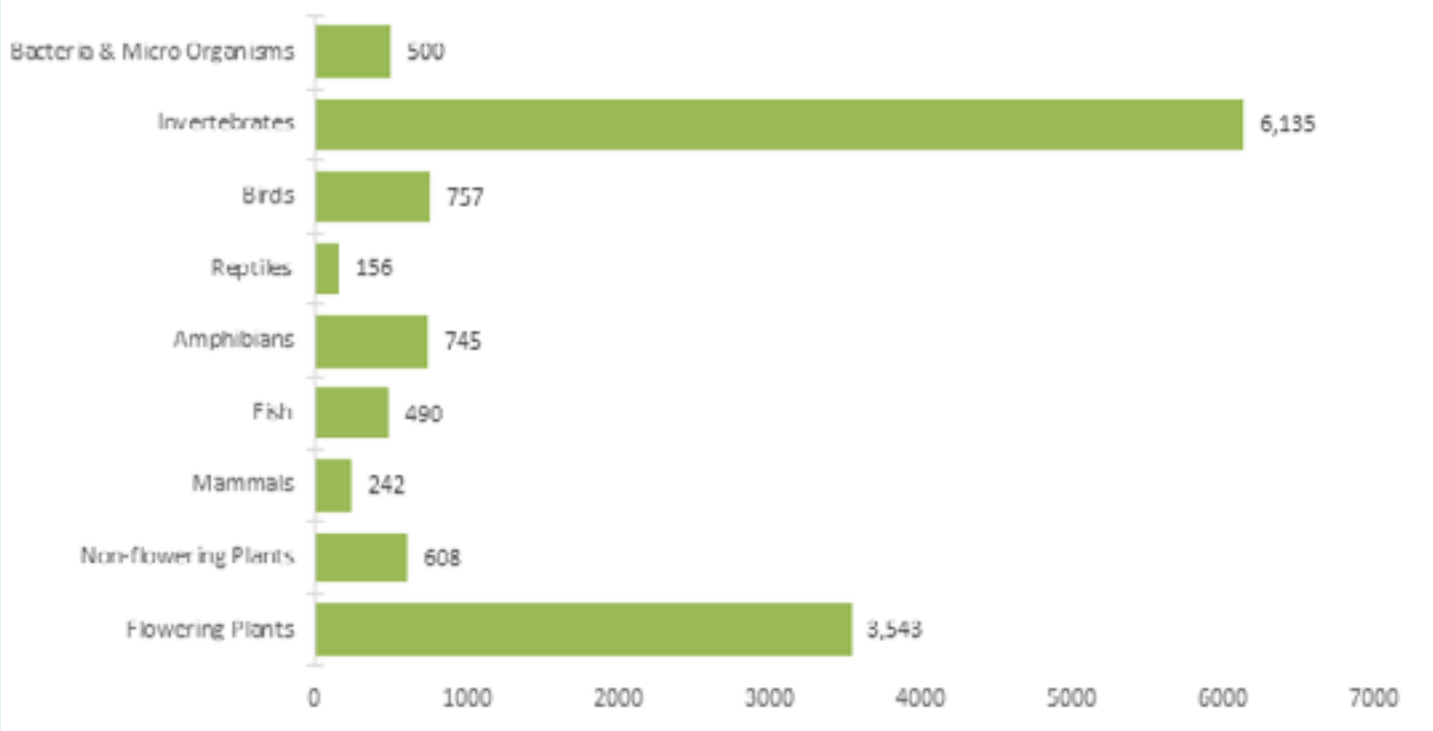
Table 2.13: Extent of Ecosystems in Zambia

Biome	Ecosystem	Approximate Extent	
		Km^2	Percentage
Forest	Dry Evergreen	15,835	2.10
	Deciduous	6,735	0.90
	Thicket	1,900	0.25
	Montane	40	0.01
	Swamp	1,530	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
	Termitaria	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, Forest Plantations And Built-Up Areas	24,210	3.21
	Total	752,578	100.00

Source: Fanshawe, 1971; and Edmonds, 1976

An estimated 12,505 species of organisms are known to occur in Zambia. Bacteria and microorganisms make up 4 percent of this biodiversity, while plants and animals comprise 33 percent and 63 percent of the population, respectively. Out of the estimated species, there are 3,543 species of known flowering plants, 6,135 species of invertebrates, 242 species of mammals, 490 species of fish, 74 species of amphibians, 156 species of reptiles, and 757 species of birds (Source: Zambia's Second National Biodiversity Strategy and Action Plan, 2015 - 2025)..

Figure 2.1: Zambia's Biodiversity



Source: Zambia's Second National Biodiversity Strategy and Action Plan, 2015 - 2025

Table 2.14: Breakdown of Biodiversity in Zambia

Types of Species	Number	Percentage
Flowering plants	3,543	28.33
Non flowering plants	608	4.86
Mammals	242	1.94
Fish	490	3.92
Amphibians	74	0.59
Reptiles	156	1.25
Birds	757	6.05
Invertebrates	6,135	49.06
Bacteria & Micro Organisms	500	4.00
TOTAL	12,505	100.00

Source:Zambia's Second National Biodiversity Strategy and Action Plan, 2015 - 2025

Comprehensive identification and documentation of species that occur in Zambia has remains incomplete as it requires continues levels of taxonomic enquiry over various seasons and ecological areas

Table 2.15: Fish Species Richness in some Major Zambian Fisheries

Fishery	Area(km²)	Center Coordinates		Depth(m)	Fish species	
		Longitude	Latitude		Total	Endemic
Mweru-Luapula	2,591	28.6	-9.3	37	103	24
Mweru-Wantipa	1,555	29.7	-8.68	2	20	0
Bangweulu	7,773	29.75	-11.15	4	87	9
Tanganyika	21,172	30.8	-8.43	1470	252	220
Kafue	7,773	27.24	-15.64	1	61	3
Kariba	1,814	27.71	-17	93	57	13
Itezhi-tezhi	370	26	-15.6	45	ND	ND
Upper Zambezi	700	23	-15	2	80	20

Note: ND refers to No Data

Source: DoF, 2015

Clearly, long term routine fish catch data by individual species is required in order to determine the conservation status of fish species in the country. Sadly, available data lacks consistency in both time and space. Among the commonly harvested species include tilapia, kapenta and tiger fish.

Table 2.16: Biodiversity Table, 1990 and 2000 - 2013

Category	Unit	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Area of ecosystems (1)	km^2	514,446	477,422	477,343	477,404	477,947	489,813	500,282	499,524	499,391	499,481	499,504	499,575	499,501	499,337	499,405
Known flora and fauna species (2)	No.	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378	13,378
Of which plants (Flora)	No.	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
Of which animals (Fauna)	No.	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878	7,878
Endemic flora and fauna species	No.	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560
Of which plants (Flora)	No.	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Of which animals (Fauna)	No.	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Invasive alien flora and fauna species	No.	42	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Of which plants (Flora)	No.	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Of which animals (Fauna)[1]	No.	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4
No. of Protected terrestrial and marine area	No.	487	487	487	487	487	477	477	477	477	477	477	477	472	472	472
Area of Protected terrestrial and marine area	km^2	72,212	72,212	72,212	72,212	72,212	70,452	70,452	70,452	70,452	70,452	70,452	70,452	70,170	70,170	70,170
Of which terrestrial	km^2	72,212	72,212	72,212	72,212	72,212	70,452	70,452	70,452	70,452	70,452	70,452	70,452	70,170	70,170	70,170
Of which mariine	km^2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proportion of terrestrial area protected	%	14.0	15.1	15.1	15.1	15.1	14.4	14.1	14.1	14.1	14.1	14.1	14.1	14.0	14.1	14.1
Proportion of marine area protected	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[1] The numbers on invasive alien fauna species does only reflects fish invasive as information for other fauna was not available. The three fish invasive species are Oreochromis niloticus (Nile tilapia), Cherax quadricarinatus (Redcraw cray fish) and Parachana obscura (Snakehead), Cyprinus carpio (Common Carp).Known endemic fauna species based on information available include invertebrates, birds and fish species.

Source

2.2.2.1 Gaps on Biodiversity

Comprehensive data on biodiversity remains scanty, scattered and in some instances unavailable due to limited and restricted aerial and ground trothed surveys coverage and sample counts which make it difficult to get an up-to-date picture of wildlife and floristic status at national level. With regards to wildlife surveys that have been conducted mainly in the past have only been restricted to South Luangwa and Kafue Protected Area (PA) landscapes due to financial constraints and only providing detailed information on few iconic species. This makes it even more difficult to establish the total number of endemic mammal and other species at national level.

The country does not have comprehensive information pertaining to threatened aquatic fauna. In terms of fish species, Labeoaltivelis (threatened in all fishery areas), Serranochromisrobustus (threatened in all fishery areas) and NeolebiusLozii which is endemic only to the Barotse Floodplain which commercially exploited are known to be threatened for extinction. However, the IUCN red list for the year 2014 shows that there is a total of twenty (20) threatened fish species in Zambia.

The recent forestry inventory that has been conducted through integrated land Use Assessment II (ILUAII) attempted to establish the vegetation change rather than enumerating the detailed speciation. Therefore, there is need for the country to conduct a comprehensive research and assessment at national level to establish total number of fauna and flora species in order to appreciate a comprehensive biodiversity extent occurring in Zambia.

2.2.3 *Forest Areas*

Zambia isactually regarded as one of the highly forested countries in Southern Africa. The area of indigenous (natural) forests in Zambia is estimated to be 459,432 km2 and covers 61.31 percent, while the current exotic (planted) forest area is estimated to be 627 km2 and covers 0.08 percent of the total land area of the country. The indigenous forests are managed by the Forestry Department though 60 percent of these forests are on customary land. About 50 percent of the exotic forests are managed by Zambia Forest and Forestry Industrial Corporation (ZAFFICO), while 10 percent are in regional plantations managed by the Forestry Department.

Table 2.17: Natural Forested Areas in 4 epoch, 1990, 2000, 2010 and 2014

Provinces	Total land area by Province (km^2)	Forested area in 1990 (km^2)	Forested area in 2000 (km^2)	Forested area in 2010 (km^2)	Forested area in 2014 (km^2)
Central	110,029	62,140	61,235	59,599	57,015
Copperbelt	31,328	22,189	20,190	19,491	18,963
Eastern	50,976	37,172	36,132	36,141	35,994
Luapula	50,569	33,146	33,057	32,865	32,695
Lusaka	25,507	15,982	14,159	14,122	14,092
Muchinga	86,806	64,015	63,896	63,834	63,592
Northern	76,927	43,713	42,981	42,892	42,779
Northwestern	125,826	91,210	91,158	90,522	88,337
Southern	68,258	38,811	37,813	37,702	37,563
Western	126,386	70,016	69,920	69,793	68,402
TOTAL	752,614	478,394	470,541	466,961	459,432

Source: Forest cover estimates from land cover mapping for greenhouse gas (GHG) inventory for land use and land-use change in forestry (LULUCF) using wall-to-wall remote sensing data, Forestry Department, 2015

Much of Zambia is covered by woodland (Miombo) in which Brachystegia and Julbernardia species being dominant. Acacia-Combretum woodland of a drier type occupies well drained base-rich soils in the southern half of the country, with thicket types present in the driest parts of the lower Zambezi valley. Seasonally flooded plains and dambos carry grassland of various types. Mopane* woodland is characteristic of some seasonally wet clays and very rocky sites in the south. The country has significant cover of dry evergreen forests that hosts the Chryptosepalum forest system popularly known as mavunda forests in the North western region as one of the highest floristic biodiversity hot spots.Except in perennially wet sites, most of the vegetation is subject to annual grass fires, the intensity of the burn varying with the height and density of the grass cover as well as the time when it occurs. The tables below shows the proportion of forest areas to total land area in Zambia.

Table 2.18 (a) Proportion of Forest Areas, 1990 - 2005

Category	Unit	1990	2000	2001	2002	2003	2004	2005
Total land area (1)	km^2	752,614	752,614	752,614	752,614	752,614	752,614	752,614
Total Forest Areas (2)	km^2	514,446	477,422	477,343	477,404	477,947	489,813	500,282
of which natural	km^2	513,844	476,820	476,741	476,802	477,345	489,211	499,680
of which planted	km^2	602	602	602	602	602	602	602
Forest biomass	Tonnes	62,247,966	57,768,062	57,758,503	57,765,884	57,831,587	59,267,373	60,534,122
Proportion of surface area covered by forests (3) = (2)/ (1) x 100	%	68.35	63.44	63.42	63.43	63.50	65.08	66.47

Source: Department of Forestry

Table 2.18 (b): Proportion of Forest Areas, 2006 - 2013

Category	Unit	2006	2007	2008	2009	2010	2011	2012	2013
Total land area (1)	km^2	752,614	752,614	752,614	752,614	752,614	752,614	752,614	752,614
Total Forest Areas (2)	km^2	499,524	499,391	499,481	499,504	499,575	499,501	499,337	499,405
of which natural	km^2	498,922	498,789	498,879	498,902	498,973	498,899	498,735	498,803
of which planted	km^2	602	602	602	602	627	627	627	627
Forest biomass	Tonnes	60,442,404	60,426,311	60,437,201	60,439,984	60,448,575	60,439,621	60,419,777	60,428,005
Proportion of surface area covered by forests (3) = (2)/ (1) x 100	%	66.37	66.35	66.37	66.37	66.38	66.37	66.35	66.36

Source: Department of Forestry

2.2.4 The Protected Areas (PAS)

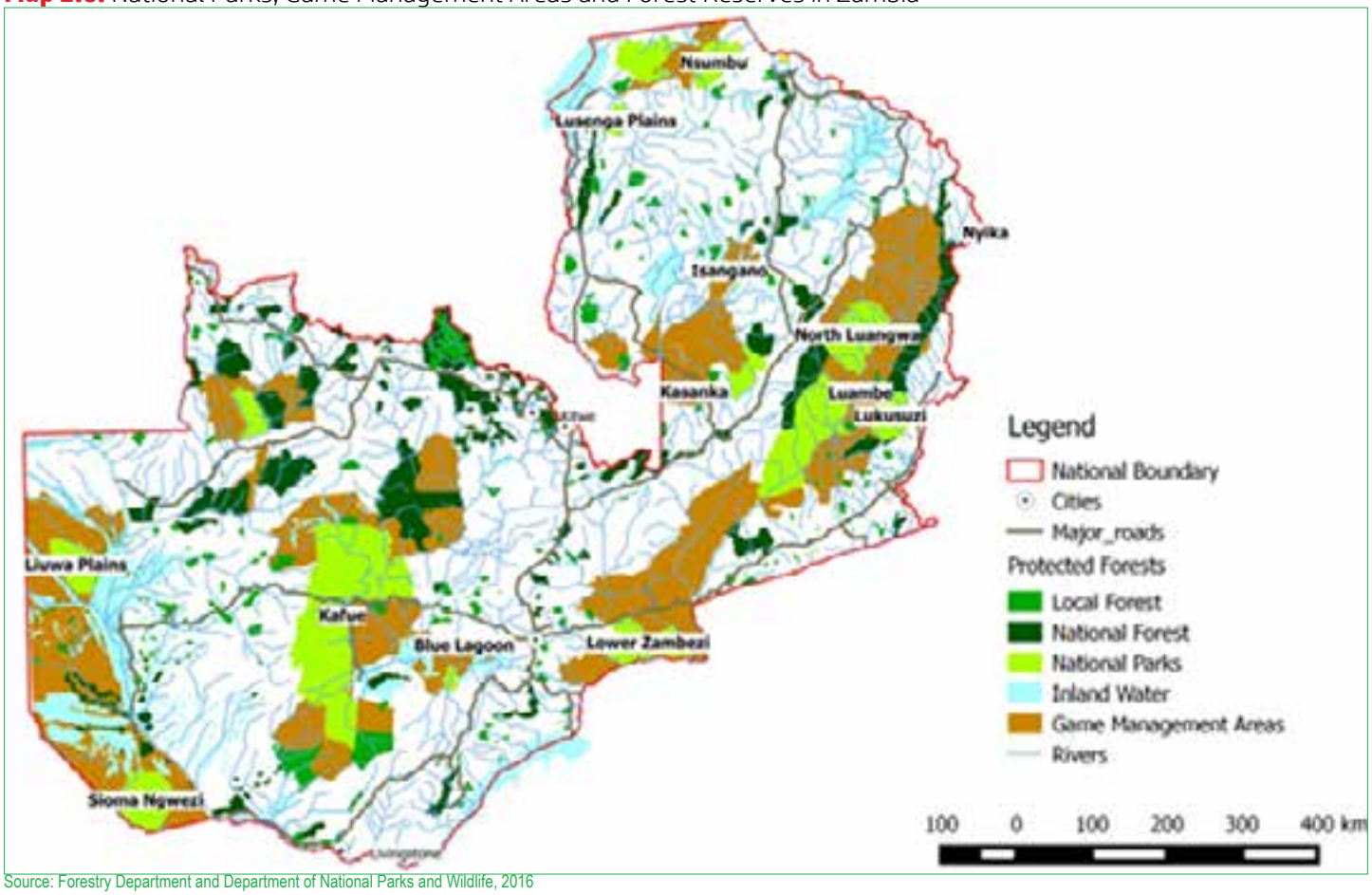
Zambia's network of statutory protected areas is composed of 487 Forest Reserves covering 74,361square Kilometers, 20 National Parks covering 63,630 square kilometers, 36 Game Management Areas covering 167,557 square kilometers, 2 wildlife and 1 bird sanctuary. Overall, National Parks, Game Management Areas, Wildlife Sanctuaries, one Bird Sanctuary altogether encompass approximately 236,376 km2 or 31.4 percent of the total Zambian landmass, that is, almost a third of the country. It is also worth noting that about forty five percent (45 percent) of sub-Sahara African freshwater bodies whose watershed/catchment areas are within wildlife protected areas are found in Zambia. Additionally, there are 180 National Forests covering 5,345,162 hectares or 7.1 percent and 307 Local Forests covering 2,076,062 hectares or 2.8 percent of the land area of the country respectively as illustrated in the map below.

Zambia has eight (8) Ramsar sites with a combined total area of 40,305 km2. These wetlands are habitats of several important fauna and flora species including some endemic and endangered species. Apart from their global significance, these wetlands are also very important at national level including others (e.g., Kariba, Itezhi-tezhi and Lower Zambezi) as they comprise the major fisheries of the country.

Table 2.19: Ramsar Sites in Zambia

Name of Ramsar Site	Area (km²)
Bangweulu Swamps	11,000
Busanga Swamp	2,000
Kafue Flats (includes Lochinvar & Blue Lagoon NPs)	6,005
Lake Tanganyika (portion in Zambia)	2,300
Luangwa Floodplains	2,500
Lukanga Swamp	2,600
Mweru-Wa-Ntipa Swamps	4,900
Barotse Floodplain	9,000
Total	40,305

Map 2.6: National Parks, Game Management Areas and Forest Reserves in Zambia



Source: Forestry Department and Department of National Parks and Wildlife, 2016

Chapter 3: ENVIRONMENTAL RESOURCES AND THEIR USE

3.0 Introduction

This chapter contains information on Environmental resources and their use. These include Mineral resources,Energy resources,Land,Soil resources, Biological resources and Water resources.

3.1 Environmental Resources and their Use

3.1.1 Mineral Resources

The mining sector is the mainstay of the economy of Zambia. But despite increase in mining production over the years, employment in the sector has remained fairly constant due to the capital intensive nature of mining.

The government through the Ministry of Mines, is responsible for the administration of mineral exploration, mining and mineral processing. Private companies do the actual prospecting and mining.

The principal mineral developments are copper mines at Kansanshi mines, Mopani Copper mines, chibuluma, lubambe, NFC Africa mining, Lumwana mine, CNMC Luanshya, Kalumbila mines, Sino Metals and, Konkola Copper mines. Most production is exported. In spatial extent, copper mining which is the mainstay of the country's economy takes the largest (about 41.5 percent) land area designated for mining; Dolomite 3.71percent, Limestone 3.1 percent and Emerald 0.84 percent of land designated for mining.

Production of copper has been on the increase over the years. It should be noted that the increase in copper production is not always proportional to the value of exports as at times production is stockpiled depending on the market prices.

The chapter on mining covers mining inventory only that is, mineral reserves, production and location. Information on the impact of mining process on the environment is not readily available.

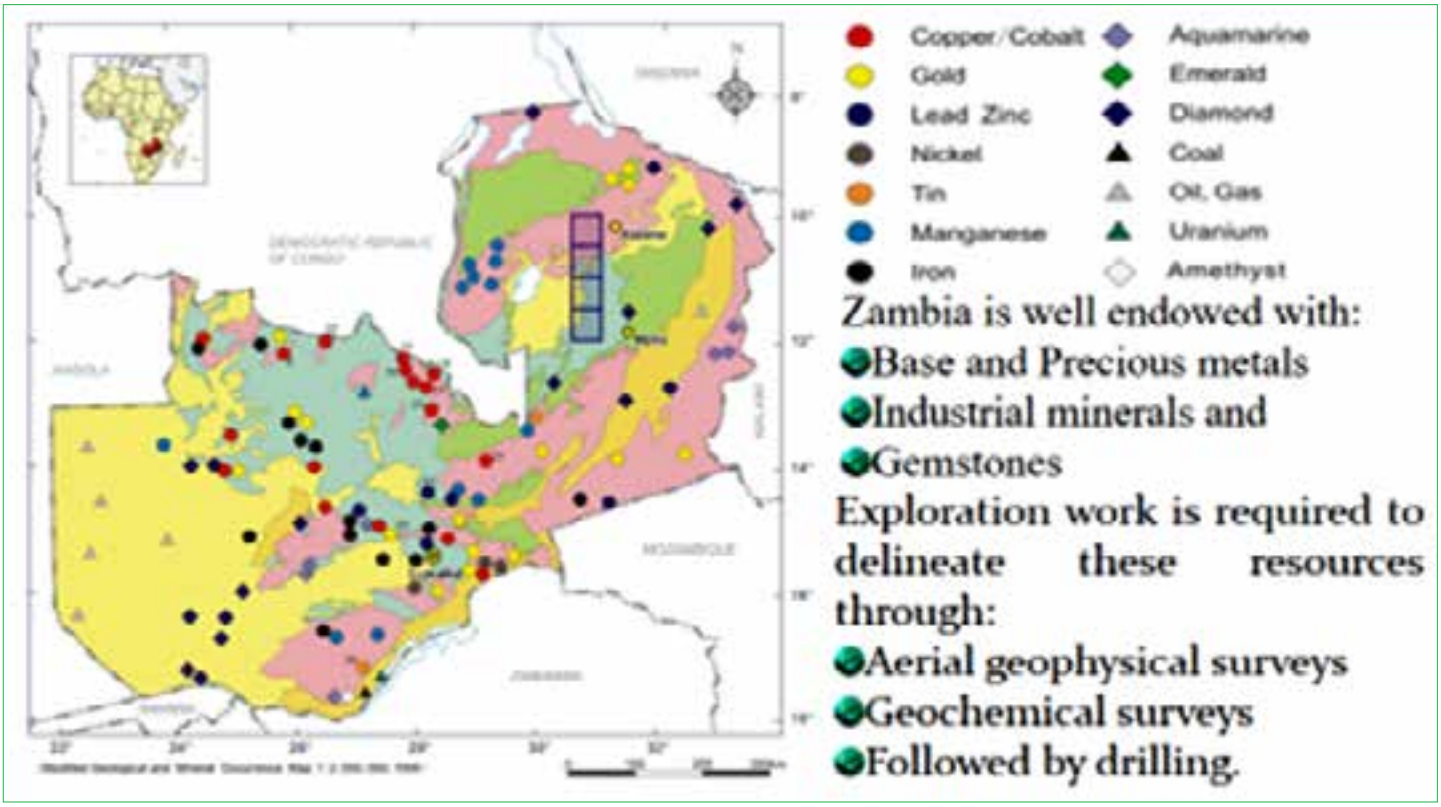
Mining is the extraction of valuable minerals or other geological materials from the earth, usually (but not always) from an ore body, vein, or (coal) seam. Materials commonly recovered by mining include bauxite, coal, copper, diamonds, iron, gold, lead, manganese, magnesium, nickel, phosphate, platinum, salt, silver, tin, titanium, uranium, and zinc. Other highly useful materials that are mined include clay, sand, cinder, gravel, granite, and limestone. Any material that cannot be grown from agricultural processes must be mined. Mining in a wider sense can also include extraction of petroleum and natural gas.

Surface mining is used to extract deposits of mineral resources that are close to the surface. This mining method usually leaves large devastated areas called spoil banks, unless the land is recovered.

Copper is largely mined in Copperbelt and North-western provinces. The typical mining method used is the vertical hoisting shafts, using a certain number of men cage for transportation of personnel and heavy 6 -12 tonne skips for ore and waste hoisting. The mining method varies from one mine to the next depending on the depth and thickness of the ore body and ground conditions. But generally the methods employed are the cut-and-fill, open stopping with rib pillars and hand jackhammers.

The other minerals that are mined, are gemstones, precious metal, and industrial minerals. The importance of mining in Zambia has been immeasurable as some of these minerals are exported abroad and bring in the much-needed foreign capital.

Map 3.1: Investment Opportunities in Zambia's Mining Industry (Diversity of Minerals in Zambia)



Source: Ministry of Mines Cadastre Department

3.1.2 Types of Mining Rights granted under the Mines and Minerals Development ACT of 2015

Below is the list of rights that are granted under the ACT of 2015

- *Large Scale Mining Licence*
- *Large Scale Prospecting Licence*
- *Small Scale Prospecting Licence*
- *Small Scale Mining Licence*
- *Artisan's Mining Rights*

Also granted are:

- *Mineral Processing Licence (Non-Mining Right)*
- *Mineral Trading Permit (Non-Mining Right)*

3.1.3 Data Collection and Production

The department collects data related to Mineral production, Labour in the industry, commodity prices, and technical data relating to mining methods being used. The department disseminates to the end users data relating to production and projections of minerals to production and projections of minerals.

3.1.4 Data Collection Method

The department collects data through monthly mineral and labour returns. The holder of the mining and non-mining rights is obliged to submit returns by the mines and minerals development ACT of 2015. The other method of collecting data is through technical audit inspections which is done quarterly.

3.1.5 Available Data and Gaps

Copper production data as way back as 60s is available this is mainly because Zambia is predominantly a copper producing country. We have gaps in our production information for the other minerals especially the period before 2010.

3.1.6 Challenges

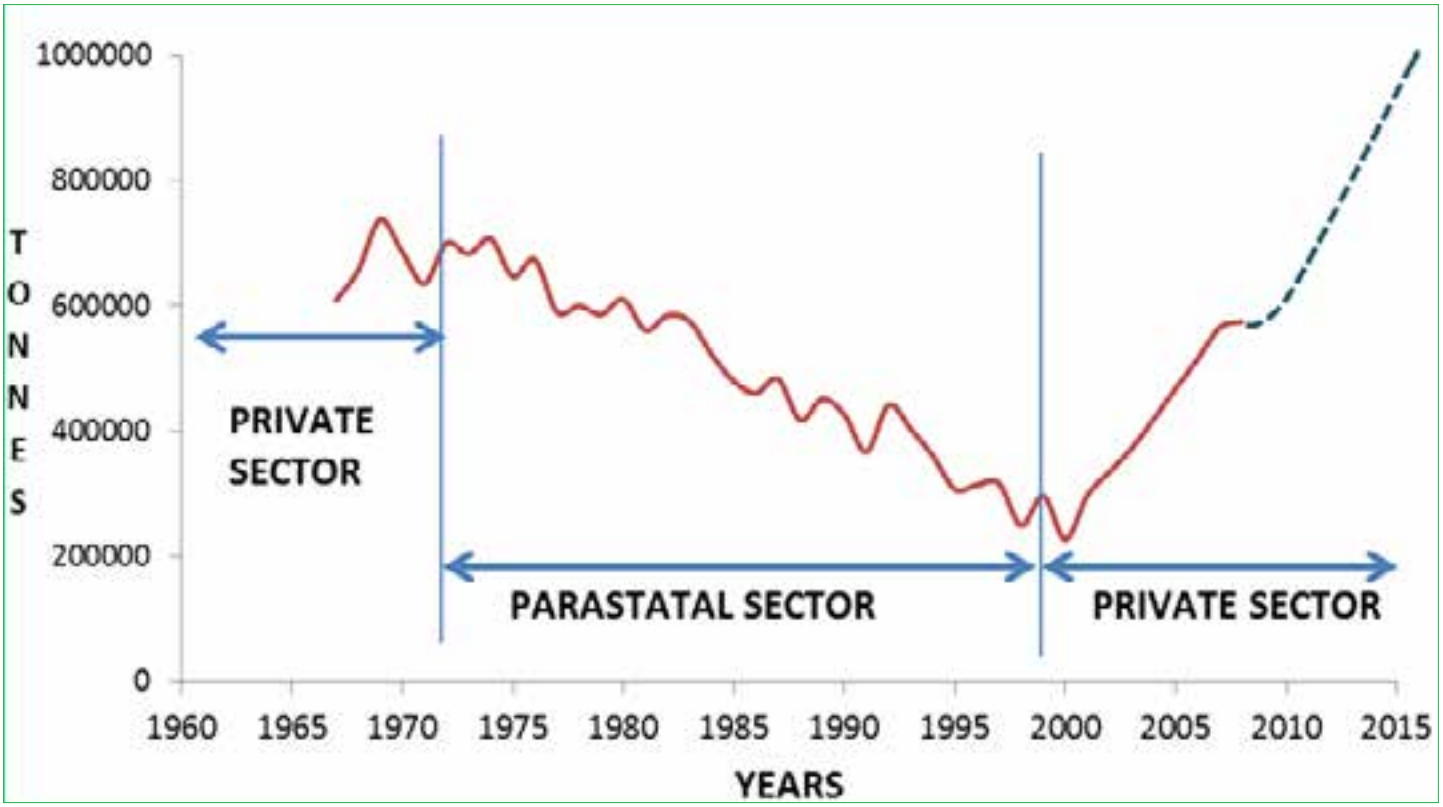
Collection of data from small scale miners is a challenge as most of them tend to submit returns only when they want to export the minerals. Sometimes the information submitted by the small scale miners is inaccurate as inspections to these sites normally uncovers the mismatch between the levels of production and the declared production figures.

Furthermore, the funding levels from Central Government to conduct inspections have drastically reduced. This has affected the department negatively as officers are unable to verify on sites some of the submitted information on production.

3.1.7 Overview of Mining Sector in Zambia

Zambia has predominantly been a copper mining country being the largest copper producer in Africa. In 1973, copper production in Zambia reached its peak at 750,000 tonnes. Zambia was ranked 4th among the top Copper producing countries in the world. Subsequently, falling Copper prices caused annual production to drop to 257,000 tons in the year 2000. The Zambian mining sector has been recovering sharply with the rising metal prices on the international commodity markets spurred by increased demand for metals from Asia, especially China. Zambia's mining sector contributes up to 80 percent of foreign exchange earnings. A wide spectrum of other metallic, industrial minerals and energy resources have since been identified and, to variable extents, have been exploited. Mining in Zambia has been predominantly for copper and cobalt. The production profile over the years is as shown in Figure 3.1.

Figure 3.1: Zambia's Copper Production Trend, 1960 - 2015



Source: Ministry of Mines, Cadastre Department

3.1.8 Location and Land Area of Mining Sites

The area of the land used for mining gives an estimate of the land that will need to be rehabilitated after the mining operations have ended. This is of great importance to environmentalists and land planners as this enables them to come up with remedial measures that will be taken during the land rehabilitation.

Most of the mining in Zambia takes place in the Copperbelt, Central, North-western, Southern and Luapula provinces. Most of the Copper is mined, in copper belt and North-western provinces. Large scale mining licenses are for a twenty-five year period and small scale mining licences are for a 10 year period respectively. Large scale and small scale licences can be renewed if there are still some reserves that need to be mined after the expiry date of the lease. For details on the location and land area of mining sites see Annexes 1, 2 and 3.

Table 3.1: Proportions of Total Mining Area Allocated to different Minerals

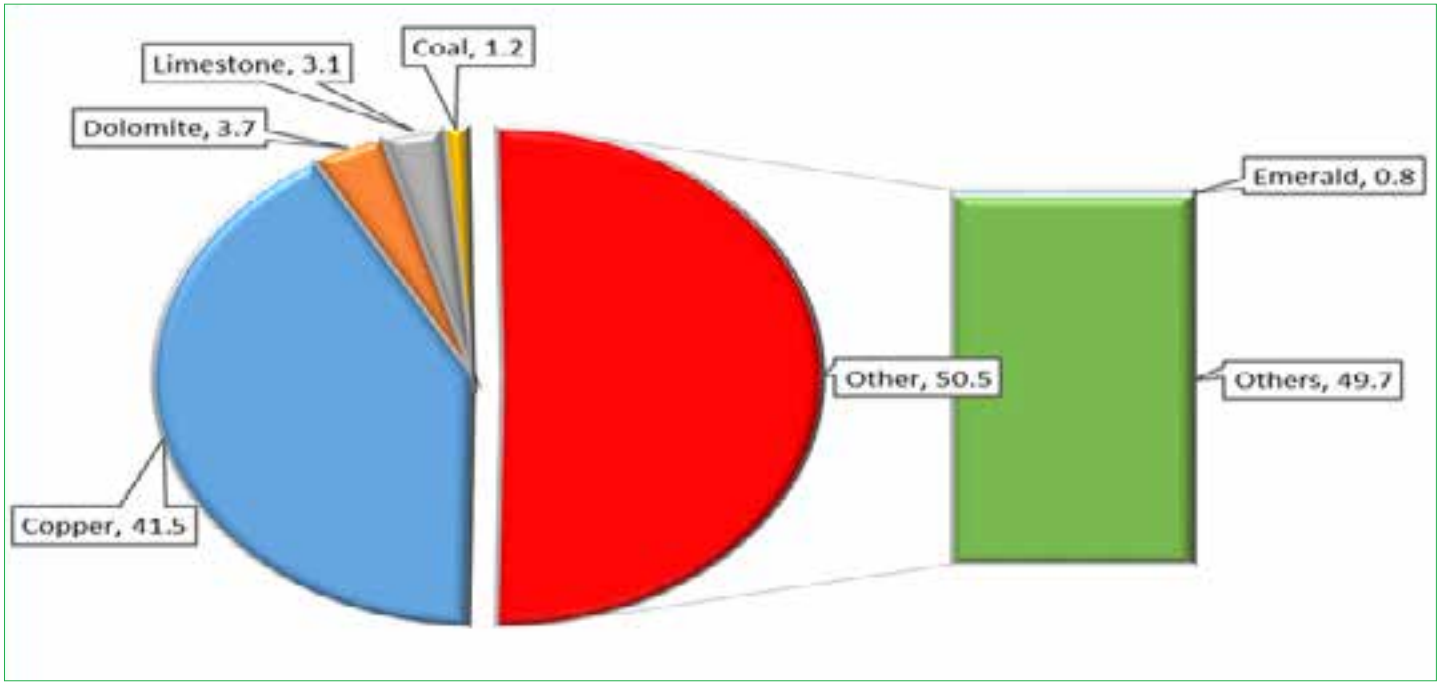
Mineral	Area of Land Allocated for Mining (Hectares)	Proportion of Total (%)
Copper	454,188.62	41.5
Dolomite	40,615.92	3.7
Limestone	33,752.76	3.1
Coal	12,560.11	1.2
Emerald	9,234.85	0.8
OTHERS	545,037.38	49.7
TOTAL	1,095,389.63	100

Source: Ministry of Mines, Cadastre Department

Total area of land allocated for mining does not include the area of land allocated for artisanal mining permits as these sometimes seat on other large scale mining licences.

Figure 3.2 shows that copper mining which is the most important economic activity in the mining sector accounts for 41.5 percent of the designated mining areas. While Dolomite accounts for 3.7 percent, Limestone accounts for 3.1 percent and Coal accounts for 1.15 percent and Emerald accounts for 0.84 percent. This is well represented by Figure 3.2.

Figure 3.2: Total Area of Land Allocated for Mining



Source:Ministry of Mines, Cadastre Department

Although some companies have been issued licences for these other activities like for clay mining, gravel and sand mining, these companies are not well monitored by the authorities except those with explosive licences.

The discovery and mining of different minerals has contributed in many ways to the economic and social development of the country. The Government has then been able to undertake investment in both human and physical infrastructure development. Road networks, which were hitherto undeveloped, were improved significantly throughout the country, and a number of schools and health facilities were built to improve access to social services and the standard of living for Zambian. Mining also created employment opportunities for the residents.

3.1.9 Copper, Cobalt, Gold and Nickel Concen1trate Production from 2000 to 2015

Copper is mined by private companies in Zambia. The mining companies operate underground mines. The extracted ore is fed to the on-site concentrator, then dried and smelted. The matte produced is of high-grade quality and it is exported for separation and refining. The

major destination for copper has been Asia and China in particular. Production of copper has been on the increase and the highest quantity that has been mined so far is 769,222 in 2013 and 746,750 tonnes in 2014. The least quantity of copper produced between the years 2000 and 2015 was 226,804.84 Tonnes in 2000. Cobalt Production has been on the decrease. The highest production was in 2005 with 5,448 tonnes and the least being in 2014 with 504 tonnes. The only company that reports Gold production so far is Kansanshi Mines and production is highest in 2013 and 2014 at 5,418 kgs each. On the other hand, Nikel was being reported by Albidon Limited and the highest production reported is 33,350 tonnes in 2010. The company is currently under care and maintenance.

Table 3.2 (a) : Copper, Cobalt, Gold & Nickel Concentrate Production, 2000 - 2007

COMPANY	METAL	2000	2001	2002	2003	2004	2005	2006	2007
Konkola Copper Mines	Copper(T)	158,343	196,805	222,010	195,163	191,685	163,603	141,777	154,304
	Cobalt(T)	2,177	2,424	2,039	1,157	210	19	-	-
Mopani Copper Mines	Copper(T)	50,645	83,515	97,966	134,391	161,000	132,719	140,764	162,530
	Cobalt(T)	884	1,822	1,786	2,045	2,128	1,777	1,437	1,788
Kansanshi Mining Ltd	Copper(T)	-	-	-	-	-	79,626	126,586	165,994
	Gold(kg)	-	-	-	-	-	-	-	-
Chibuluma Mines Plc	Copper(T)	7,832	7,403	7,548	6,887	5,248	5,699	9,718	12,636
	Cobalt(T)	108	106	88	-	-	-	-	-
Bwana Mkubwa Ltd	Copper(T)	9,985	9,569	7,499	29,471	41,605	49,081	50,647	25,069
Luanshya Copper Mines/CNMC	Copper(T)	-	-	-	-	5,172	17,632	22,793	20,832
	Cobalt(T)	-	-	-	-	303	3,652	3,212	2,671
NFC Africa Mining Plc	Copper(T)	-	-	-	6,300	19,432	19,789	22,603	24,185
Lumwana Mining Plc	Copper(T)	-	-	-	-	-	-	-	-
Sino-Metals Leach Plc	Copper(T)								
Sable Zinc Ltd	Copper(T)								
Albidon Ltd	Ni Conc(T)	-	-	-	-	-	-	-	-
Lubambe Copper Mine	Copper(T)								
Kalumbila Mines	Copper(T)								
	Copper(T)	226,805	297,292	335,023	372,212	424,142	468,148	514,888	565,550
ANNUAL TOTAL	Cobalt(T)	3,169	4,352	3,913	3,202	2,641	5,448	4,649	4,459
	Gold(kg)	-	-	-	-	-	-	-	-
	Ni Conc(T)	-	-	-	-	-	-	-	-

Source: Ministry of Mines and Minerals Development

Note:All quantities are in metric tonnes unless otherwise stated. The above data does not include minerals outsourced outside the country, particularly DR. Congo
Ni Conc. Means Nickel Concentrate

Table 3.2 (b) : Copper, Cobalt, Gold & Nickel Concentrate Production, 2008- 2015

COMPANY	METAL	2008	2009	2010	2011	2012	2013	2014	2015
Konkola Copper Mines	Copper(T)	128,016	137,711	138,726	134,690	159,877	132,704	120,409	115,098
	Cobalt(T)	44	106	-	42	13	-	205	-
Mopani Copper Mines	Copper(T)	160,736	98,218	97,945	106,300	111,628	116,851	109,870	93,260
	Cobalt(T)	1,456	1,271	790	559	69	-		
Kansanshi Mining Ltd	Copper(T)	216,719	250,439	232,709	244,604	270,880	286,800	262,553	226,674
	Gold(kg)	2,100	2,890	1,985	1,942	2,199	5,418	5,418	4,241
Chibuluma Mines Plc	Copper(T)	15,504	16,460	17,822	17,624	18,636	18,772	15,825	13,256
	Cobalt(T)	-	-	-	-		-		
Bwana Mkubwa Ltd	Copper(T)	5,827	-	-	-	-	-		
Luanshya Copper Mines/CNMC	Copper(T)	22,098	508	10,017	16,018	24,289	36,506	44,421	44,039
	Cobalt(T)	2,598	34	537	565	198	-		
NFC Africa Mining Plc	Copper(T)	26,001	23,490	22,030	23,279	26,272	28,068	28,600	26,041
Lumwana Mining Plc	Copper(T)	-	108,985	146,690	117,023	81,143	117,968	130,063	130,363
Sino-Metals Leach Plc	Copper(T)			8,216	7,002	5,186	4,002	3,642	4,317
Sable Zinc Ltd	Copper(T)			1,755	873	-	-		
Albidon Ltd	Ni Conc(T)	10,911	3,330	33,350	31,244	-	-		
Lubambe Copper Mine	Copper(T)						22,135	25,724	24,860
Kalumbila Mines	Copper(T)								32,952
	Copper(T)	574,901	643,442	712,572	701,764	700,391	769,222	746,730	715,101
ANNUAL TOTAL	Cobalt(T)	4,097	1,411	1,327	1,166	281	-	205	-
	Gold(kg)	2,100	2,890	1,985	1,942	2,199	5,418	5,418	4,241
	Ni Conc(T)	10,911	3,330	33,350	31,244	-	-	-	-

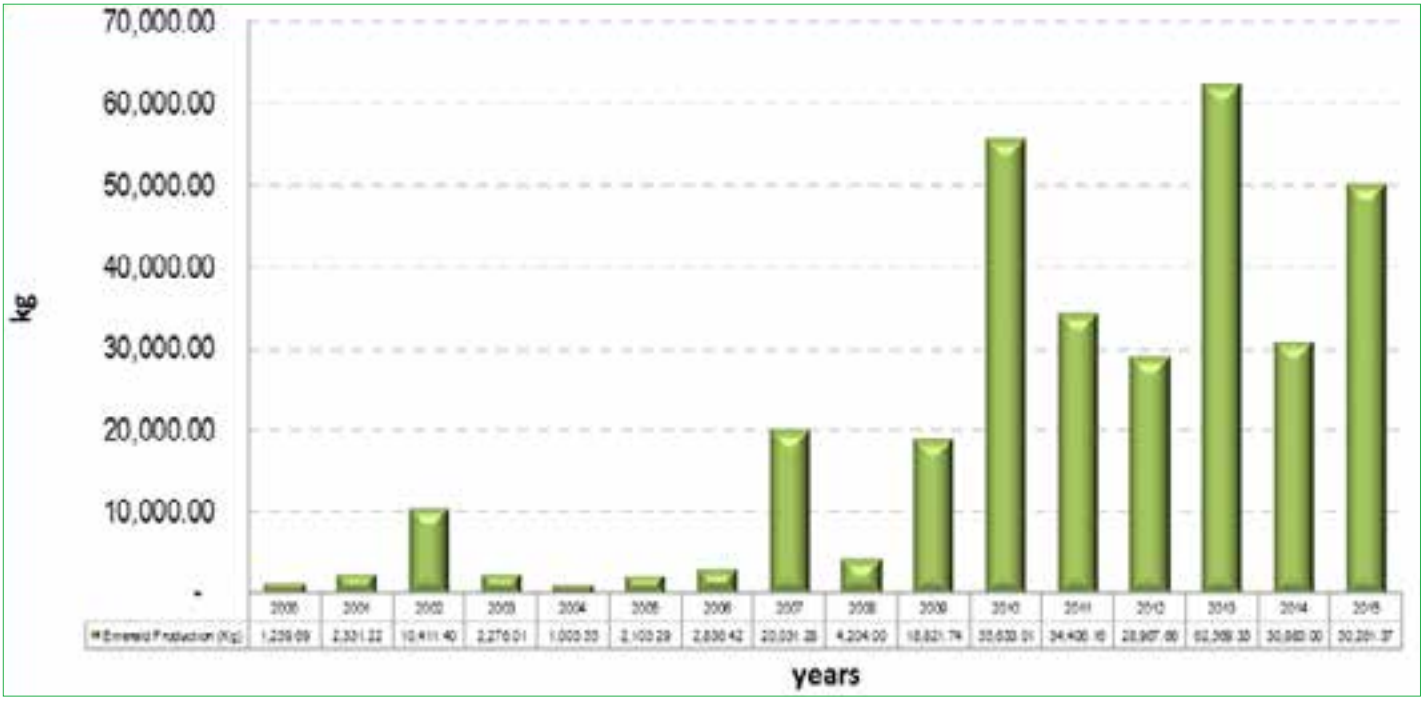
Source: Ministry of Mines and Minerals Development

Note:All quantities are in metric tonnes unless otherwise stated. The above data does not include minerals outsourced outside the country, particularly DR. Congo
Ni Conc. Means Nickel Concentrate

3.1.9.1 Emerald Production

Currently there are two main players in emerald production being Kagem and Grizzly mines. Emerald production in 2013 is the highest at 62,569 kgs while production in 2004 is the lowest at 1,005 kgs. The table 3.7 below shows how the emerald production has been from 2000 to 2015.

Figure 3.3: Emerald Production, 2000 - 2015 (Kg)



Source: Ministry of Mines and Minerals Development

Table 3.3: Emerald Production,2000 - 2015

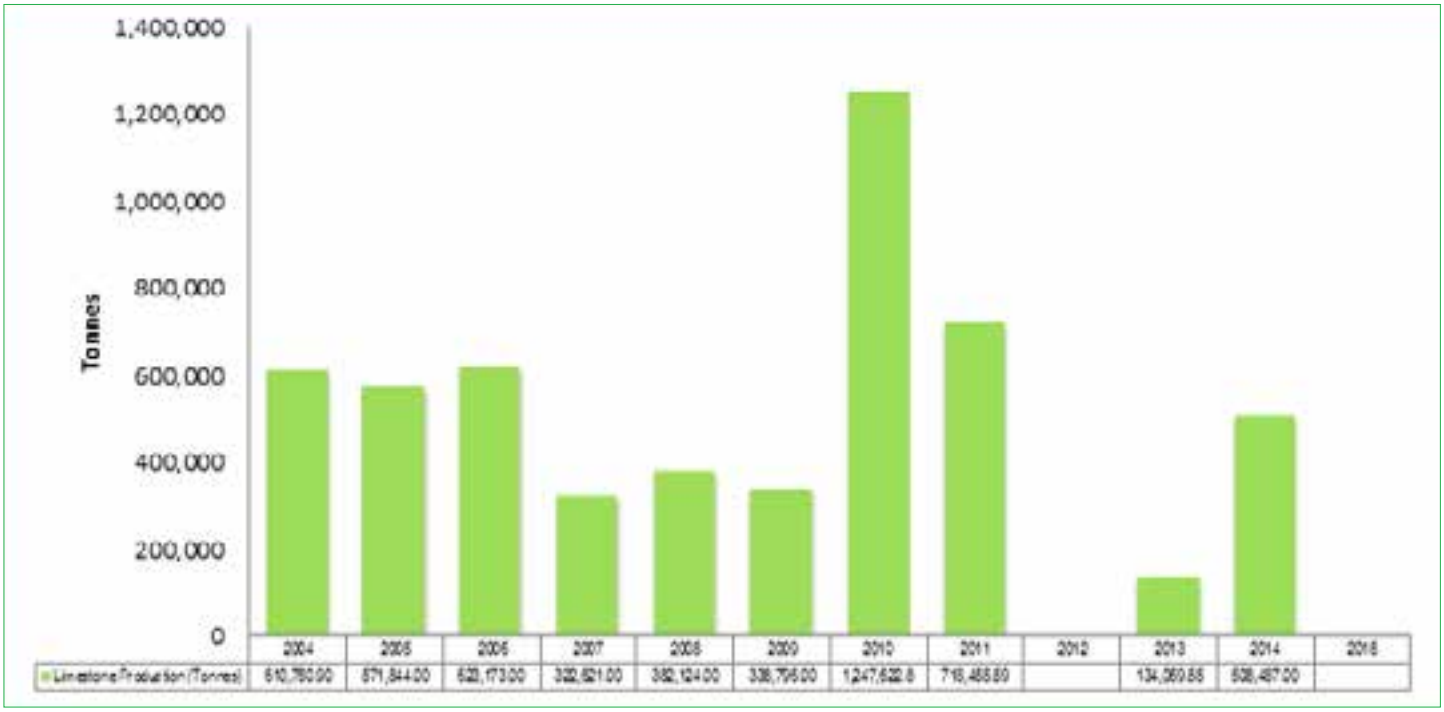
Year	Production (Kg)
2000	1,259.69
2001	2,331.22
2002	10,411.40
2003	2,276.01
2004	1,005.55
2005	2,105.29
2006	2,836.42
2007	20,031.28
2008	4,204.00
2009	18,821.74
2010	55,633.01
2011	34,406.16
2012	28,967.66
2013	62,569.33
2014	30,885.00
2015	50,261.37

Source: Ministry of Mines and Mineral Development

3.1.9.2 Limestone Production

Limestone production was highest in the year 2010 at 12,247,622 tonnes and lowest in the year 2013 at 134,059 tonnes. Limestone production was highest in the year 2010 due to high demand. Similarly the low production recorded in 2013 was due to low demand for the mineral. Figure 3.7 shows production from 2004 to 2015.

Figure 3.4: Limestone Production, 2004 - 2015 (Tonnes)



Source: Ministry of Mines and Minerals Development

Table 3.4: Limestone Production, 2004 - 2014

Year	Production (Tonnes)
2004	610,750.90
2005	571,844.00
2006	623,173.00
2007	322,621.00
2008	382,124.00
2009	338,796.00
2010	1,247,622.88
2011	718,455.59
2012	
2013	134,059.55
2014	508,487.00

Source: Ministry of Mines and Minerals Development

Figure 3.7: Cement Production, 2000 - 2015 (Tonnes)

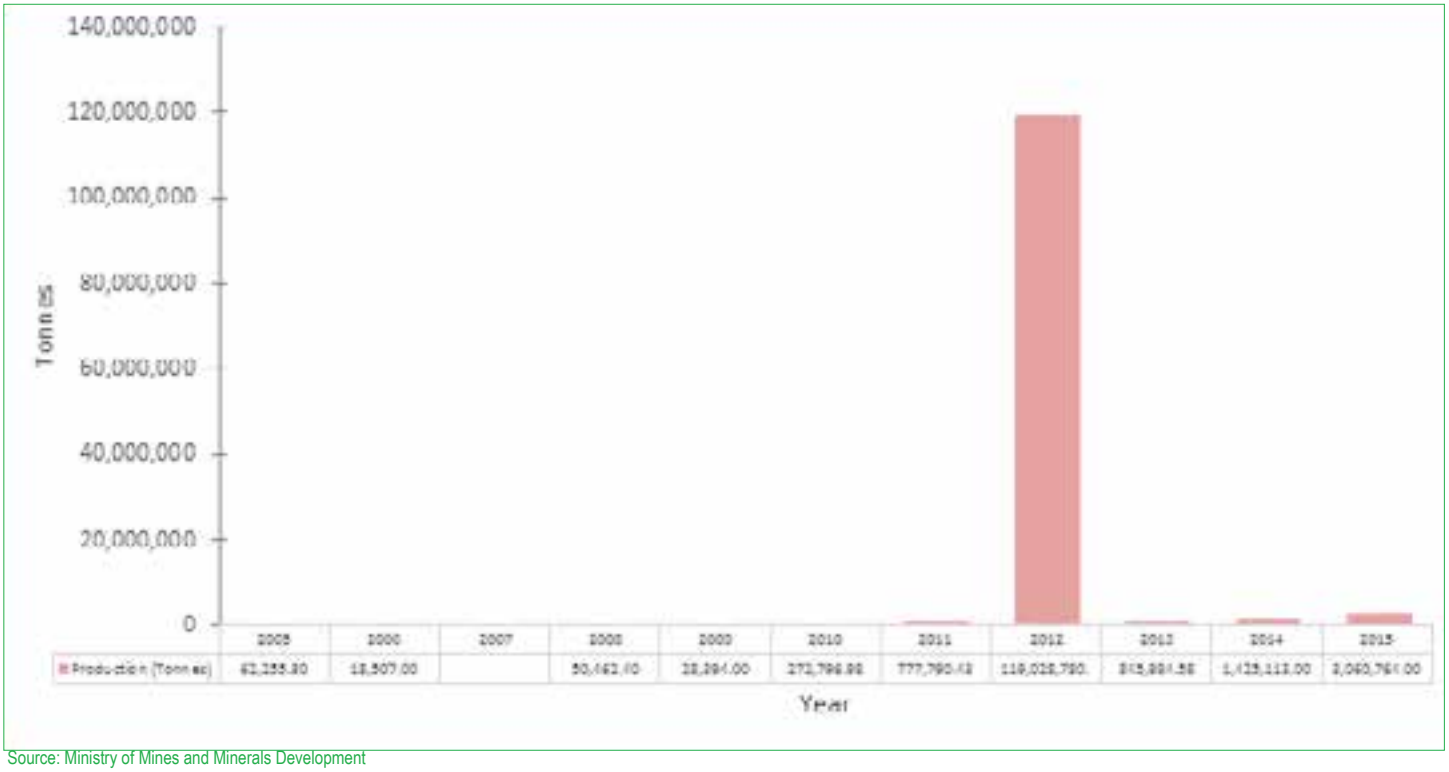
Source: Ministry of Mines and Minerals Development

Table 3.5: Cement Production, 2000 - 2015	
Year	Production (Tonnes)
2004	510,807.00
2005	228,761.00
2006	196,199.00
2007	167,465.00
2008	578,442.00
2009	826,632.00
2010	783,642.00
2011	
2012	
2013	
2014	2,980,486.00
2015	1,631,125.24
Source: Ministry of Mines and Minerals Development	

3.1.9.4 Dolomite Production

Dolomite Production has been very poor except in 2012 when production rose to 11,028.44 as compared to 2006 being the worst year at 18,507.00. Figure 3.9 below shows the production of cement from 2000 to 2015.

Figure 3.6: Dolomite Production, 2000 - 2015 (Tonnes)



Source: Ministry of Mines and Minerals Development

Table 3.6: Dolomite Production , 2000 - 2015	
Year	Production (Tonnes)
2005	62,255.80
2006	18,507.00
2007	
2008	50,462.40
2009	28,394.00
2010	272,796.98
2011	777,790.43
2012	119,028,780.43
2013	845,984.58
2014	1,425,113.00
2015	3,060,764.00

Source: Ministry of Mines and Minerals Development

3.1.9.5 Other Minerals

There are a lot of other minerals found in Zambia and the list comprises of the following: Agates, Fluorite, Kyanite, Silver, Sand, Graphite, Limestone, Talc, Gypsum, Lead, Manganese, Uranium, Iron, Platinum, Zinc, and Gold.

Commercial exploitation of some of the mentioned minerals has been constrained by a number of factors, such as insufficient reserves, unfavourable metallurgical properties and having the reserves in remote locations where there is no infrastructure to support the mining of such reserves. Developments are in some cases constrained by the weak and often volatile markets for some of these minerals. For example, talc, and kyanite have been exploited in the past, but are no longer in commercial production because mining them is no longer feasible.

3.1.9.6 Conclusion and Recommendations

Small scale mining in Zambia is characterized by non-compliance and inconsistent submission of mineral production returns by small scale miners. For the few that report, the determination of amounts mined and percentage mineral content in ores is highly doubtful as most of these miners lack necessary machinery to determine such properties. This has made it hard to compute the best estimate of small scale production in Zambia over the years. A lot of sensitization on the importance of timely submission of monthly mineral returns is needed to small scale miners and Central Government should consider improving funding to the ministry to enable officers to verify on sites some of the submitted information on production.

3.2.1 Energy Resources

3.2.1.1 Overview of Zambia's Energy Sector

Zambia's sources of energy include; electricity, petroleum, coal, biomass, and renewable energy. Major source of energy in Zambia is wood fuel (i.e. firewood and charcoal), with the largest consumer group being households in both rural and urban areas. The country is basically self-sufficient in all the other energy resources, as it has substantial unexploited reserves of these forms of energy, it is only petroleum which is wholly imported in the country.

The country's economy has been growing over the past few years and demand for energy has also been rising. The demand for electricity has been growing at an average of about 3 percent per annum mainly due to the increased economic activities in the country. Furthermore the country's growing economy has also lead to an increase in the demand for the other forms of energy such as petroleum and coal. The demand for renewable energies has also seen significant growth in the recent years as the market explores alternative sources of energy, with renewable energies proving to be a viable alternative.

3.2.1.2 Wood Fuel (i.e., Firewood and Charcoal)

Wood fuel accounts for over 70 percent of energy consumption in the country in form of firewood and charcoal. Supply of Wood fuel is regulated by the Forestry Department under the Forestry Act. Because of the strategic nature and potential impact of the use of wood fuel on the environment, a number of institutions such as the Department of Energy (DoE) and the Zambia Environmental Authority (ZEMA) cooperate with the Department of Forestry.

Table 3.7: Estimated Consumption of Wood Fuel by Sector ('000 Tonnes'), 2000 -2012

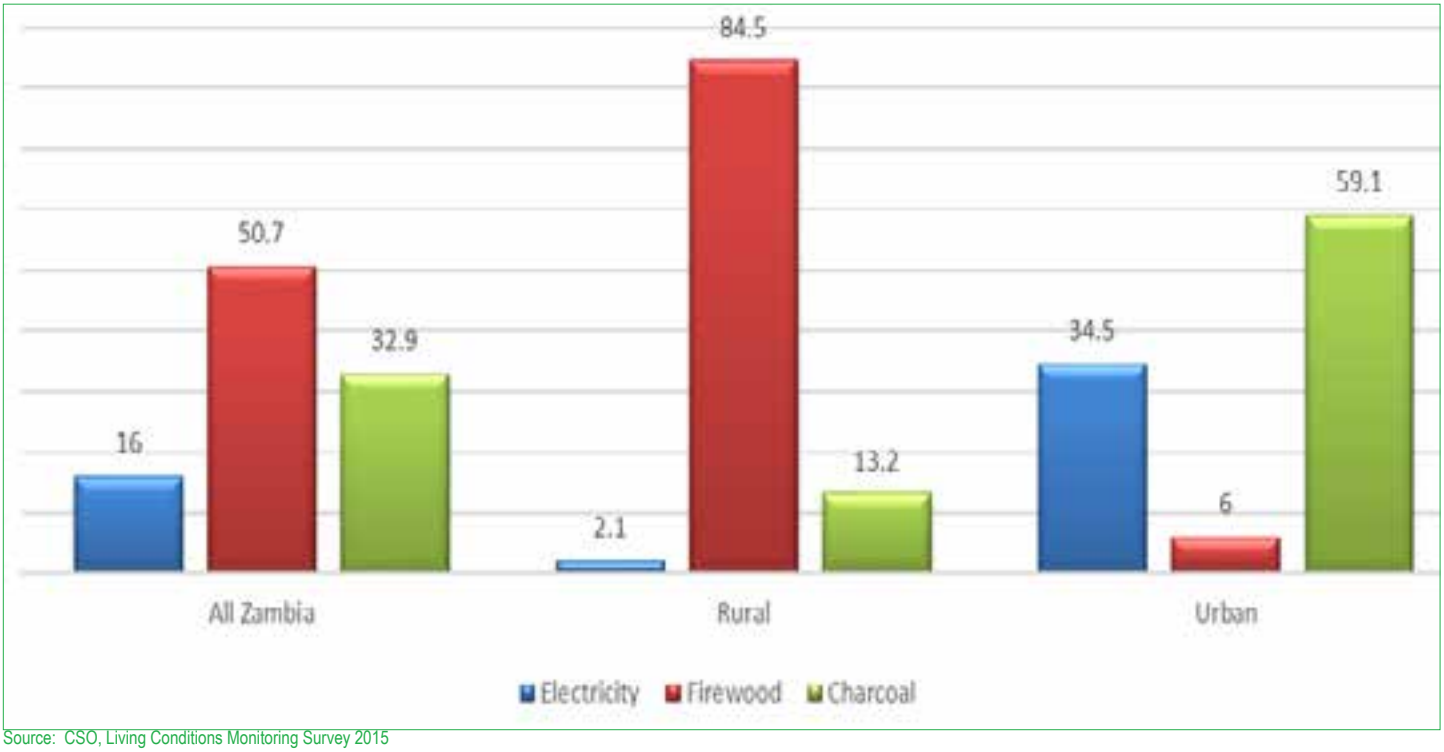
Year	Wood for Energy		Conversion Losses	Available fuel for Final Use		Final Consumption by Sector				
						Households		Agric	Industry	Mining
						Rural	Urban			
2000	Firewood	8,546.10	-	Firewood	8,546.10	6,836.88	683.69	341.84	683.69	0.2
	Wood for charcoal production	4,047.20	3,237.70	Charcoal	809.5	121.43	655.7	-	31	1.38
	Total	12,593.30	3,237.70		9,355.60	6,958.31	1,339.38	341.84	714.69	1.58
2001	Firewood	8,717.00	-	Firewood	8,717.00	6,967.20	736.6	308.6	704.4	0.2
	Wood for charcoal production	4,209.00	3,367.20	Charcoal	841.8	126.27	681.86	-	32.24	1.43
	Total	12,926.00	3,367.20		9,558.80	7,093.47	1,418.46	308.6	736.64	1.63
2002	Firewood	8,891.25	-	Firewood	8,891.25	7,113.00	753.8	311.19	713.08	0.18
	Wood for charcoal production	4,377.36	3,501.89	Charcoal	875.47	131.32	709.13	-	33.53	1.49
	Total	13,268.61	3,501.89		9,766.72	7,244.32	1,462.93	311.19	746.61	1.67
2003	Firewood	9,069.08	-	Firewood	9,069.08	7,255.26	768.88	317.42	727.34	0.18
	Wood for charcoal production	4,552.45	3,641.96	Charcoal	910.49	136.57	737.5	-	34.87	1.55
	Total	13,621.53	3,641.96		9,979.57	7,391.84	1,506.37	317.42	762.21	1.73
2004	Firewood	9,250.46	-	Firewood	9,250.46	7,400.37	784.25	323.77	741.89	0.19
	Wood for charcoal production	4,734.55	3,787.64	Charcoal	946.91	142.04	767	-	36.27	1.61
	Total	13,985.01	3,787.64		10,197.37	7,542.40	1,551.25	323.77	778.15	1.79
2005	Firewood	9,435.47	-	Firewood	9,435.47	7,548.37	799.94	330.24	756.72	0.19
	Wood for charcoal production	4,923.93	3,939.15	Charcoal	984.79	147.72	797.68	-	37.72	1.67
	Total	14,359.40	3,939.15		10,420.26	7,696.09	1,597.62	330.24	794.44	1.86
2006	Firewood	9,624.18	-	Firewood	9,624.18	7,699.34	815.94	336.85	771.86	0.19
	Wood for charcoal production	5,120.89	4,096.71	Charcoal	1,024.18	153.63	829.58	-	39.23	1.74
	Total	14,745.07	4,096.71		10,648.36	7,852.97	1,645.52	336.85	811.09	1.93
2007	Firewood	9,816.66	-	Firewood	9,816.66	7,853.33	832.26	343.58	787.3	0.2
	Wood for charcoal production	5,325.73	4,260.58	Charcoal	1,065.15	159.77	862.77	-	40.8	1.81
	Total	15,142.39	4,260.58		10,881.81	8,013.10	1,695.02	343.58	828.09	2.01

Table 3.7: Estimated Consumption of Wood Fuel by Sector ('000 Tonnes'), 2000 -2012

Year	Wood for Energy		Conversion Losses	Available fuel for Final Use		Final Consumption by Sector				
						Households		Agric	Industry	Mining
						Rural	Urban			
2008	Firewood	10,012.99	-	Firewood	10,012.99	8,010.40	848.9	350.45	803.04	0.2
	Wood for charcoal production	5,538.76	4,431.01	Charcoal	1,107.75	166.16	897.28	-	42.43	1.88
	Total	15,551.75	4,431.01		11,120.75	8,176.56	1,746.18	350.45	845.47	2.08
2009	Firewood	10,213.25	-	Firewood	10,213.25	8,170.60	865.88	357.46	819.1	0.2
	Wood for charcoal production	5,760.31	4,608.25	Charcoal	1,152.06	172.81	933.17	-	44.12	1.96
	Total	15,973.56	4,608.25		11,365.32	8,343.41	1,799.05	357.46	863.23	2.16
2010	Firewood	10,417.52	-	Firewood	10,417.52	8,334.02	883.2	364.61	835.49	0.21
	Wood for charcoal production	5,990.72	4,792.58	Charcoal	1,198.14	179.72	970.5	-	45.89	2.04
	Total	16,408.24	4,792.58		11,615.66	8,513.74	1,853.69	364.61	881.37	2.25
2011	Firewood	10,625.87	-	Firewood	10,625.87	8,500.70	900.86	371.91	852.19	0.21
	Wood for charcoal production	6,230.35	4,984.28	Charcoal	1,246.07	186.91	1,009.32	-	47.72	2.12
	Total	16,856.22	4,984.28		11,871.94	8,687.61	1,910.18	371.91	899.92	2.33
2012	Firewood	10,838.39	-	Firewood	10,838.39	8,670.71	918.88	379.34	869.24	0.22
	Wood for charcoal production	6,479.56	5,183.65	Charcoal	1,295.91	194.39	1,049.69	-	49.63	2.2
	Total	17,317.95	5,183.65		12,134.30	8,865.10	1,968.57	379.34	918.87	2.42

Source: Department of Energy

Figure 3.7: Percentage Distribution of Households by Main Source of Energy for Cooking and Rural/Urban, 2015



Source: CSO, Living Conditions Monitoring Survey 2015

Figure 3.7 above shows the percentage distribution of households by main source of energy for cooking and rural/urban. At national level, firewood was the most common source of energy for cooking at 50.7 percent.

3.2.1.3 Coal Resources

Zambia has coal deposits mainly situated in the Southern Province. Coal mining in Zambia has been going on for a long time and the major consumers for coal were the breweries, cement manufactures and the mines. The major supplier of coal has always been Maamba Collieries Limited which mined all the coal in Zambia. However, the Monopoly of coal mining by Maamba Collieries discontinued when Collumn Coal Mine started mining coal in Southern Province.

Table 3.8 Coal Production Exports, 2000 - 2014

Year	tonnes	kt	TJ	Exports kt	Exports TJ
2000	227,160	227.2	6,176.7	3.961	107.78
2001	231,276	231.3	6,285.5	16.032	436.23
2002	196,633	197	5,360.4	2.327	63.32
2003	117,295	117	3,183.6	5.259	143.10
2004	133,062	133	3,618.9	6.916	188.18
2005	233,104	233	6,339.9	10.677	290.52
2006	231,749	232	6,312.7	10.787	293.51
2007	62,641	63	1,714.2	4.019	109.36
2008	14,346	14	380.9	0	0
2009	0	0	0	0	0
2010	85,327	0	0	4.157	113.11
2011	0	0	0		
2012	90,494	90	2,448.9	4.871	132.54
2013	415,234	415	11,292.2	3.119	84.87
2014	369,563	370	10,067.7		

Source: Maamba Collieries Limited

3.2.1.4 Maamba Collieries

The company was wholly owned by the Government of Zambia under ZCCM-IH but was privatised and the majority stake in the company was sold to Nava Bharat (Singapore) Limited while the minority stake remained with ZCCM-IH.

Maamba Collieries Limited has a total concessional area of 77 kilometer square. The coal that is mined at the mine is sub bituminous coal which contains about 53% concentration of coal. The current resource that is known is 180 to 190 million metric tons which is indicated reserves. The measured reserves are currently being calculated to get a more accurate figure as further explorations are underway.

Overall production of coal has been on the decline at Maamba Collieries and profitability has been affected. At one point the company started making losses mainly due to lack of demand from the market and this made the Government sell a controlling stake to Nava Bharat (Singapore) Limited. Below are the production figures of Maamba Collieries Limited from the time Nava Bharat (Singapore) Limited took over and started mining:

Table 3.9 Overall Production of Coal, 2010 - 2014 (Mt)

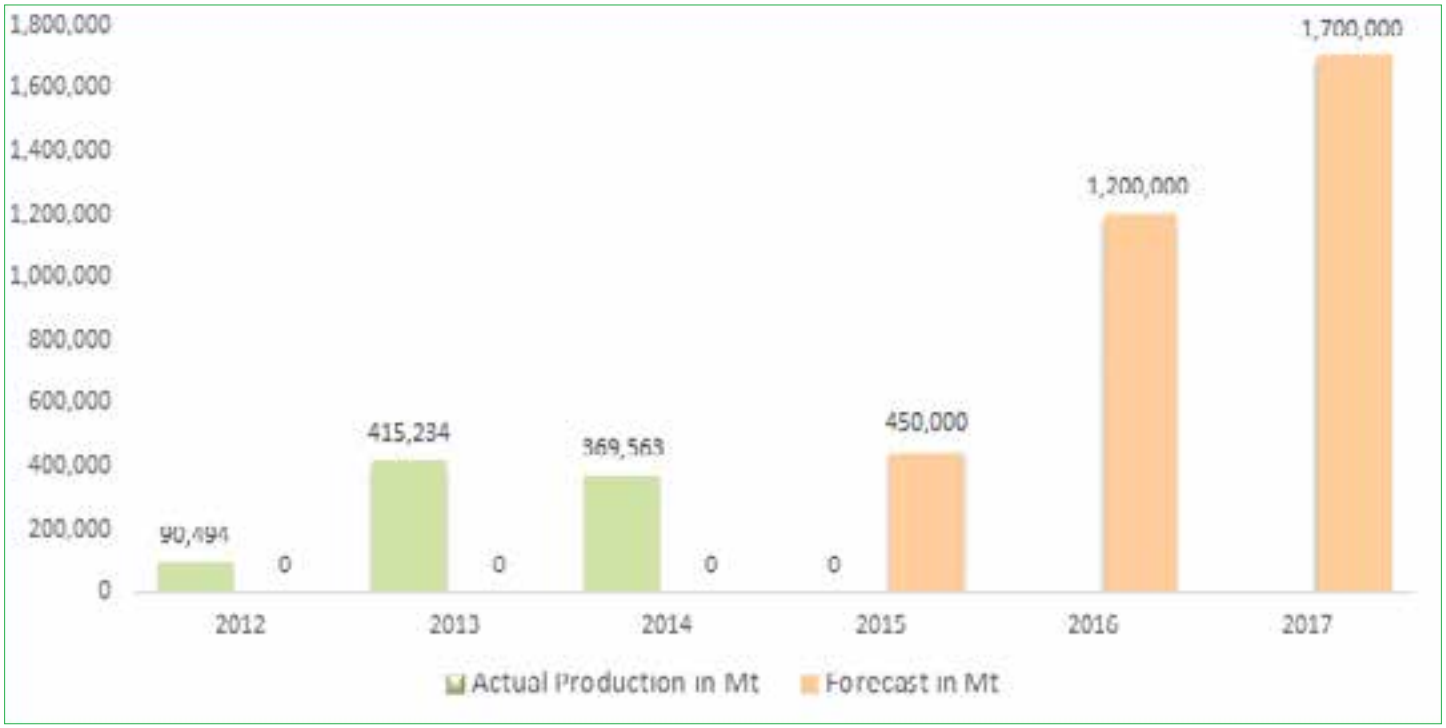
Year	Coal Excavated in Tons
2010	0
2011	Mining commenced in late October
2012	90,493.52
2013	415,233.75
2014	369,562.59

Source: Maamba Collieries Limited

Nava Bharat (Singapore) Limited's strategy was to change the demand profile for Maamba Collieries Limited to include a coal fired power plant to produce electricity. This is already underway and construction of the coal fired power plant will more than triple the current demand. The coal fired power plant will be consuming on average an estimated 1.7 million metric tons annually which will be producing 300 MW of power. Profitability of the mine henceforth is expected to increase upon commissioning of the coal fired power plant. The Power plant at is scheduled to be commissioned in July, 2016.

Figure 3.8 showing the forecast of the production trend of Maamba Collieries Limited.

Figure 3.8: Coal Production Forecast, 2012 - 2017 (Mt)



As can see from the graph above projected output by Maamba Collieries Limited will increase significantly once the coal fired power plant is commissioned. It is worthy to note that the current coal fired power plant will be modern a use cutting age technology which has very low pollution and does not require high grade coal to operate suitable for sub bituminous coal currently being produced at Maamba Collieries Limited.

3.2.1.5 Electricity

Electricity installed capacity is 2,451MW;

- *96 percent hydro, 2.1 percent thermal (HFO and Diesel) and 1.7 percent renewable comprising of solar and small hydros*
- *"Renewable hydro" = up to 20 MW*
- *25 percent of population have access to electricity (Urban 48 percent& Rural 4.5 percent)*

Table 3.10: Electricity Production, Exports and Imports, 2000 - 2014

Year	Production GWh	Production TJ	Export GWh	Export TJ	Import GWh	Import TJ
2000	7,797	28,069.2	753	2,710.8		
2001	9,018	32,464.8	1,502	5,407.2		
2002	8,349	30,056.4	769	2,768.40		
2003	8,279	29,804.4	204	734.40		
2004	8,062	29,023.2	270	972.00		
2005	8,569	30,848.4	275	990.00		
2006	8,997	32,389.2	552.2	1,987.2	45	162.0
2007	9,742	35,071.2	416.7	1,500.1	274.8	989.3
2008	9,801	35,283.6	95.8	344.8	263.8	949.7
2009	10,352	37,267.2	589	2,120.4	9.8	35.28
2010	11,474	41,306.4	578	2,080.8	12.8	46.08
2011	11,483	41,338.8	28	100.8	119.6	430.56
2012	11,958	43,048.8	979	3,524.4	163	586.80
2013	13,380	48 168	1,083.4	3,900.2	72	259.2
2014	12,813	46,126.8	1,267.2	4,561.9	12	43.2

Source: ZESCO

3.2.1.6 Electricity Consumption by Sector

In 2013, the national electric energy consumption stood at 10,845 GWh compared to 10,317.4 GWh in 2012, depicting an increase of 5 percent.

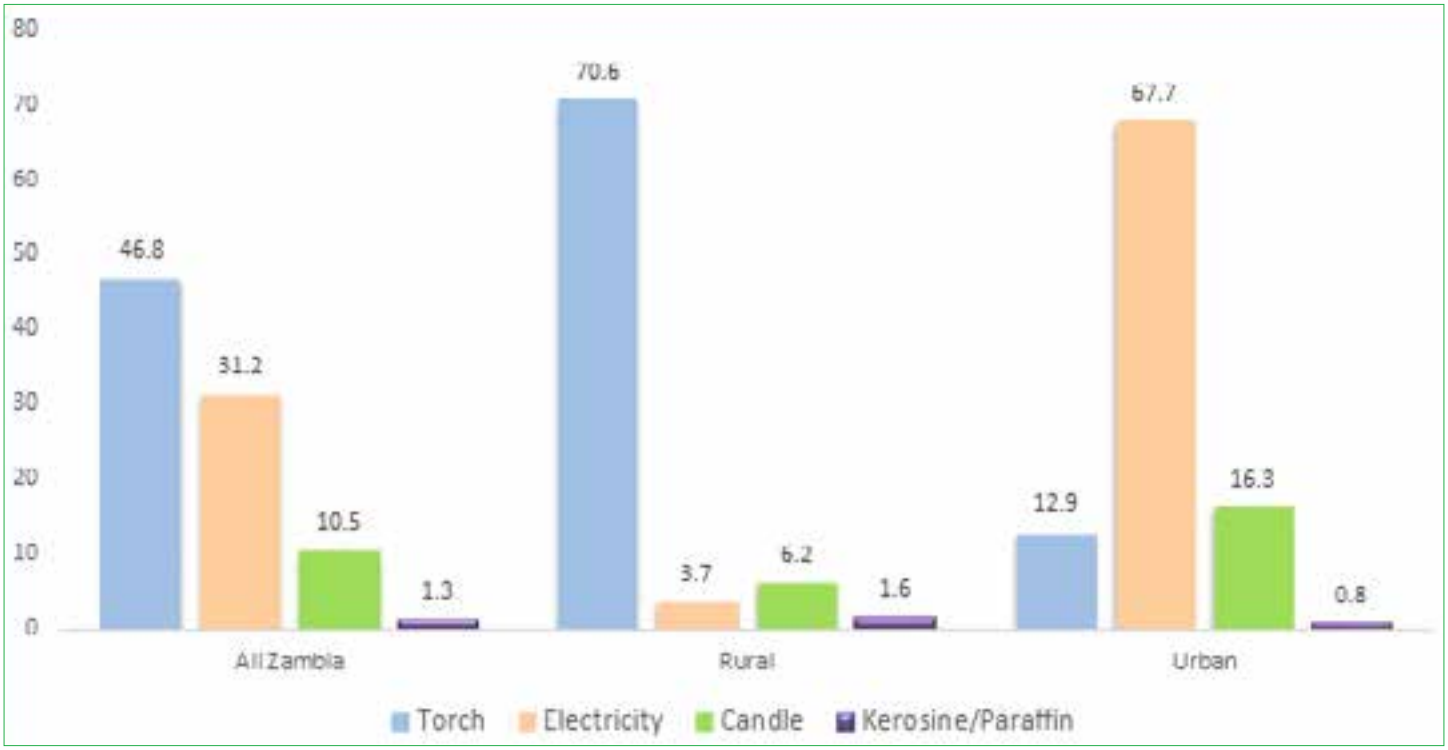
In terms of the share of total electric energy consumption by economic sector, mining still remained the largest power consumer at 54.7 percent in 2013 and 53.8 percent in 2012. This was followed by the domestic sector, which includes residential consumers, at 31.0 percent and 30.9 percent for the years 2013 and 2012, respectively. The balance of 14.3 percent and 15.3 percent was accounted for by the rest of the economic sectors, in 2013 and 2012 respectively. Table 11.3 shows consumption by economic sector from 2004 to 2013.

Table 3.11: Electricity Consumption by Sector, 2004 - 2013 (GWh)

Sector /Year	Agric & Forestry	Construction	Energy	Finance & property	Other	Manufac-turing	Quarries	Mining	Domestic	Trade	Transport	Total
2004	110.10	2.5	-	-	2,883.03	135.9	22.7		360.80		5.60	3,520.63
2005	157.74	21.2	26.2	126.82	242.27	610.57	-	1,85.7	2,616.33	115.4	32.5	3,515.8
2006	166.92	5.19	30.56	163.28	339.24	503.56	21.43	4,498.61	1,963.43	180.79	15.01	7,888.03
2007	184.66	5.14	62.07	222.31	170.01	491.3	-	59.06	2161.3	162.99	18.27	3,537.12
2008	165.87	6.94	75.76	275.28	156.9	487.49	-	20.58	2318.78	152.1	18.55	3,678.25
2009	174.41	8.46	91.63	345.05	143.03	494.16	-	37.79	2,627.25	156.89	19.8	4,098.48
2010	193.69	9.8	88.69	345.86	299	403.79	14.11	-	2,782.90	144.11	21.83	4,303.79
2011												
2012	244.5	12.7	81.8	434.0	117.5	506.0	19.1	5,554.4	3,187.2	136.7	23.7	10,317.4
2013	270.3	17.5	71.0	499.7	120.9	397.1	35.0	5,929.1	3,360.8	115.8	28.3	10,845.7

Source: ZESCO Annual Statistics, 2012 and 2013

Figure 3.9: Percentage Distribution of the Main Type of Lighting Energy by Rural/Urban, 2015



Source: CSO Living Conditions Monitoring Survey, 2015

Figure 3.9 show the percentage distribution of households by main type of lighting energy. About 46 percent of households used a torch as the main source of lighting energy. This was followed by Electricity, used by 31.2 percent of the households.

3.2.1.7 Petroleum

The petroleum sub-sector is one of the key drivers of the economy. The Government imports commingled petroleum feedstock from a feedstock supplier. The petroleum feedstock is then offloaded at the tank farms in Dar-es-Salaam and later transported to the Refinery through the Tazama pipeline before distribution for consumption. There is also a proportion of unleaded petrol and diesel which is imported by road as finished product by both the Government and Oil Marketing Companies (OMCs).

Table 3.12: Spiked Crude Oil Imports by Composition, 2004 – 2013 (MT)

Year	Crude	Gas Oil	Jet A1/ Kerosene	Av. Fuel /Gasoline	Naphtha	Fuel Oil	Condensate	Total	Percentage of Spikes
2004	138,515	180,763	0	0	0	0	222,980	542,258	74.5
2005	50,976	74,704	0	0	0	0	99,258	224,937	77.3
2006	176,672	148,970	0	0	0	0	74,851	400,493	55.9
2007	232,754	207,740	0	0	23,990	0	71,512	535,996	56.6
2008	160,727	186,969	0	0	57,119	0	48,254	453,068	64.5
2009	277,615	194,546	0	0	37,845	0	37,082	547,088	49.3
2010	160,304	332,524	0	0	120,165	0	18,901	631,894	74.6
2011	182,282	304,336	0	0	90,480	0	0		
2012	211,286	316,321	0	0	115,076	0	0		
2013	263,466	241,212			95,846				

Source: TAZAMA Piplines

Table 3.13: Refinery Output by Fuels, 2004 – 2013 (MT)

Year	Premium Petrol	Unleaded Petrol	Diesel	Naphta	Kerosene	Jet A1	L.F.O.	H.F.O.	L.S.G.	LPG/ Butane	MC 30 (Cutback)	Bit 80/100	Total
2004	117,733.72	1,323.44	195,033.63	-	13,046.59	18,768.43	998.52	57,798.18	1,850.14	4,407.66	-1	1,358.44	412,317.75
2005	84,861.29	1,691.10	178,159.60	-	9,603.73	17,135.01	930.9	43,418.14	3,260.33	3,314.37	-	1,868.20	344,242.67
2006	77,253.71	8,757.08	194,283.18	-	9,611.06	17,281.74	402.52	51,180.50	-	4,457.30	-	-2	363,225.09
2007	75,992.70	22,274.06	205,488.24	-	12,607.65	22,085.81	267.02	62,511.00	-	5,214.94	1	-	406,442.42
2008		110,075.00	208,582.00		33,963.00			43,730.00		8,566.00			404,916.00
2009		120,129.00	251,731.00		37,342.00			77,112.00		7,886.00			494,200.00
2010		142,116.00	302,060.00		53,618.00			66,286.00		7,704.00			571,784.00
2011		132,294.00	264,691.00		25,256.00	25,256.00		51,659.00		11,674.00			510,830.00
2012		138,090.00	310,190.00		28,938.00	33,250.00		51,612.00		12,492.00			574,572.00
2013		129,692.00	47,898.00		7,204.00	30,757.00		95,466.00		11,028.00			322,045.00

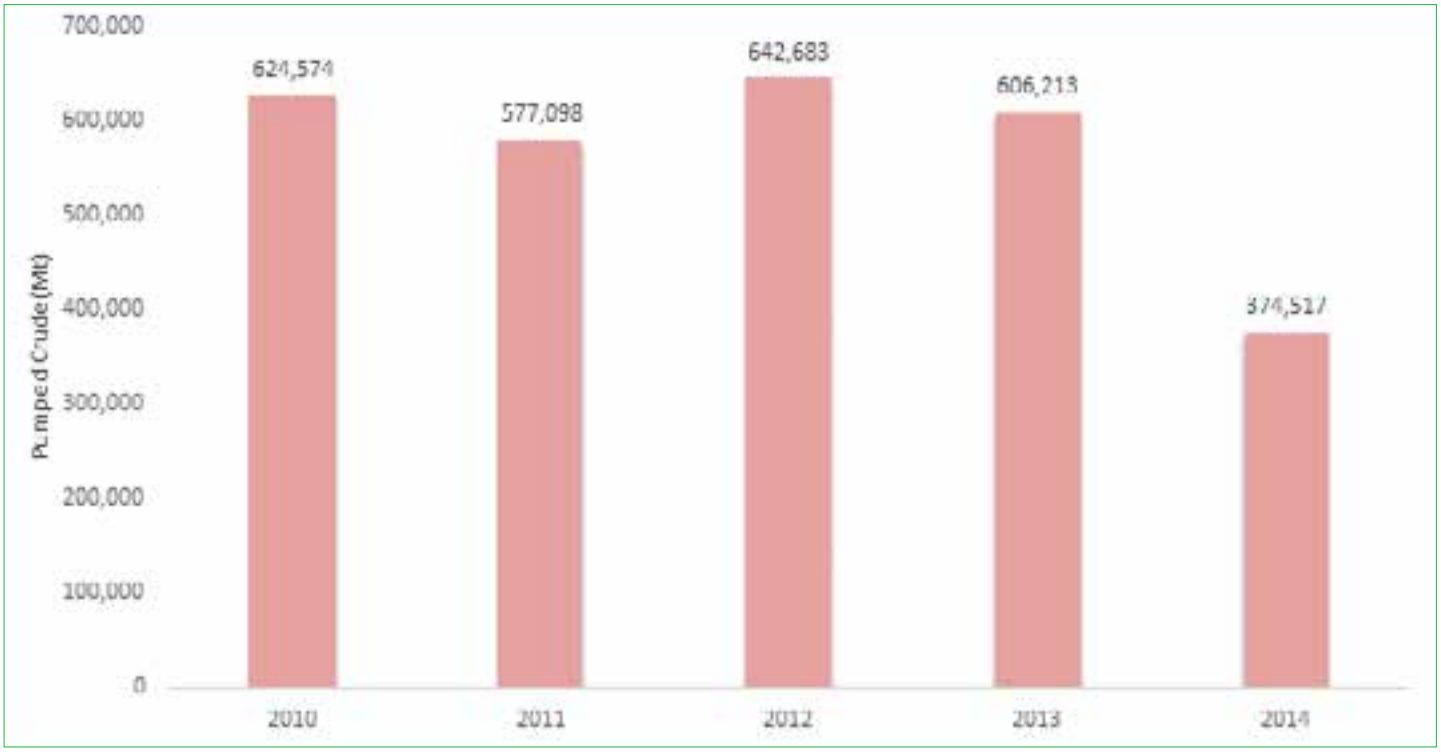
Source: TAZAMA Piplines

Table 3.14: Direct Refined Petroleum Imports, 2000 – 2012 (MT)

Year	Petrol	Diesel	Kerosene	Jet A1	Avgas	L.F.O.	H.F.O.	Bitumen
2000	152,813	65,445	9,137	9,341		1,023	18,381	
2001	61,330	109,883	4,172	32,114	1265		31,157	
2002	55,736	107,941	4,857	33,534	1,143	866	28,671	
2003	54,005	115,089	4,806	23,190		970	30,758	
2004	70,041	778,537	16,844	56,689	13	2,214	8,050	44,811
2005	319,785	1,029,385	1,657	113,548	1	1,061	160,244	90,868
2006	233,921	1,138,366	160	107,511	4	2,043	158,760	99,957
2007	282,521	1,360,292	359	109,752	2	8,034	104,228	78,992
2008	300,706	1,920,766	710	152,740	0		223,607	228,129
2009	34,229	290,001	1	3,015		677	47,491	70,246
2010	356,683	1,999,067	2,872	47,101	20	2,815	51	
2011	201,303	5,709,323	337	38,273	3	17,422	3	
2012	275,616	9,903,895	6	102,673	10		18	

Source: Zambia Revenue Authority (ZRA)

Figure 3.10: Imported Comingled Crude (Mt), 2010 - 2014



Source: Energy Regulation Board

Figure 3.11: Average National Daily Consumption for the period January to August 2014

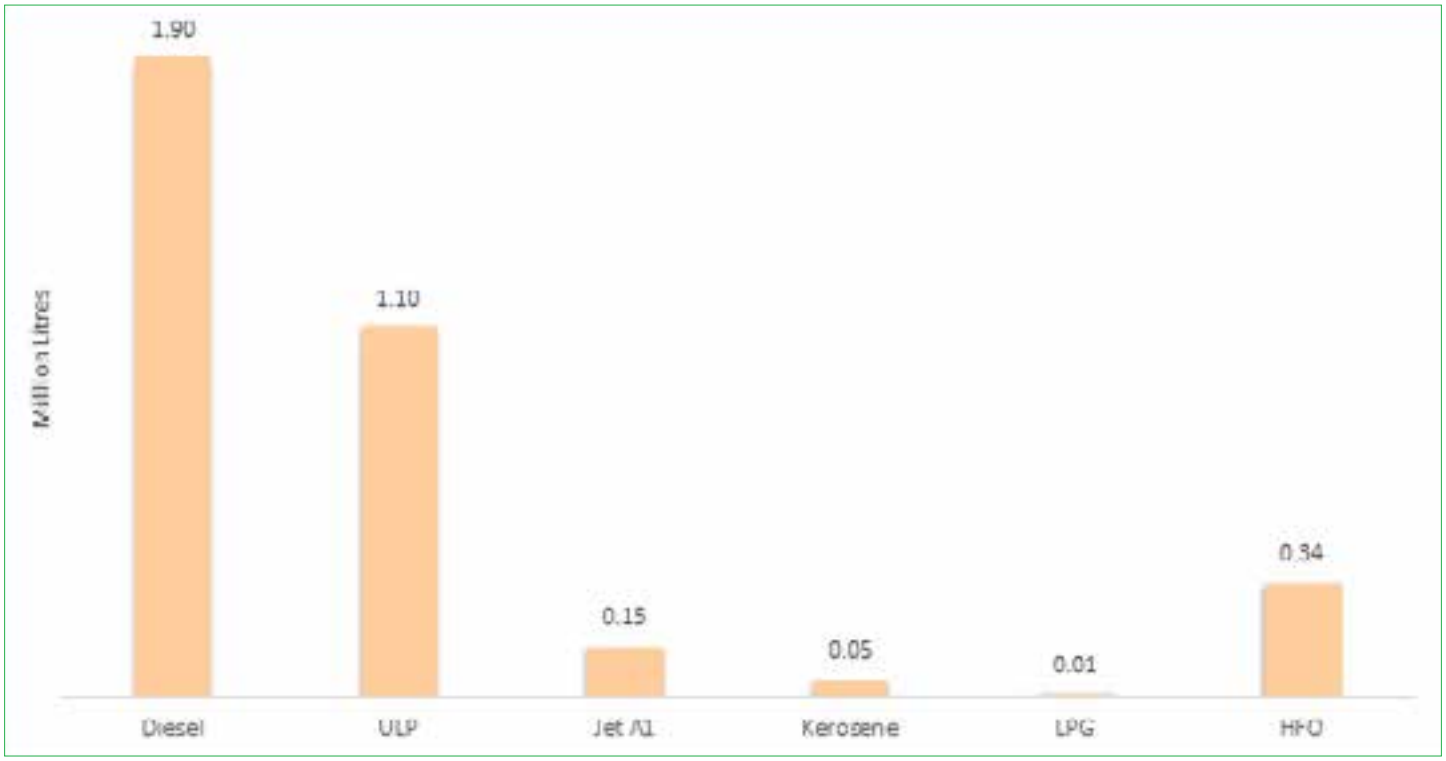


Table 3.15: Trends in National Consumption of Fuel by Type, 2007-2013 (MT)

Year	Fuel Oils	LPG	Jet A1	Kerosene	Unleaded Petrol	Diesel	Total Consumption
2007	65,635	2,072	30,639	9,729	123,780	352,030	583,885
2008	63,911	2,124	38,729	123,780	130,705	408,935	656,936
2009	59,951	2,097	29,655	15,574	152,443	445,431	705,149
2010	46,845	1,848	29,130	17,330	160,982	496,568	752,704
2011	49,461	2,424	32,593	19,898	182,123	577,836	854,335
2012	60,222	658*	49,477	14,669	234,224	675,756	1,036,006
2013	50,793	3,021	49,613	12,315	275,604	676,078	1,067,460

Source:Energy Regulation Board

*Some companies did not report their consumption of LPG during the year 2012.

Table 3.16: Export of Refined Petroleum Products,2004 – 2007 (MT)

Year	Petrol	Gasoil	Kerosene	Jet A1	AvGas	HFO	LFO	LPG	Bitumen	Other
2004	34				21			773		
2004	140,938	160,670	829	18,371	6,628	338	280	1,759	75	
2005	19,519	59,461	0	18,126	191	2,660	1	1,266	15	
2006	41,046	22,233	0	3,353	-	3,020	2	2,046	67	
2007	19,770	24,852	-	6,023	-	6,922	61	2,229	6	

Source: Energy Regulation Board

3.2.1.8 Renewable Energy Potential

Zambia is well endowed with renewable energy resources particularly hydropower and solar; other resources are; geothermal, agro-industrial residues and wind.

Renewable resources have great potential for electricity generation but some key data on renewable energy in Zambia is not readily available.

3.2.1.9 Small Hydros

The Rural Electrification Authority (REA) has identified 29 small-mini hydro sites mainly in Northern Luapula (4MW) and in the North-Western Province (13MW). A number of feasibility studies have been undertaken in selected mini hydro potential sites and the planned hydro capacity in 2019 is expected to be 45MW. For off-grid applications, there are plans by the private sector to develop additional off-grid projects to include Chavuma (15MW), West Lunga (3MW) and Chitokoloki Mission (15MW). Furthermore REA is undertaking a feasibility study and detailed engineering design for a 3.5MW off-grid hydropower generation plant at chikata Falls and a 500KW power generation at Kasanjiku Falls in Northwestern Province.

3.2.1.10 Biomass

The biomass potential in Zambia is high with bioenergy potential estimated a 2.15 million tons and 498 MW, respectively (MEWD). The largest expected contribution is from agricultural waste (91 percent) followed by forest waste (9 percent). A biomass-based electricity generation is the Nakambala Sugar where bagasse generates 17MW of electricity; similarly Kafue Sugar produces 3MW.

3.2.1.11 Solar Energy

Zambia has an average solar insolation of 5.5 kWh/m2/day with approximately 3,000 sunshine hours annually providing good potential for photovoltaic and solar themal applications (including electricity generation, solar home systems, solar water pumping, solar water heating, etc.). A preliminary evaluation of the solar energy potential has been carried out by IRENA. REA has developed a 60kW solar minigrid in Samfya District (Luapula Province).

3.2.1.12 Geothermal

Historic surveys have identified over 80 hot and mineralised springs in Zambia.Subsequently, a detailed study by an Italian-Zambian joint venture in the mid-1980s identified five prospective sites.

3.2.1.13 Wind Energy

Wind speeds in Zambia average 3 m/s. at 10m. above ground which is only suitable for mechanical applications. However indications are that higher speeds may be available at higher heights (70-100m). A wind resource mapping (World Bank financing) is underway to assess the potential for wind projects in Zambia.

Figure 3.12: Availability and Utilisation of Renewable Sources in Zambia

RENEWABLE ENERGY	OPPORTUNITIES/ USE	RESOURCE AVAILABILITY	POTENTIAL ENERGY OUTPUT
Solar	Thermal (water heating), electricity (water pumping, lighting, refrigeration)	6-8 sunshine hours	5.5 kWh/m^2/day (modest potential especially for limited irrigation)
Wind	Electricity, mechanical (water pumping)	Average 3 m/s at 10 m height	Modest potential, especially for irrigation
Mini-hydro	Small grids for electricity supply	Reasonably extensive	Requires elaboration and quantification
Biomass (combustion and gasification)	Electricity generation	Agro wastes, forest wastes, sawmill wastes	Requires elaboration and quantification
Biomass (biodigestion)	Electricity generation, heating and cooking	Animal waste, agro- and industrial waste, wastewater	Potential requires elaboration
Biomass (biofuels)	Ethanol and biodiesel for transport and stationary engines	Sugarcane, sweet sorghum, jatropha	150 km^2 of agricultural land to meet current demand
Biomass (household energy)	Improved charcoal production, improved cook stoves	Sawmill waste and indigenous trees from sustainable forest management.	Reasonably extensive
Geothermal	Electricity generation	Hot springs	Requires elaboration and quantification

Source: MEWD, 2008

3.3.1 Aquatic Resources

Zambia being a landlocked country has no direct access to the sea or ocean but is a country well-endowed with freshwater resources in the form of large rivers, lakes, swamps, streams and dams which host various fish species. A total of fourteen (14), a composing of both major and minor fishery areas have been gazetted for commercial fishing, supporting 77,647 fishers utilizing more than 49,000 fishing vessels to navigate to the fishing grounds. Capture fisheries currently account for 80 percent of national fish production annually.

Aquaculture is practiced on both land and cages which are placed in the water bodies (lakes). The contribution of aquaculture to the total annual fish production currently stands at 20 percent involving slightly over 20,000 fish farmers distributed throughout the country.

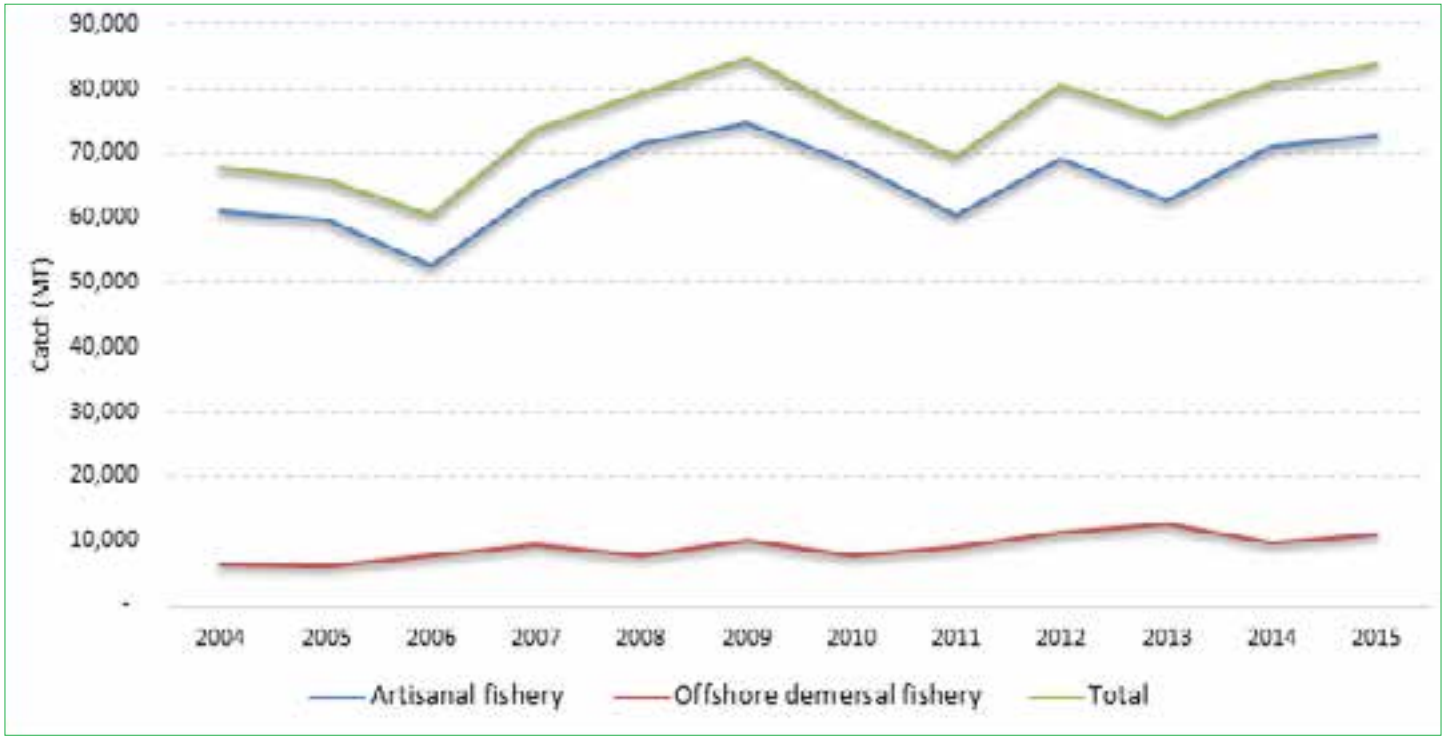
3.3.1.1 Fish Capture Production by Type of Fishery

Table 3.17: Fish Production (Tones) by Type of Fishery, 2004 - 2015

Type of fishery	Type	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Artisanal	Others	61,151	59,696	52,577	64,066	71,437	74,723	68,575	60,399	69,214	62,587	71,193	72,584
Offshore demersa[3]l	Clupidae, Lates	6,574	6,251	7,659	9,476	7,860	9,993	7,821	8,965	11,424	12,600	9,633	11,135
Total		67,725	65,947	60,236	73,542	79,297	84,716	76,396	69,364	80,638	75,187	80,826	83,719

Source: FDES, 2016

Figure 3.13: Fish Production by Type of Fishery, 2004 - 2015



Source: FDES, 2016

Zambia's capture fish production has stagnated over the past few decades although Tables 3.23 shows a marginal increase from 67,725MT to 83,719MT between 2004 and 2015. This is despite the fishers significantly increasing (more than double) from 29,422 to 77,647 between the two periods as shown in Table 3.23 below. This situation could be attributed to the reduced CpUE experienced in most fishery areas caused by poor fishing practices and overcapacity as our fishing industry is open access.

3.3.1.1 Aquaculture Production

The major aquaculture production systems currently used in Zambia are ponds and cages. Pond fish farming is practiced generally throughout the country while cages are still restricted to Lake Kariba and Lake Tanganyika. In addition to these systems, a number of fish farmers have now begun to utilize recirculation tanks and pens are being experimented in isolated and suitable places of the country. Although reservoirs or dams constructed in most parts of Zambia are mainly intended to water animals,crops and gardens, fish production is now being undertaken in these facilities.

Table 3.18: Aquaculture Production by Species, 2004 - 2015

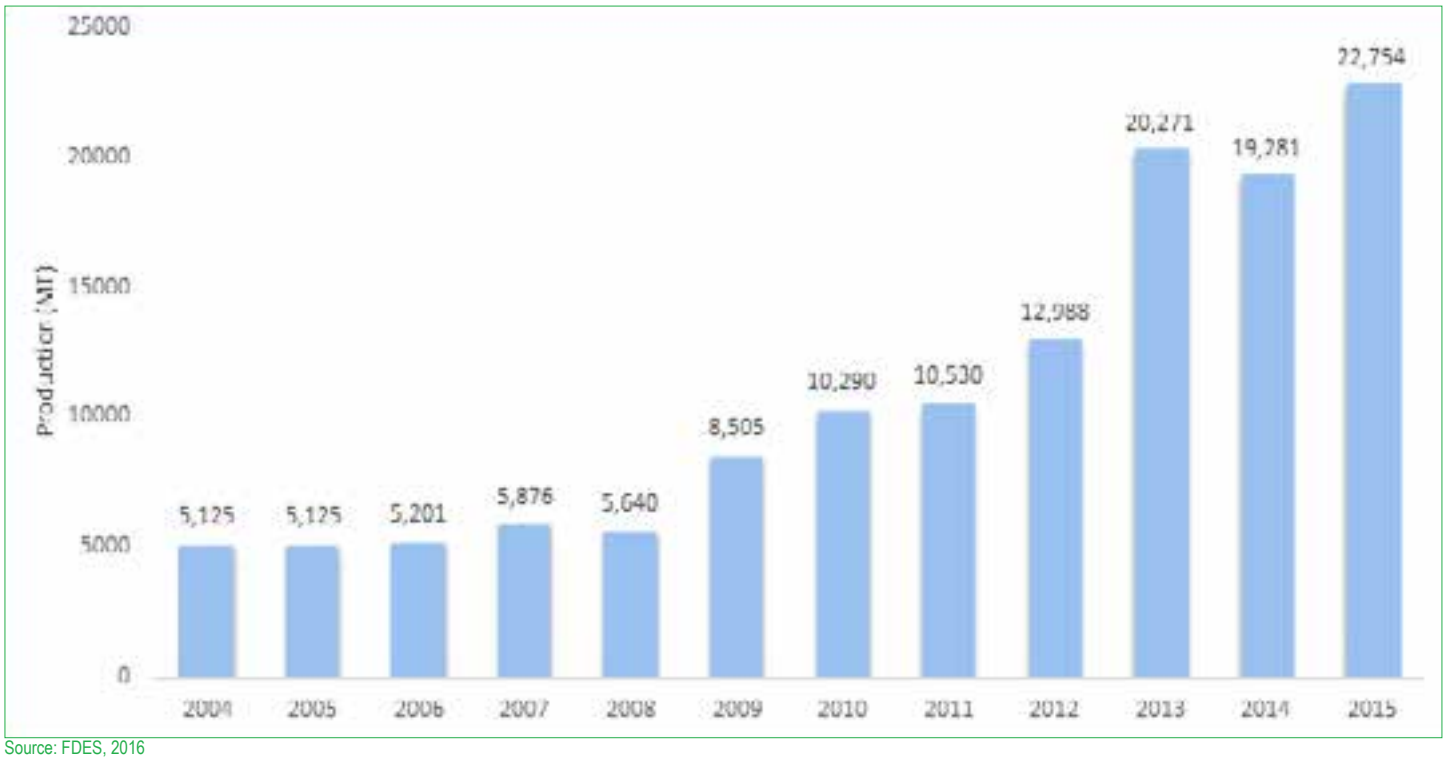
SCIENTIFIC NAME	FAO ENGLISH NAME	Unit	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cyprinus carpio	Common carp	Tonnes	45	45	37	37	36	68	82	82	32	38	35	159
Oreochromis niloticus	Nile tilapia	Tonnes	2900	2900	3034	3486	3346	3419	4136	4234	6374	12404	12000	15447
Oreochromis macrochir	Longfin tilapia	Tonnes	90	90	150	195	187	1174	1420	1453	1620	2147	1925	764
Oreochromis andersonii	Three spotted tilapia	Tonnes	2000	2000	1900	2080	1996	3070	3715	3802	3978	4108	3900	3112
Oreochromis tanganicae	Tanganyika Bream	Tonnes	0	0	0	0	0	0	0	0	0	142	140	280
Tilapia rendalli	Redbreast tilapia	Tonnes	90	90	80	78	75	774	937	959	984	1432	1281	2992
TOTAL		Tonnes	5125	5125	5201	5876	5640	8505	10290	10530	12988	20271	19281	22754

Source: FDES, 2016

[3]Offshore fish catch data reported mainly includes only Clupides species from Lake Kariba as information for Lake Tanganyika, Itezhi Tezhi, Bangweulu and Mweru Luapula is rarely available. Clupidae species commercially exploited in Zambia include Limnothrissa miodon, Stolothrissa tanganicae and Poecilothrissa moeruensis. Lates species (Lates mariae, Lates microlepis, Lates anguistifons and Lates stappersii) are other offshore dwellers which are endemic to Lake Tanganyika.

The significant changes to annual fish production at species level could be explained by the Aquaculture Baseline survey that was conducted in 2015 in Copperbelt and North-western provinces which are among the major producers of farmed fish in Zambia.

Figure 3.14: Aquaculture Production, 2004 - 2015



Source: FDES, 2016

The exotic, *Oreochromis Niloticus* has continued to be the most popular cultured fish species probably due to its superior growth rate compared to the local ones. However, Oreochromis tanganicae has recently added to the number of commercially reared fish species in the country although its contribution to the annual production is still minimal but progressing gradually. Generally, the aquaculture subsector has rapidly expanded in the past decade probably due to the huge fish demand gap currently existing in Zambia as well the neighbouring countries and as a result, fish production has jumped from 5,000MT to over 20,000MT in the past decade.

3.3.1.2 Number of Active Fishermen

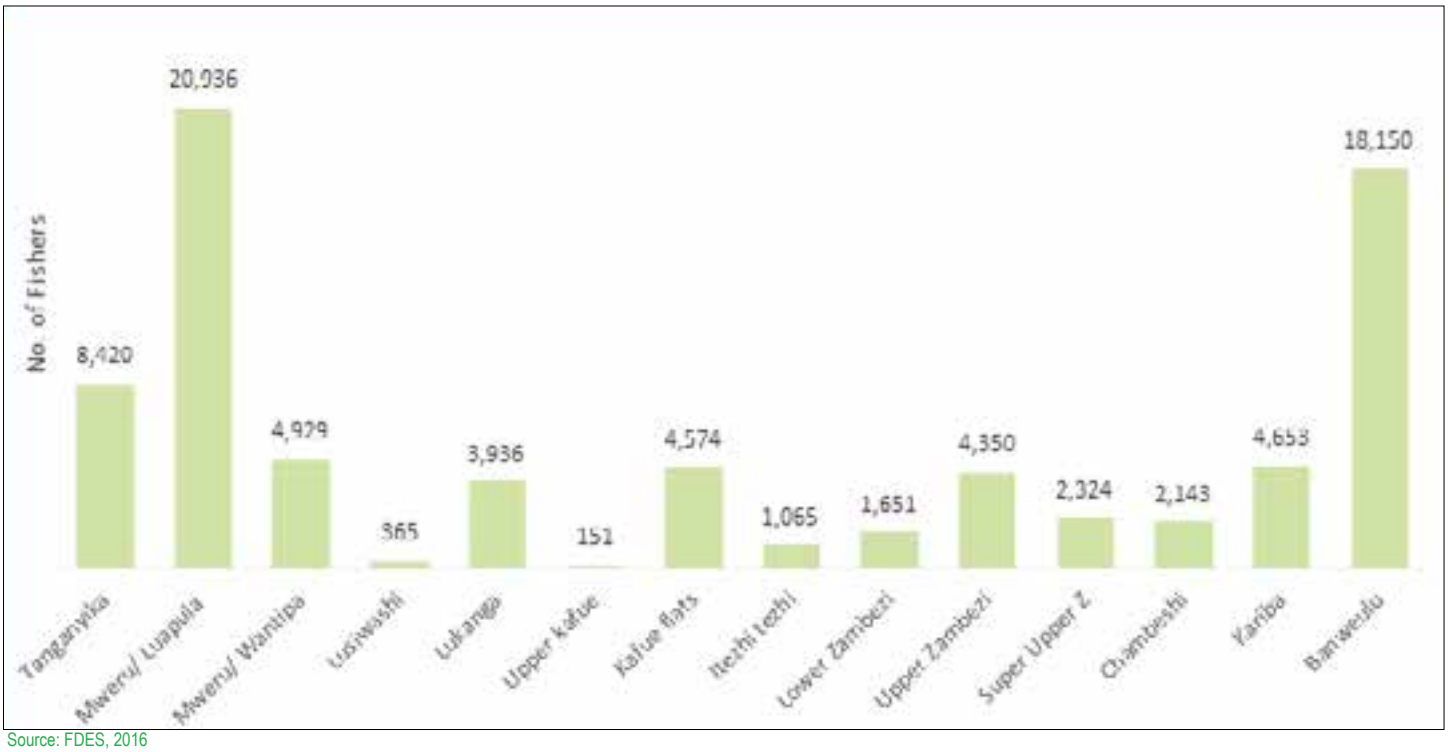
Recent fishery frame surveys conducted show that the fisher population has continued to grow at the rate of around 3 percent per annum. Women participation has however remained low standing at 3 percent compared to 97 percent for men. It is important to note that the participation of women is actually higher at fish processing and marketing stage than production.

Table 3.19: Number of Active Fishers by Fishery Area, 2004 - 2015

Fishery	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tanganyika	4,118	4,118	4,118	4,118	4,118	4,118	4,118	8,420	8,420	8,420	8,420	8,420
Mweru/L	12,047	12,047	12,047	12,047	21,222	21,222	21,222	21,222	21,222	20,936	20,936	20,936
Mweru/W	2,337	2,337	2,337	2,337	2,337	2,337	2,337	2,337	2,337	4,929	4,929	4,929
Lusiwashi	365	365	365	365	365	365	365	365	365	365	365	365
Lukanga	-	901	901	901	901	901	901	901	901	901	3,936	3,936
Upper Kafue	-	-	151	151	151	151	151	151	151	151	151	151
Kafue Flats	-	-	2,950	2,950	2,950	2,950	2,950	2,950	2,950	2,950	2,950	4,574
Itezhi Tezhi	-	-	1,614	1,614	1,614	1,614	1,614	1,614	1,614	1,614	1,065	1,065
L/Zambezi	706	706	706	706	706	706	706	706	706	706	706	1,651
Upper Zambezi	-	-	-	-	-	-	-	-	-	4,350	4,350	4,350
Super Upper Zambezi	847	847	847	847	847	847	847	847	847	2,324	2,324	2,324
Chambeshi	-	-	-	-	-	-	-	-	-	2,143	2,143	2,143
Kariba	1,306	1,306	1,306	1,306	1,306	1,306	1,306	4,653	4,653	4,653	4,653	4,653
Banweulu	7,696	7,696	7,696	15,113	15,113	15,113	15,113	15,113	18,150	18,150	18,150	18,150
Total	29,422	30,323	35,038	42,455	51,630	51,630	51,630	59,279	62,316	72,592	75,078	77,647

Source: FDES, 2016

Figure 3.15: Active Fishers by Fishery Area in Zambia, 2015



Source: FDES, 2016

Mweru Lupaula fishery which constitutes of Lake Mweru and Lupaula river has the highest concentration of fishers (20,936) closely followed by the Bangweulu complex (18,150) composed of Lake Bangweulu and the Bangweulu swamps or wetlands. Upper Kafue and Lusiwashi are least populated fishery areas because their small fishing grounds.

3.3.1.3 Fisherman-Days, Catch and Catch per Fisherman-Day

In Zambia, fishing takes place in all major and minor fishery areas. Out of the fourteen (14) fishery areas, fishing ban is not implemented only on three (Lake Kariba, Tanganyika and Lower Zambezi) which remain open for fishing throughout the year. Conclusive information required in this particular section was only readily available on Lake Kariba and Kapenta fishery to be specific because it is collected through catch return system which is rather cheaper as compared to sample surveys.

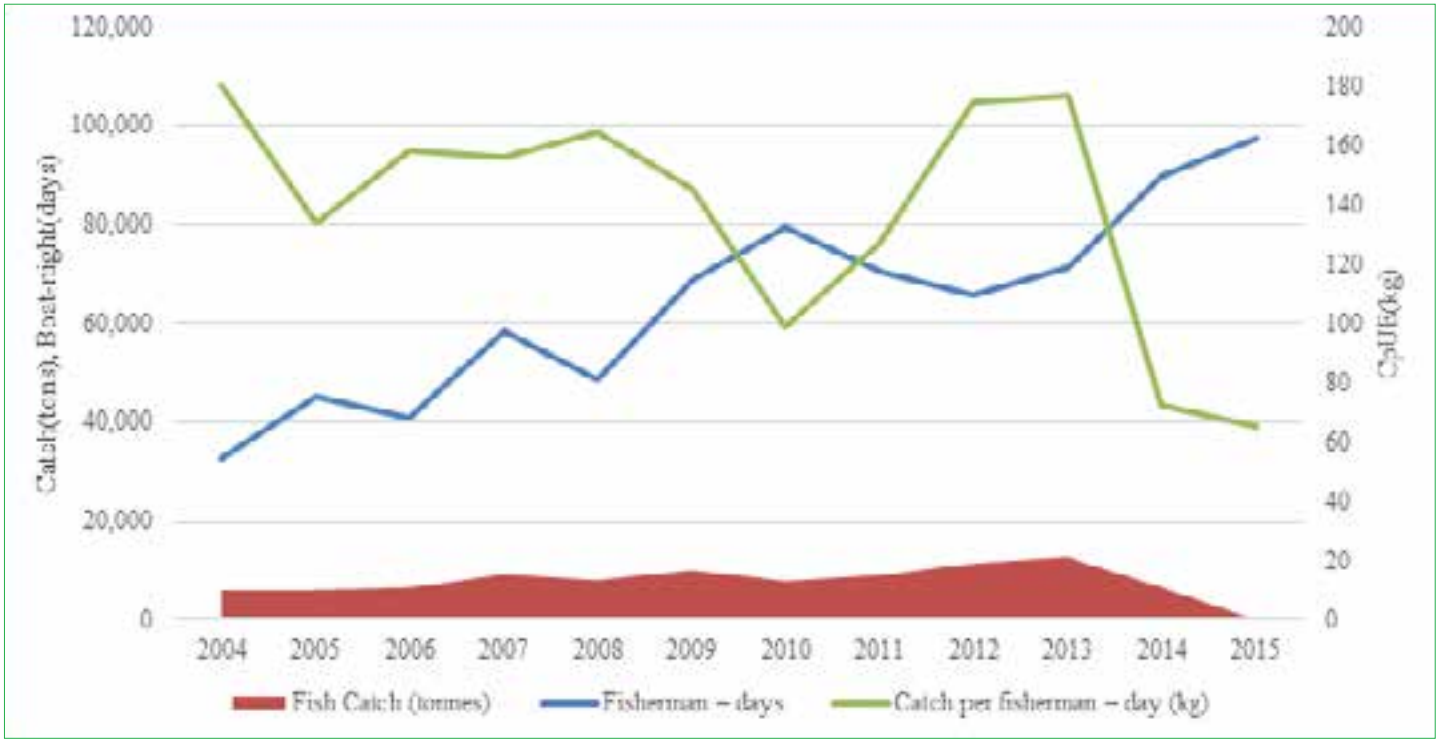
Table 3.20: Fisherman-Days, Catch and Catch per Fisherman-Day, 2004 - 2015

Year	Location	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fisherman – days	Lake Kariba	32,812	44,921	40,906	58,400	4,8426	68,734	79,284	70,243	65,484	71,263	89,536	97,545
Fish Catch (tonnes)	Lake Kariba	5,913	6,004	6,460	9,116	7,967	9,993	7,821	8,965	11,424	12,600	6,490	6,345
Catch per fisherman – day (kg)	Lake Kariba	180.20	133.66	157.92	156.10	164.52	145.38	98.64	127.62	174.45	176.81	72.49	65.44

Source: FDES, 2016

Figure 3.18 shows that despite the Kapenta annual fishing effort increasing from 32,812 to 97,545 fisherman-days between 2004 and 2015, annual catch has stagnated within this period oscillating around 6,000MT. Regular and consistent data on Catch per unit effort (CpUE) is directly proportional with the abundance frequency. On the other hand, high fishing effort leads to a slight increase in CpUE and consequently high CPUE attracts additional fishing effort. This could imply that despite CpUE dropping from 180kg/ boat/ day in 2004 to 65kg in 2015, the catch levels are still economically sustainable.

Figure 3.16: Kapenta Fish Catch Trends on Lake Kariba, 2004 - 2015



Source: FDES, 2016

3.3.1.4 Average Price of Fresh Fish and Fish Products

The pricing of fish vary from one fishery and/ or town to another. Usually fish price per measuring unit is lower in remote places compared to urban ones. Prices also vary depending on the type (family/species) as well as size of fish.

Table 3.21: Average Price (ZMW) of Fresh Fish and Fish Products, 2004 - 2016

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cyprinus carpio	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Oreochromis niloticus	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Oreochromis macrochir	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Oreochromis andersonii	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Oreochromis tanganicae	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Tilapia rendalli	-	-	-	-	-	15,000	16,000	18,000	17,000	18	18	22
Lates stappersii	-	-	-	-	-	-	-	-	-	-	21	25
Cat fish	-	-	-	-	-	-	-	-	-	-	13	17
Lates anguistifrons	-	-	-	-	-	-	-	-	-	-	26	35
Mackerel	-	-	-	-	-	-	-	-	-	-	10	12
Tilapia/ bream fillets	-	-	-	-	-	-	-	-	-	-	25	32

Source: FDES, 2016

The price of fresh fish in Zambia has been increasing steadily between 2009 and 2015. However a big jump was recorded between 2014 and 2015 and this could probably be attributed to increased fish demand on both local and international market.

3.3.1.5 Import, Export and Trade Balance of Fish and Fish Products

Zambia mainly imports fish from Africa and Asia. Within Africa, the major fish import sources are Namibia (mainly Horse mackerel), Zimbabwe (farmed tilapia fish) and South Africa (assorted Sea fish). As for the Asian continent, China and Thailand are the key contributors mainly supplying farmed Tilapia.

With regards to exports, the DR Congo and Angola have remained our major fish export destinations in Africa while China and Hong Kong lead in Asia.

Table 3.22: Import, Export and Trade Balance of Fish and Fish Products, 2004 - 2015

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Imports												
Quantity (tonnes)	3,862	15,615	4,626	4,242	3,241	2,784	4,076	16,078	15,720	32,244	55,184	77,199
Value (US$)	2,727,969	4,677,271	6,022,409	7,729,994	4,562,443	5,464,023	6,887,081	32,118,412	31,155,119	50,072,929	76,930,000	113,434,446
Value ('000 Zmk/ Zkw)	13,006,253	21,477,815	22,254,416	30,607,400	16,609,500	26,588,100	33,086,800	78,605,300	159,923,500	270,267	475,674	1,015,981
Exports												
Quantity (tonnes)	5,500	1,031	263	239	1,810	666	394	155	51	141	136	334
Value (US$)	1,003,782	3,416,884	359,212	384,906	1,245,976	950,148	681,801	1,081,964	466,668	776,962	521,100	503,649
Value ('000 Zmk/ Zkw)	4,799,155	12,219,896	1,278,895	1,546,760	4,617,400	4,740,330	3,272,850	2,495,520	2,363,250	4,178	3,189	4,169
Trade Balance												
('000 Zmk/ Zkw)	-8,207,098	-9,257,919	-20,975,521	-29,060,640	-11,992,100	-21,847,770	-29,813,950	- 76,109,780	-57,560,250	-266,089	-472,485	-1,011,812

Source: FDES, 2016

The prices are collected from large supermarkets in provinces from which averages are calculated.
In 2013, the Zambian kwacha was rebased by dropping the last three zeros.
Year when the Zambian currency was rebased by dropping three zeros (from Zmk to Zkw)

Figure 3.17: Fish Import and Export for Zambia, 2016

Source: FDES, 2016

3.3.1.6 Total Number and Type of Fishing Vessels

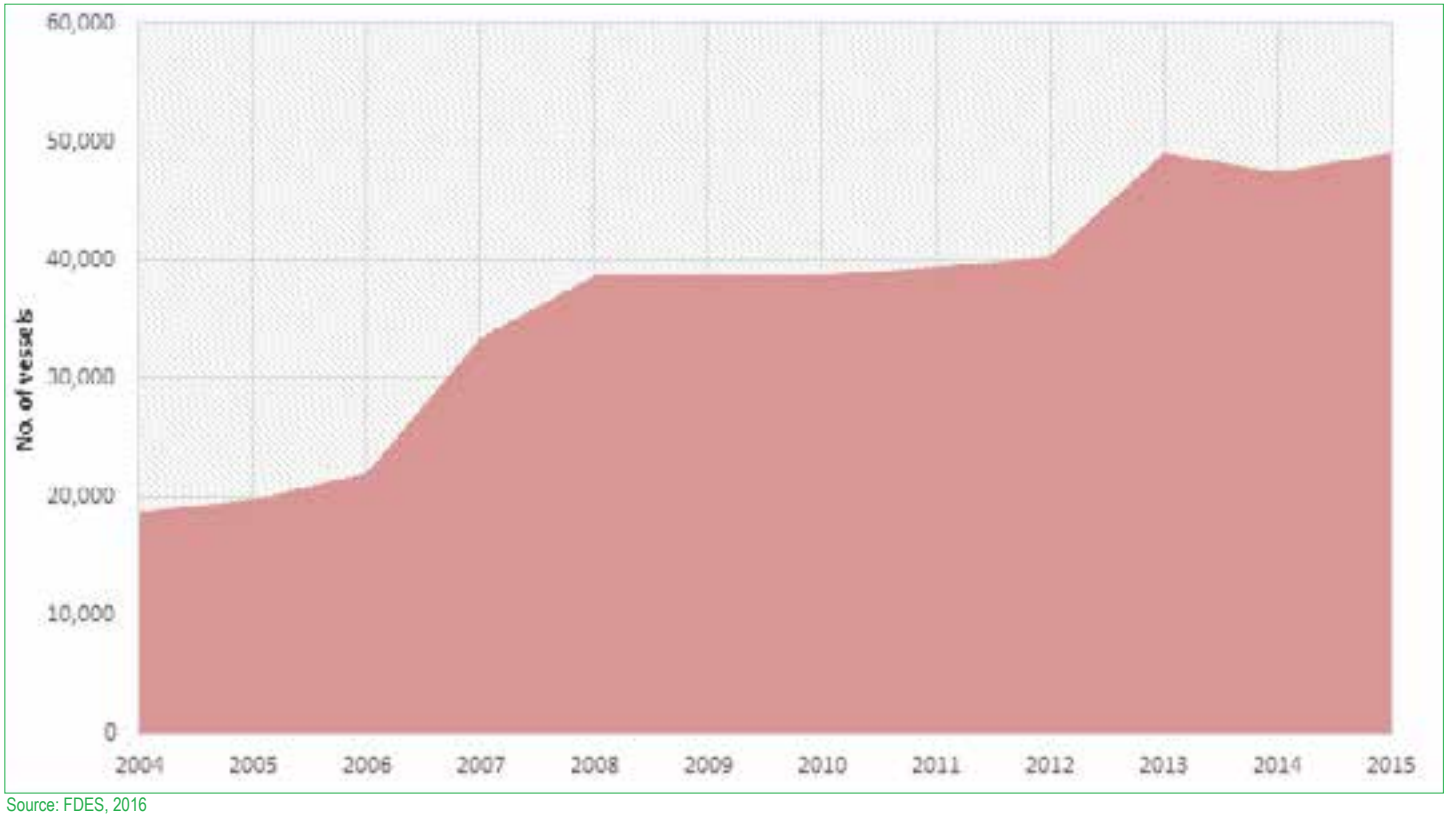
Generally, the number of fishing vessels have significantly increased in the past decade in all fishery areas of the country.

Table 3.23: Total Number of Fishing Vessels, 2004 - 2015

Type/Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Dogout Canoes	7,384	8,432	10,666	21,200	23,127	23,127	23,127	22,747	23,798	33,147	31,463	31,445
Plankboats	8,279	8,279	8,335	8,341	11,493	11,493	11,493	12,691	12,701	11,533	11,540	13,049
Fibre	521	527	550	1,270	1,299	1,299	1,299	1,370	1,152	1,179	1,186	1,457
Metal	135	135	137	143	169	169	169	106	100	75	75	73
Chombo	0	0	0	0	90	90	90	90	90	135	135	135
Asbestos	105	105	109	109	109	109	109	112	112	112	112	23
Catamaran	28	28	28	28	28	28	28	28	5	5	5	5
Fishing rigs	336	336	336	336	336	336	336	336	336	962	962	962
Total	18,792	19,847	22,167	33,434	38,659	38,660	38,661	39,491	40,306	49,161	47,492	49,164

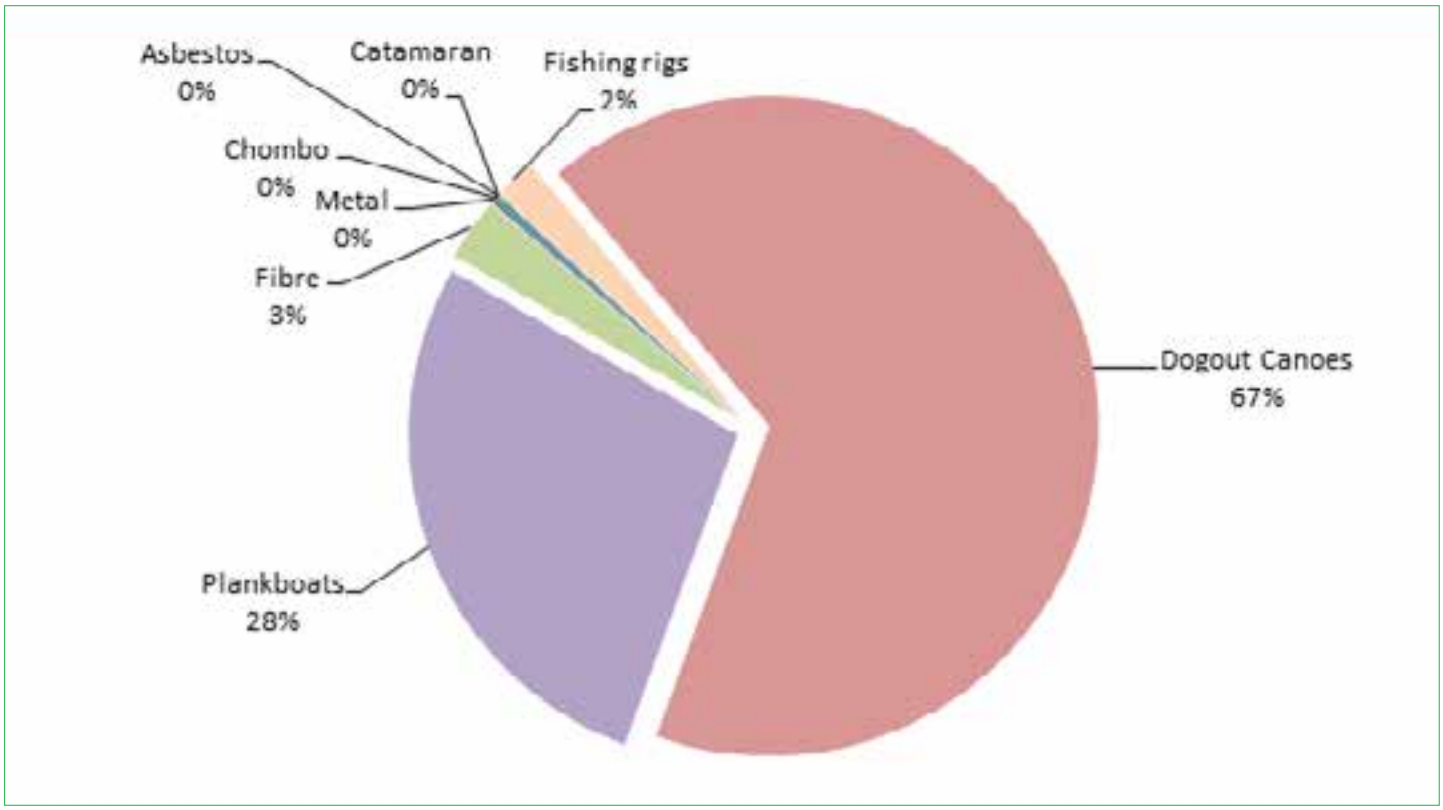
Source: FDES, 2016

Figure 3.18: Number of Fishing Vessels in Zambia, 2004 - 2015



Source: FDES, 2016

Figure 3.19: Types of Fishing Vessels in Zambia, 2015



Source: FDES, 2016

Zambian fishers utilize a wide range of fishing vessels as shown in table 3.21 above. The use of dugout canoes, plankboats, chombo and fibreboats and fishing rigs for fishing has been on the rise in the past decade. The earlier three boat types of course use wood as raw material hence have potential to put pressure on the forests. On the other hand, metal, asbestos and catamaran fishing vessels are no longer favoured by fishermen for fishing and it is not clearly understood whether this is a supply or demand problem or both. The other possibility could be high maintenance costs associated with these vessels types.

3.4.1 Crops and Livestock

3.4.1.1 Agriculture Production

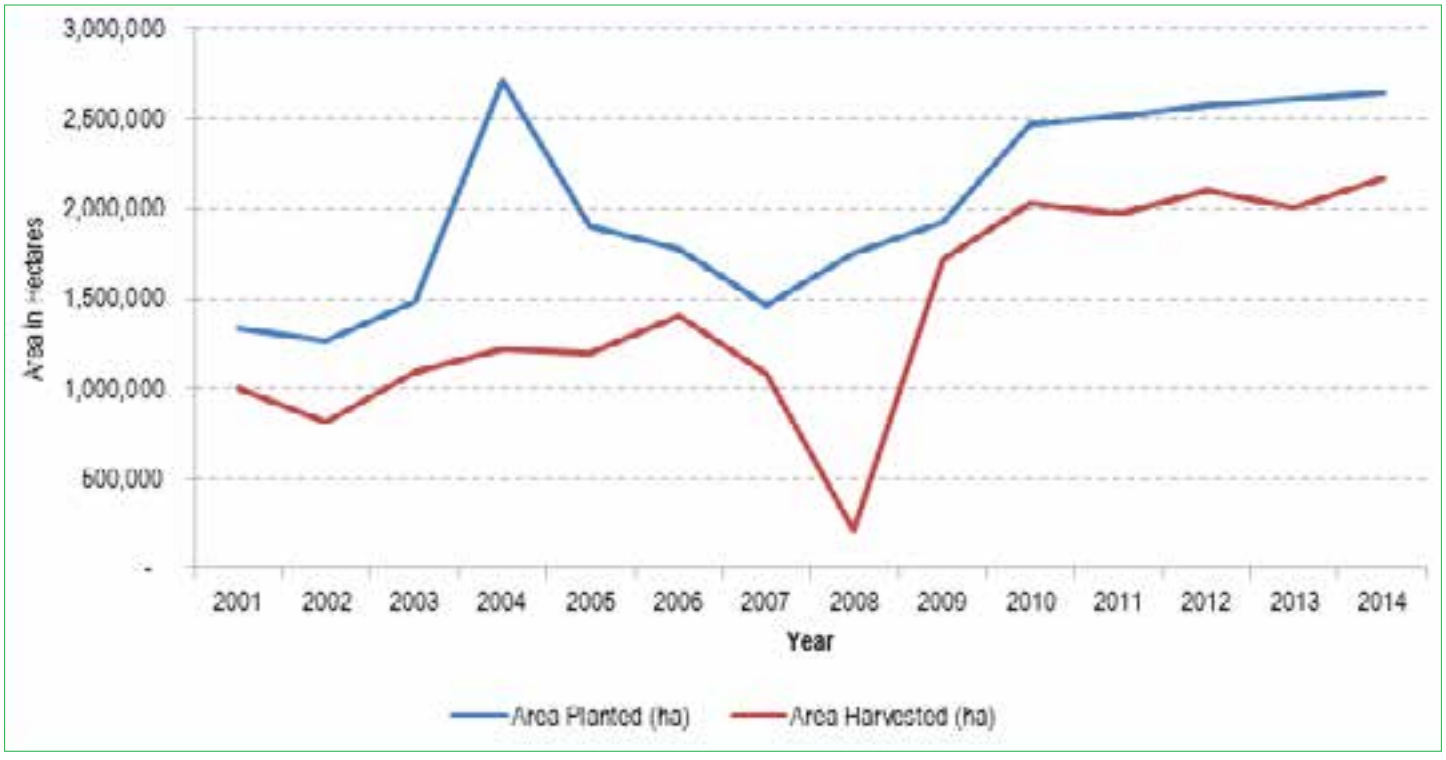
Agriculture is the backbone of the Zambian rural economy. The agriculture sector contributes on average at least 10 percent to GDP, absorbs about 67 percent of labour force and supports livelihoods of more than 70 percent of the population; among others. Crop production plays a central and strategic role in Zambia's' development as it is the key to economic growth, increased incomes, improved living standards, poverty eradication, and enhanced food security. Crops grown include maize, sorghum, groundnuts, tobacco, cassava and sweet potatoes.

Much of Zambia's farming remains subsistence-style, relying on seasonal rains. Efforts are being made to increase yields by introducing techniques such as crop rotation and inter-cropping. Soil improving crops such as velvet beans and hemp are also being promoted.

3.4.1.2 Area Planted and Area Harvested for All Crops

Figure 3.22 shows the area planted and harvested for all crops from 2001 to 2004. The figure shows that there was a constant significant gap between the area planted and the area harvested for all crops. The area harvested has remained lower than the area planted for the entire period under consideration. This might have been caused by wilting due to droughts in some parts of the country, lack of fertiliser, poor field-management practices like planting late, weeding late or not weeding at all, and soils generally being bad in many parts of the country.

Figure 3.20: Total Area Planted and Harvested for all Crops, 2001 to 2014 Season



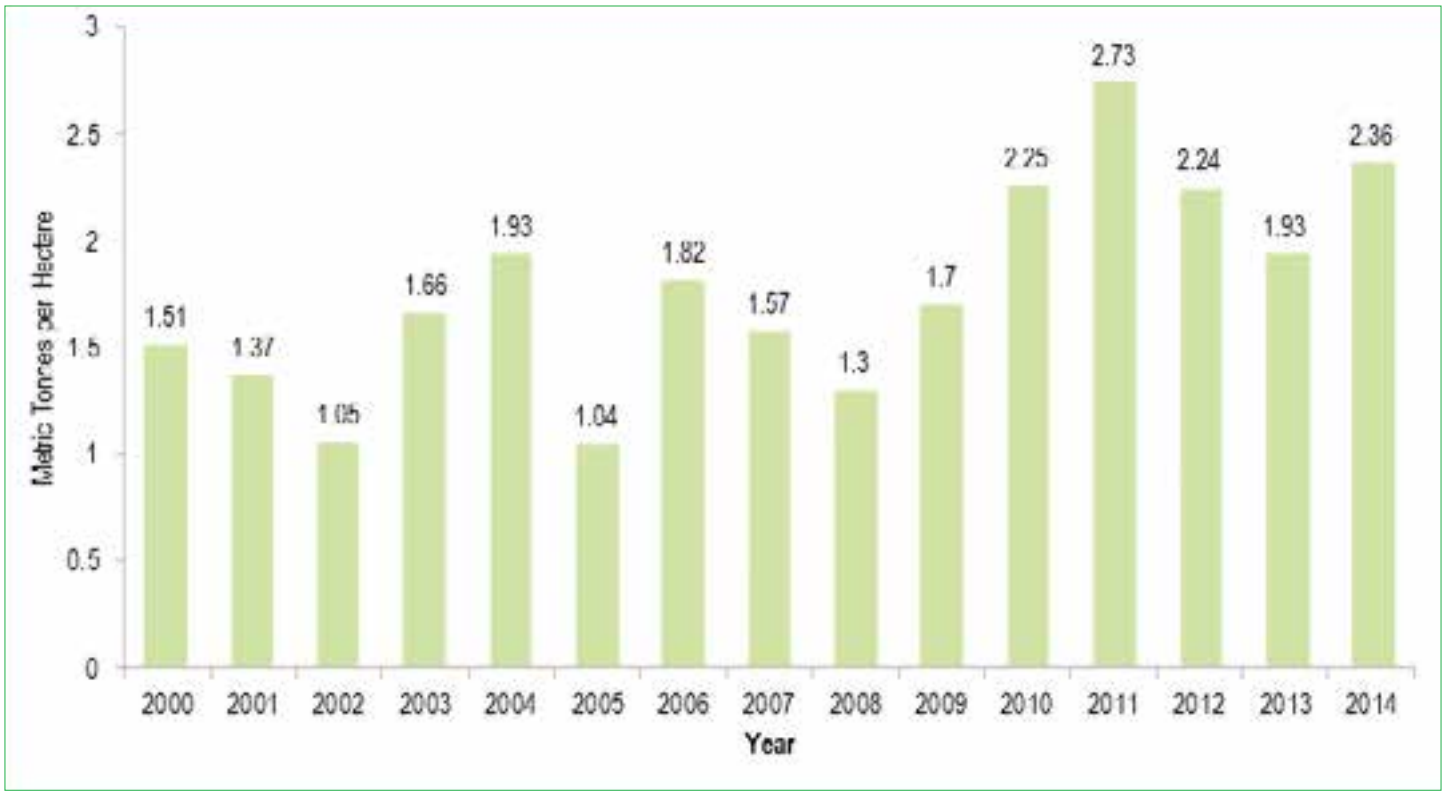
Source:

3.4.1.3 Average Yields of Maize

Figure 3.21 shows the estimated average yields of maize from 2001 to 2014. The figure shows that the estimated yields increased from 1.51 MT/Ha in 2000 to 2.36 MT/Ha in 2014. This may be attributed to most farmers adopting better farming practices over the years such as conservation farming. However, these yields are still very low as some large-scale farmers are able to produce over 7 MT/Ha.

The figure shows that over the period under review, the lowest average yield for maize was recorded in 2005 while the highest yield was recorded in 2011. During the 2004/05 season, the country experienced erratic rains which were the major contributing factor to the poor yields.

Figure 3.21: Average Yields of Maize, 2000 - 2014



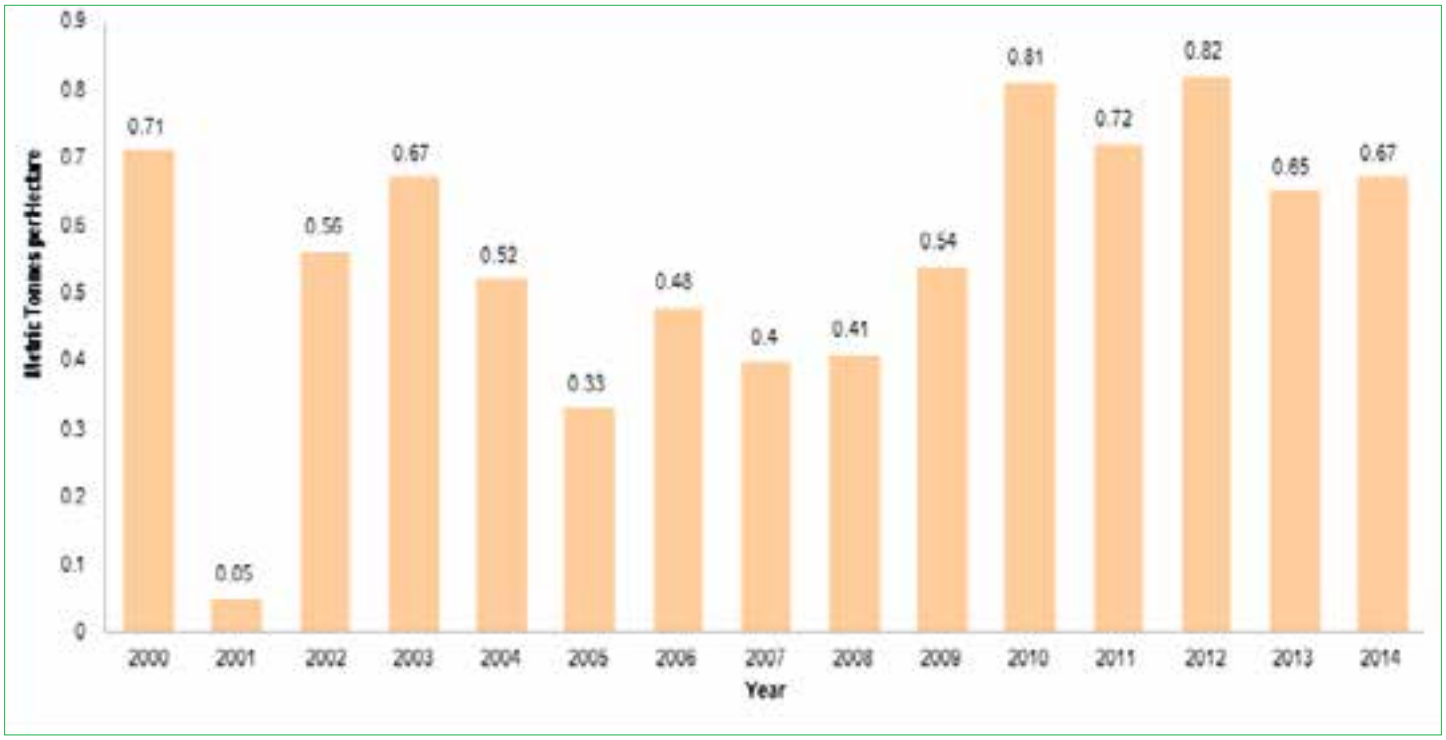
Source:

3.4,1.4 Average Yields of Sorghum

Figure 3.22 shows the estimated average yields of sorghum from 2000 to 2014. The yields of sorghum have been lower than 1MT/Ha for the entire period under consideration.

The estimated average yield of sorghum declined from 0.71 MT/Ha in 2000 to 0.67 MT/Ha in 2014. During the period under review, the lowest yields were recorded in 2001 with 0.05 MT/Ha while the highest were recorded in 2012 with 0.82MT/Ha.

Figure 3.22: Average Yields of Sorghum, 2000 - 2014



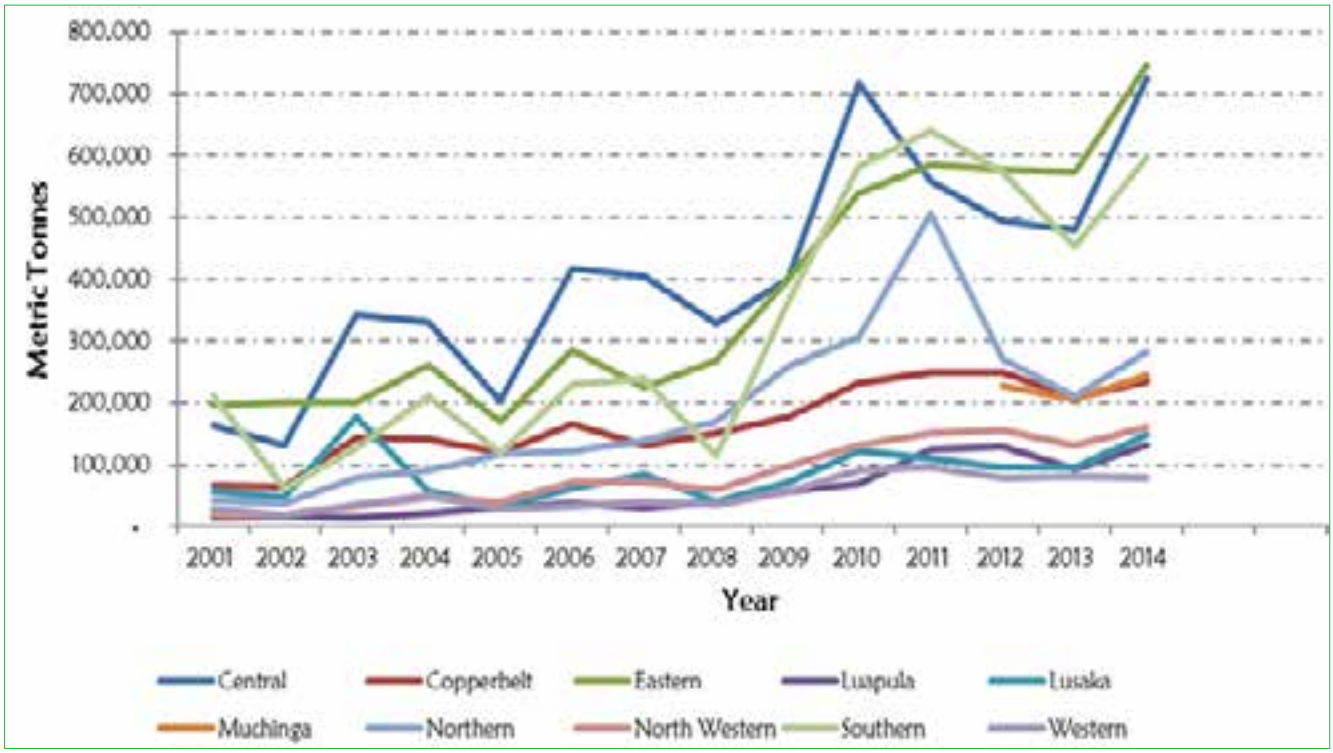
Source:

3.4.1.5 Production Quantities

3.4.1.5.1 Maize Production

Figure 3.23 shows maize production by province, from 2001 to 2014. Central, Eastern and Southern provinces have made the most contribution to maize production in most of the years while Luapula, Lusaka, North Western and Western provinces have recorded the lowest production through-out the period.

Figure 3.23: Production of Maize by Region, 2001 - 2014



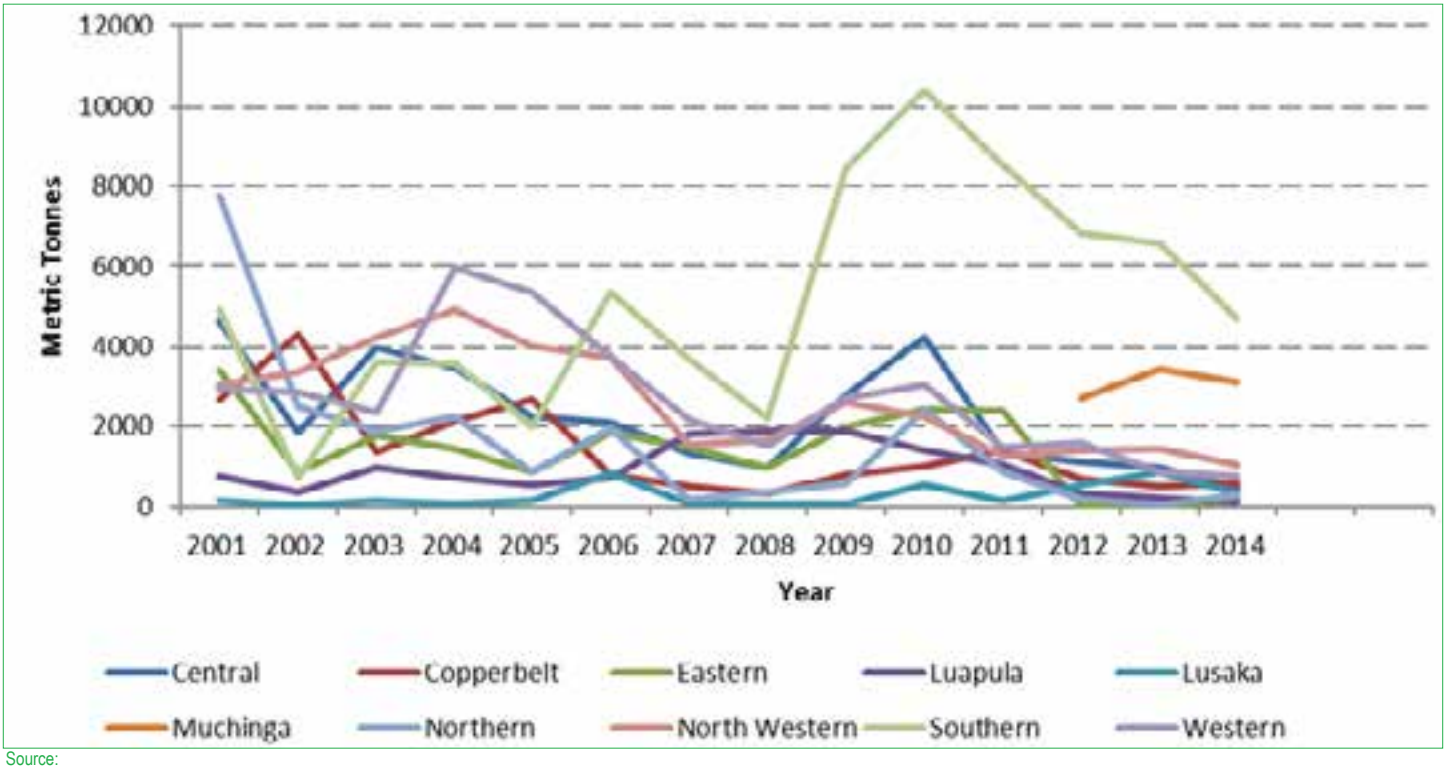
Source:

3.4.1.5.2 Sorghum Production

Figure 3.24 shows production of Sorghum by province, from 2001 to 2014. The figure shows that Southern Province has been the leading producer of sorghum in the country. Sorghum is a drought resistant crop and is able to perform well even when there is no enough rainfall.

Generally, production of sorghum in the country does not seem to increase. This could be due to lack of diversification by farmers.

Figure 3.24: Production of Sorghum by Province, 2001 - 2014

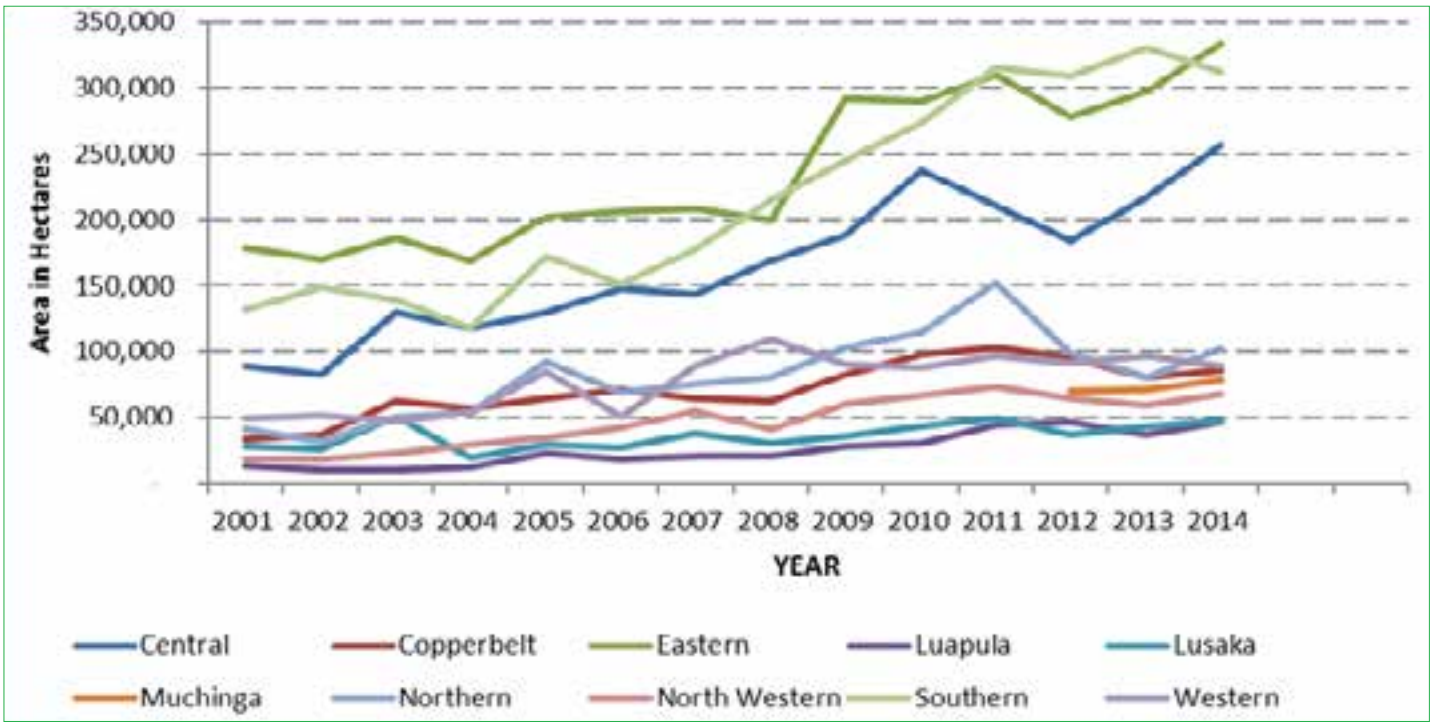


Source:

3.4.1.5.3 Area Planted to Maize

Figure 3.25 shows the area planted to maize by province from 2001 to 2014. The figure shows that over the period under review, Southern, Eastern and Central provinces have been leading in area planted to maize. The area planted to maize in the rest of the provinces has not increased much.

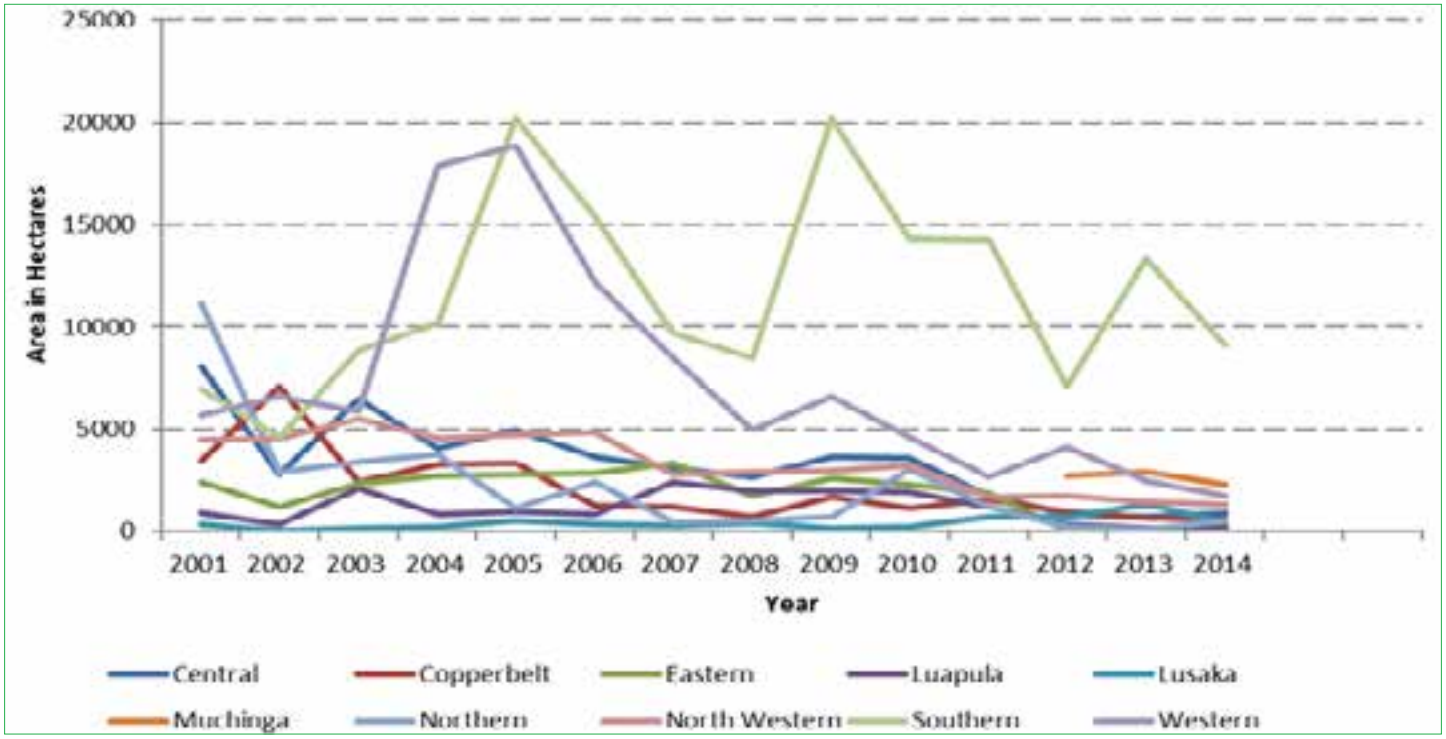
Figure 3.25: Area Planted to Maize by Province, 2001 - 2014



3.4.1.5.4 Area Planted to Sorghum

Figure 3.28 shows the area planted to sorghum by province from 2001 to 2014. The figure shows that over the period under review, Southern and Western provinces were leading in area planted to sorghum. The two provinces have been recording increases in area planted to sorghum over the years while the area planted to sorghum in the rest of the provinces has remained relatively stagnant.

Figure 3.26: Area Planted to Sorghum by Province 2001 - 2014



3.4.1.5.6 Livestock

Table 3.24 shows the number of livestock held on 1st October 2014 by type, category and province. The table shows that a total number of 3,437,618 cattle were held. Southern Province recorded the largest number of cattle with 1,477,023. The smallest number of cattle was recorded in Luapula Province with 14,942 cattle.

The total number of pigs in the country was estimated at 1,052,443 as at 1st October 2014. The largest number of pigs was reported in Eastern Province with 491,525 while Luapula Province reported the smallest number of pigs with 27,635.

The number of goats raised in the country on 1st October 2014 was 2,698,243 At provincial level, Southern Province recorded the largest number of goats in the country with 920,146. Western Province recorded the smallest number of goats with 34,534.

Sheep are not very common in Zambia. A total of 144,412 Sheep were raised countrywide as at 1st October 2014. Southern Province had an estimated 68,425 sheep while only an estimated 198 were recorded in Western Province.

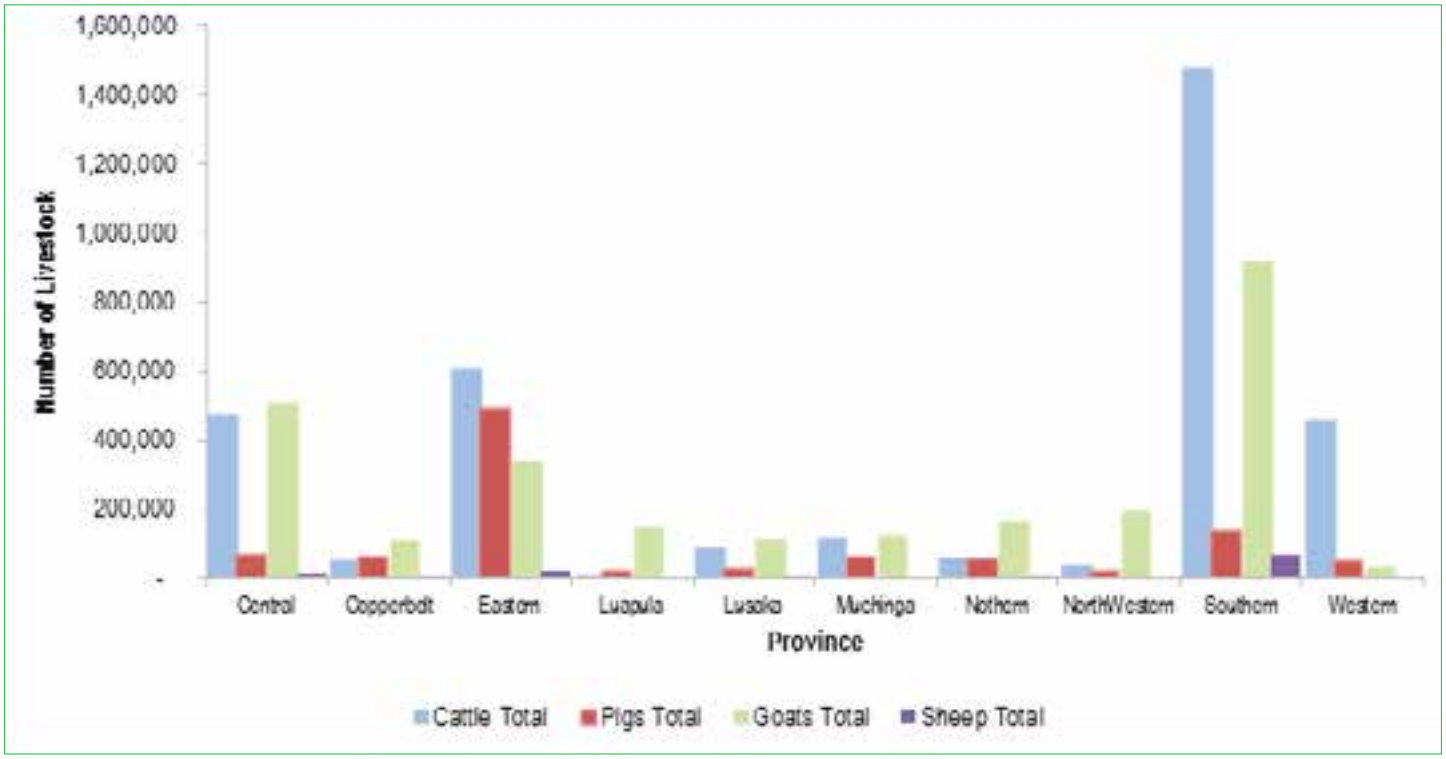
Table 3.24: Livestock held on 1st October 2014 by type, Category and Province

Province	Livestock Type											
	Cattle			Pigs			Goats			Sheep		
	LS	SM	Total	LS	SM	Total	LS	SM	Total	LS	SM	Total
Central	48,296	426,101	474,397	6,039	68,630	74,669	5,457	509,018	514,475	2,378	11,541	13,919
Copperbelt	21,100	40,944	62,044	7,633	62,383	70,016	2,980	111,467	114,447	2,304	5,118	7,422
Eastern	3,376	608,652	612,028	379	491,146	491,525	961	342,731	343,692	508	22,825	23,333
Luapula	1,033	13,909	14,942	49	27,586	27,635	294	156,642	156,936	124	3,850	3,974
Lusaka	16,509	81,767	98,276	4,540	26,023	30,563	1,128	118,291	119,419	2,316	7,669	9,985
Muchinga	1,115	121,975	123,090	269	67,215	67,484	173	131,171	131,344	.	3,567	3,567
Nothern	735	65,411	66,146	1,019	59,953	60,972	234	167,119	167,353	24	7,550	7,574
NorthWestern	369	45,403	45,772	85	27,555	27,640	165	195,732	195,897	210	5,807	6,017
Southern	82,626	1,394,397	1,477,023	13,908	128,637	142,545	7,523	912,623	920,146	6,232	62,193	68,425
Western	764	463,136	463,900	83	59,310	59,393	72	34,462	34,534	15	183	198
National Total	175,923	3,261,695	3,437,618	34,005	1,018,438	1,052,443	18,987	2,679,256	2,698,243	14,109	130,303	144,412

LS : Large-scale
SM: Small and Medium scale
Source:

Figure 3.27 shows number of livestock held by type of livestock and by province. The figure shows that Southern Province in Livestock production followed by Eastern, Central and Western provinces.

Figure 3.27: Livestock held on 1 October 2014 by Type and Province



3.5.1 Land

3.5.1.1 Land-Use Categories

In Zambia, land is used for different purposes. The table below shows various categories of land use. Agricultural land takes into account arable land, land under permanentcrops, meadows and pastures, including fallow and other agricultural land not listed. Simlarly, forest and other wooded land is not separated but grouped. However, there is no available remote sensing data for forests and other wooded land especially for years before 1990 due to limitations on the quality of input data that should have been used to generate the required statistics.There is no data available for dry open land with special vegetation cover and open land without or with significant vegetation cover alike.

Table 3.25: Land Use, 1950 - 2005

Category	Unit	1950*	1960*	1970*	1980*	1990*	2000*	2002*	2005
Agricultural land (1) = (2)+(3)	km²		192,585	198,740	198,460	231,680	224,980	226,160	-
Arable land (2)	km²	-	25,490	27,630	23,320	28,910	28,160	25,820	-
Land under permanent meadows and pastures (3)	km²	-	-	-	-	-	-	-	3610.26
Forest and other wooded land (4) = (5)+(6)	km²	-	-	-	-	514,446	477,422	477,404	500,282
Built-up and related land (7)[1]	km²	-	-	-	-	-	-	-	81,322
Wet open land (8)	km²	16,978	16,978	16,978	16,978	16,978	16,978	16,978	16,978
Dry open land with special vegetation cover (9)	km²	-	-	-	-	-	-	-	-
Open land without, or with insignificant, vegetation cover (10)	km²	-	-	-	-	-	-	-	-
Total land area (11) = (1)+(4)+(7)+(8)+(9)+ (10)	km²	743,394	743,394	743,394	743,394	743,394	743,394	743,394	743,394
Waters (12)	km²	9,220.00	9,220.00	9,220.00	9,220.00	9,220.00	9,220.00	9,220.00	9,220.00
Total area of the country (13) = (11)+(12)	km²	752,614.00	752,614.00	752,614.00	752,614.00	752,614.00	752,614.00	752,614.00	752,614.00
Built area was calculated as settlement land in urban and rural area									
Source: Department of Forestry									

3.5.1.2 Use of Forest Land

3.5.1.2.1 Deforestation and Reforestation

Based on the land-cover change map for the years between 1990 and 2000, 2000 and 2010; 2010 and 2014, the official annual deforestation rate for Zambia is estimated to be 789.16 km² or 0.17 percent of the forested land in the base of 480,386 km2. This was calculated over a period of 24 years at an overall map accuracy of 85.65 percent based on the mapping unit of 0.5ha. The rate of deforestation is never constant, but fluctuates overtime depending on different social economic activities.

Therefore, it is sufficed to say that Zambia's deforestation rate is in the range of 357 to 1,881 km² per year. Figure 3.30 shows an annualized deforestation rate between the time intervals under review and not a constant forest cover loss in each year. The trend in the loss of forest cover was more pronounced between 2000 and 2010 as compared to other intervals due to national circumstances that triggered the underlying causes of deforestation across the country. These are broader economic, political, cultural, demographic and technological forces that underpin proximate or direct causes of deforestation which severely affected the forestry sector. They include macro-level variables and policy instruments that are beyond the control of deforestation agents.

Figure 3.28: Annualized Deforestation Rate, 1990 - 2014

Source: Land cover change detection analysis wall-wall remote sensing mapping, Forestry Department, 2015

Figure 3.29: Deforestation Trend by Province, 2014

Source: Land cover change detection analysis using wall-to-wall remote sensing mapping, Forestry Department, 2015

Deforestation occurs when trees on a forested land are cleared and subsequently the cleared piece of land is transformed into another land-use (i.e. cultivated, mining, built-up and bare-land); while the change of species richness, composition or biodiversity alteration in a forest stand which negatively affects the natural ecosystem productivity is referred to as forest degradation. The Forest Act No: 4 of 2015 defines a forest "as any land with a tree canopy cover of more than 10 percent and area of more than 0.5 hectares and includes young stands that have not yet reached, but are expected to reach, a crown density of 10 percent and tree height of 5 meters that are temporarily under stocked areas". Therefore, any human activity or indeed a natural cause that may reduce the canopy cover of trees to less than the threshold in the legal interpretation amounts to deforestation.

3.6.1 Water Resources

Zambia is well endowed with water relative to other countries in southern Africa. The total renewable water resource per capita is estimated at about 8,700 m^3 per person per year. This is well above the the average for Sub-Saharan Africa which stand at 7,000 m^3 per person per year and the global average 8,210 m^3 per person per year (World Bank CWRAS , 2009 (Country Water Resources Assistance Strategy- Managing Water for sustainable growth and poverty reduction, World Bank 2009). There is however, an inherent considerable variability in terms of spatial (between different parts of the country), seasonal and annual occurrences. The consequence of these variances are recurrent 'water shocks' in the form of droughts and floods. Global Circulation Models of climate change predict that over the next 20 to 30 years, Zambia will experience increasing temperatures with longer dry periods, more intense rainfall and increased storm events.

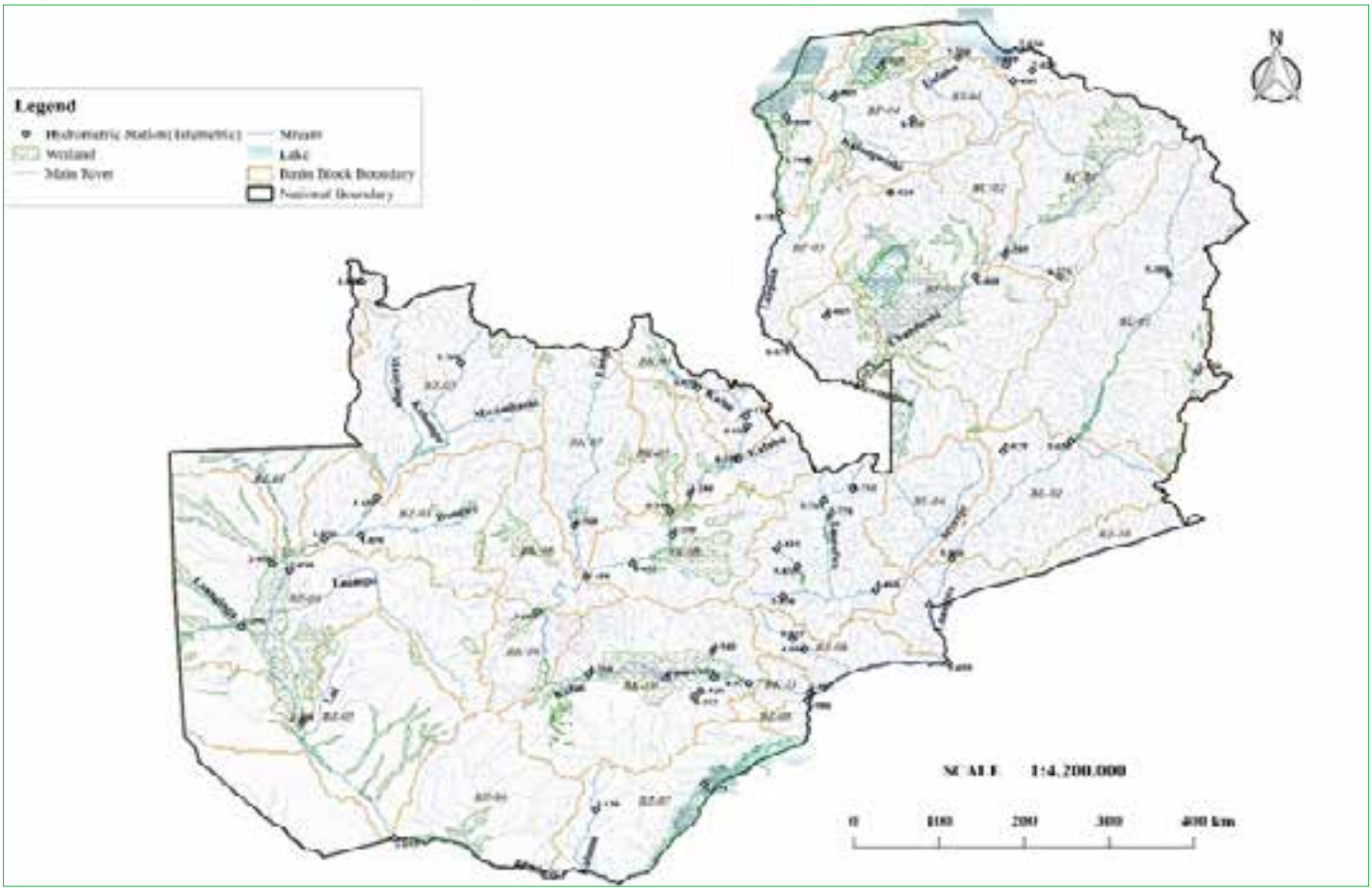
3.6.1.1 Renewable Freshwater Resources

The total renewable water resources of Zambia amount to about 105 km^3 per year, of which about 80 km^3 are produced internally. The Country has two main out -flows which are the Zambezi and the Luapula River. The main stem of the Zambezi River is the only river within Zambia that derives any significant contributions from outside the national territory. However, it is important to note that the river originally originates from Zambia in the Kalene Hills and flows into Angola before emerging into Zambian territory at Chavuma district. All of the internal runoff is shared by downstream and parallel riparian countries. The other significant inflow is the Luanginga River at Kalabo.

Available water in any particular area depends on how much surface and groundwater is available in rivers, lakes, reservoirs and aquifers.

The Zambian water resources are monitored through hydrometric stations that are spatially placed along strategic places on river channels. The country uses two methods of river gauging; the manual stations where persons record river stage three times a day and automated telemetric stations. Currently, the country has an establishment of 168 gauge stations, 65 of which have been automated and transmit data telemetrically (**See Map 3.2**).

Map 3.2: Zambian Hydrometric Station Map



Source: WARMA, Date: May, 2016

3.6.1.2 Out flows

The Luapula sub basin generates all its waters from inland sources. It's out-flows in the Congo Basin are captured at a station called Luapula River at Kashiba. This station has been upgraded to a telemetric station. Outflow data for the station spans from 2004 to 2007 over this period. The other major outflow is measured at Zambezi River at Chirundu. This flows from a huge catchment area as can be observed in the elevated volumes. The station was picked to avoid data noises due to back-flow that occurs at Zambezi River at Feira owing to the Carbora Basa dam. The third outflow is measured at Luangwa River at Luangwa Bridge. The outflows from these stations are tabulated in the Table 3.33.Clearly, the challenge of data gaps appears at this stage and sooner or later, a sustainable solution is needed for this data.

The cumulative total over the ten years notwithstanding the data gaps was a staggering 21,674,907,000m^3).

Table 3.26: Surface Water Outflows, 2001 - 2012

Year	Zambezi at Chirundu (Million m3)	Luapula at Kashiba (Million m3)	Luangwa at Luangwa Bridge (Million m3)	Zambezi at Kaleni (Million m3)	Cumulative total (Million m3)
2001	-	-	1285	13.7	1298.775
2002	-	-	682.9	18.7	2000.3
2003	-	-	401	18.1	2419.5
2004	-	449.8	364	17.7	3251.1
2005	1903	152.5	892.8	18.1	6217
2006	1848	242.6	928.8	17.7	9254.8
2007	1511	224.5	644.2	19.4	11653.9
2008	1895	-	7.74	18	13574.7
2009	2019	-	-	16	15609.8
2010	1666	-	-	19	17294.8
2011	1727	-	550.8	17.76	19590.4
2012	1727	-	339.7	17.7	21674.9

Source: WARMA

3.6.1.3 Inflows

As displayed in table (table containing catchment areas), almost all water resources in Zambia are generated from precipitation save for the Luanginga which flows from Angola and the Chobe River which flows from Botswana into the Zambezi. However, the Chobe River is considered to be an influent river which instead collects flood waters from the Zambezi at peak hours and its minimal contribution has not been documented. The other 'inflow' is the Zambezi at Chavuma District. Again, this inflow originates from Zambian territory in the Kaleni hills in North-western Zambia, enters Angolan territory before reappearing in Zambia at Chavuma town. Therefore, only the inflow at Chavuma is taken into consideration.

Table 3.27: Surface Water Inflows, 2001 - 2012

Year	Zambezi at Chavuma (Million m3)	Luanginga River at Kalabo (Million m^3)	Cumulative Total (Million m^3)
2001	561.9	42.1	603.9
2002	523.9	49.2	1177.1
2003	550.0	14.8	1741.9
2004	548.4	54.1	2344.4
2005	502.9	25.6	2872.9
2006	523.6	43.3	3439.9
2007	570.9	49.5	4060.2
2008	533.2	45.9	4639.3
2009	560.8	47.8	5247.9
2010	595.4	50.6	5893.8
2011	598.1	57.3	6549.1
2012	553.6	49.9	7152.6

Source: HYDSTRA database, WARMA, June 2016

Using the rule of thumb on the data available, it can be noted that about only 24.8 percent of renewable fresh water comes from outside of Zambia while a whopping 75.2 percent is generated locally. This places at a competitively advantaged position in terms of water security.

Table 3.28: Precipitation, Actual Evapotranspiration and Internal Flow, 2001 - 2012

Line	Category	Unit	Long term annual average	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1	Precipitation	mio m3/y	943.6	1023.2	844.6	953.2	1033.4	759.2	1010.8	1036.1	1019.9	1002.2	1008.8	890.4	1033.9
2	Actual evapotranspiration	mio m3/y	39	43.5	40.8	41.3	40.4	44.9	42.1	43.2	44.6	43.9	43.9	43.9	44.4
3	Internal flow (=1-2)	mio m3/y	904.6	979.7	803.8	911.9	993	714.3	968.7	992.9	975.3	958.3	964.9	846.5	989.5

Source:

Effective Precipitation is the amount of precipitation that is actually stored in the soil i.e. the difference between the actual precipitation and the evapotranspiration. As with total rainfall, effective rainfall is expressed in height (in millimetres) related to a unit of time or in volume (m3 per year). The annual precipitation for Zambia from 2001 to 2012 was higher than 943.6mm which is the long term average calculated over a period of more than 30years except for the years 2002, 2005 and 2011. In terms of the actual evapotranspiration, the period 2001 to 2012 saw a general increase in the annual rate of evaporation as compared to the long term average. The highest deviation from the normal was about 15% in the year 2005 which recorded the lowest annual rainfall and therefore had the lowest annual average inflow or effective rainfall of about 714.3m^3/y, a 21 % deficit form the average annual total of 904.6m^3/y.

3.6.1.4 Groundwater

Groundwater resources have been a very important resource both for human consumption as well as ecosystem support. As stated earlier, Zambia experiences one rainy season in a year from around November to around March/ April the following year. This leaves the country with no precipitation in-between those months. However, many rivers and streams are perennial due to the contribution of groundwater from base flow. Groundwater also serves as an immediate resource for rural populations as well as a source of water for municipal water supplies across the country. While groundwater occurrence and importance has been acknowledged in all sectors of the country, there has been no legal framework for its regulation from the time the country was colonized up until 2011 when the country reclassified groundwater as public water and hence amenable to regulation. It is this regulation that will provide the much needed information on groundwater abstraction and use. The country is now in the process of developing subsidiary groundwater regulation that will enforce the Water Resources Management (WRM) Act No. 21 of 2011. This report however, shall discuss some groundwater data that has been collected either by virtue of ongoing groundwater projects or start up activities by the government agency - Water Resources Management Authority (WARMA) responsible.

The Zambian law now provides for registration of all boreholes. This is a process that has been embarked on by WARMA. The water agency currently has currently records of up to 16,000 groundwater points, 3,000 of which are not georeferenced. These are records for both commercial and domestic purposes. There are other databases held at the Ministry of Local Government and Housing which will be brought into the national groundwater system over the next few months.

Groundwater development has been an ongoing process in Zambia. The absence of regulation created an environment of unregulated abstractions and hence scanty data is available. Map 3.2 shows a map created from the current database on water points but this could be more as more data is yet to be picked.

Groundwater aquifers in Zambia is mainly composed of the carbonate, alluvial and schist aquifers. The carbonate aquifers are usually highly productive and form an important source domestic and industrial water supply. These aquifers are part of the kundelungu geological formation and span from the Copperbelt though to Lusaka plateau following the famous Lufilian Arc orientation. . The dolomite aquifer is generally unconfined with preferential horizontal flow direction. Most of the karsts are developed between 50 -90m below ground. The degree of fracturing and Karstification is progressively diminished below 90m above ground. This restricts significant flow process of groundwater below this depth. Transmissivities within the Kabwe dolomite range from 1100 to 4500m2/d). This scenario repeats itself in the carbonate rocks of Lusaka and Mpongwe. (Jones et al 1972 (Toepfer K. D. and Jones M. J. (1972): Groundwater resources of the Kabwe Area with Geophysical notes, p 1 -70. Kabwe).

Zambia also boasts of vast stretches of alluvial aquifers indicated in the map. These are mainly found along on the banks of existing river channels as well as old river channels. Typical examples are the Barotse flood plains in the western part of Zambia, the Kafue flats and the Luapula basin in the North-western part of Zambia.

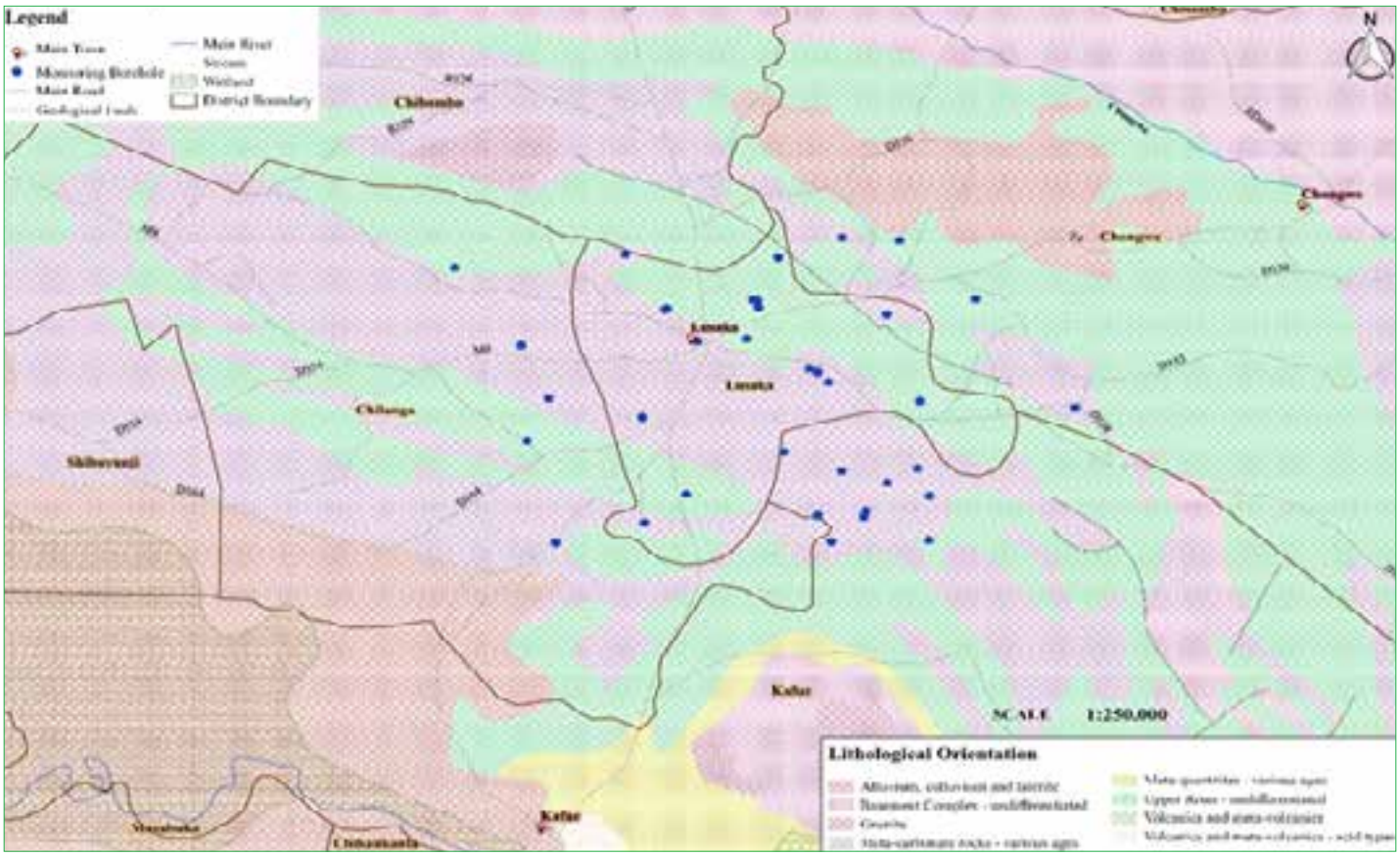
The schist aquifers are subordinate aquifers and are known to be generally poor in terms of water resources production. Geologically, the composition is mostly Schists, Phylites and shales of the Lower Roan formation series. It is a thick sequence which follows the basal group with no marked unconformity. It also exhibits common stripes of quartz veins. As mentioned earlier in-situ chemical weathering since the mid tertiary peneplanation has produced a thick saprolite layer from these rocks.

In some areas, the schist aquifers are composed of Feld spathic granitic gneiss with minor schists. This is a basement complex which is an unconformity. It is of Precambrian age with an isotope dating of 1200 to 3000 million years.

3.6.1.5 Groundwater Monitoring

Groundwater monitoring in Zambia is done using manual and data logging system. Currently, the country has an established network for Lusaka region and the upper Kafue catchment. The Lusaka groundwater network monitors water table and is spatially distributed as indicated in Map 3.3 below.

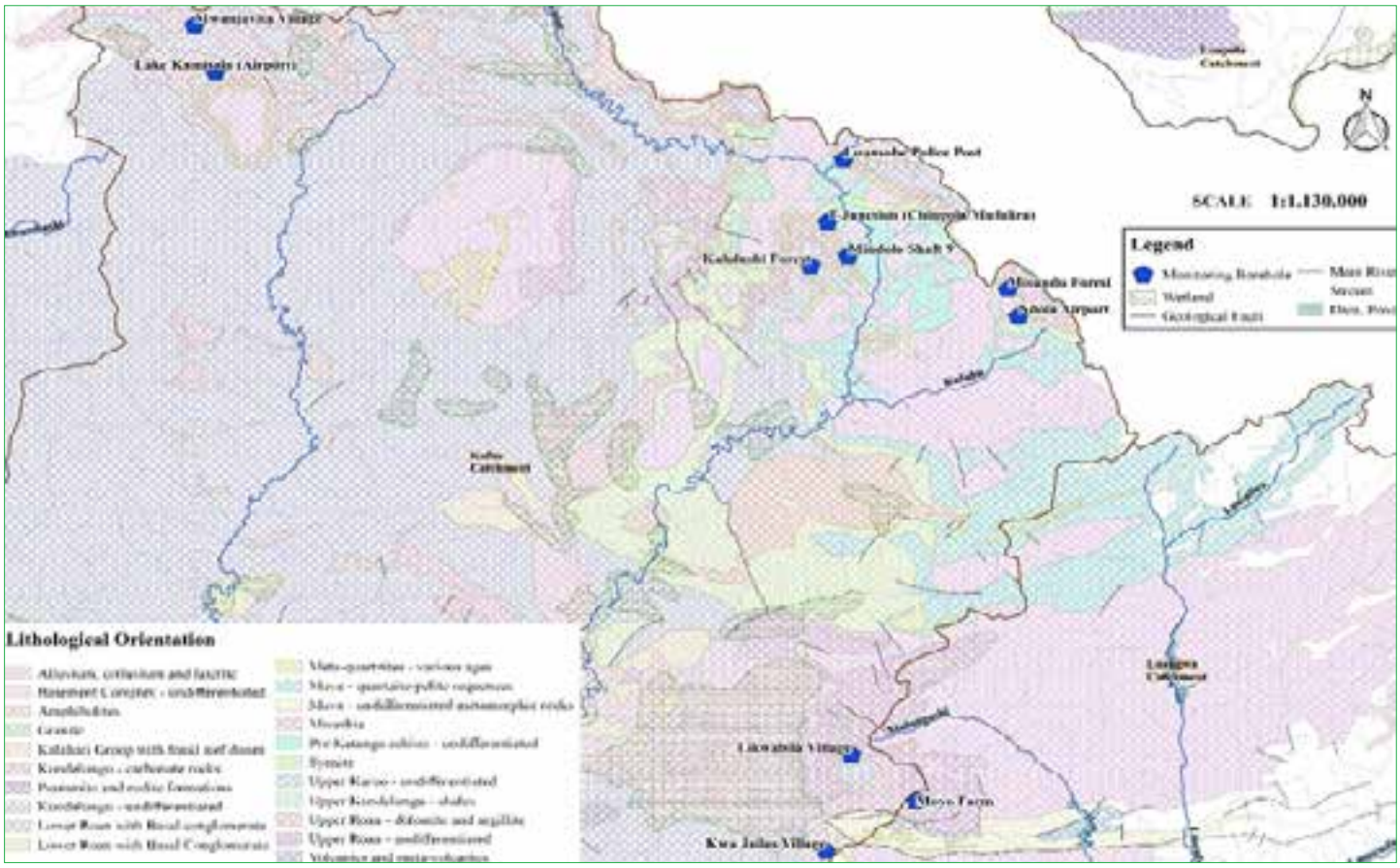
Map 3.3: Distribution of the Lusaka Groundwater Monitoring Network



Source:

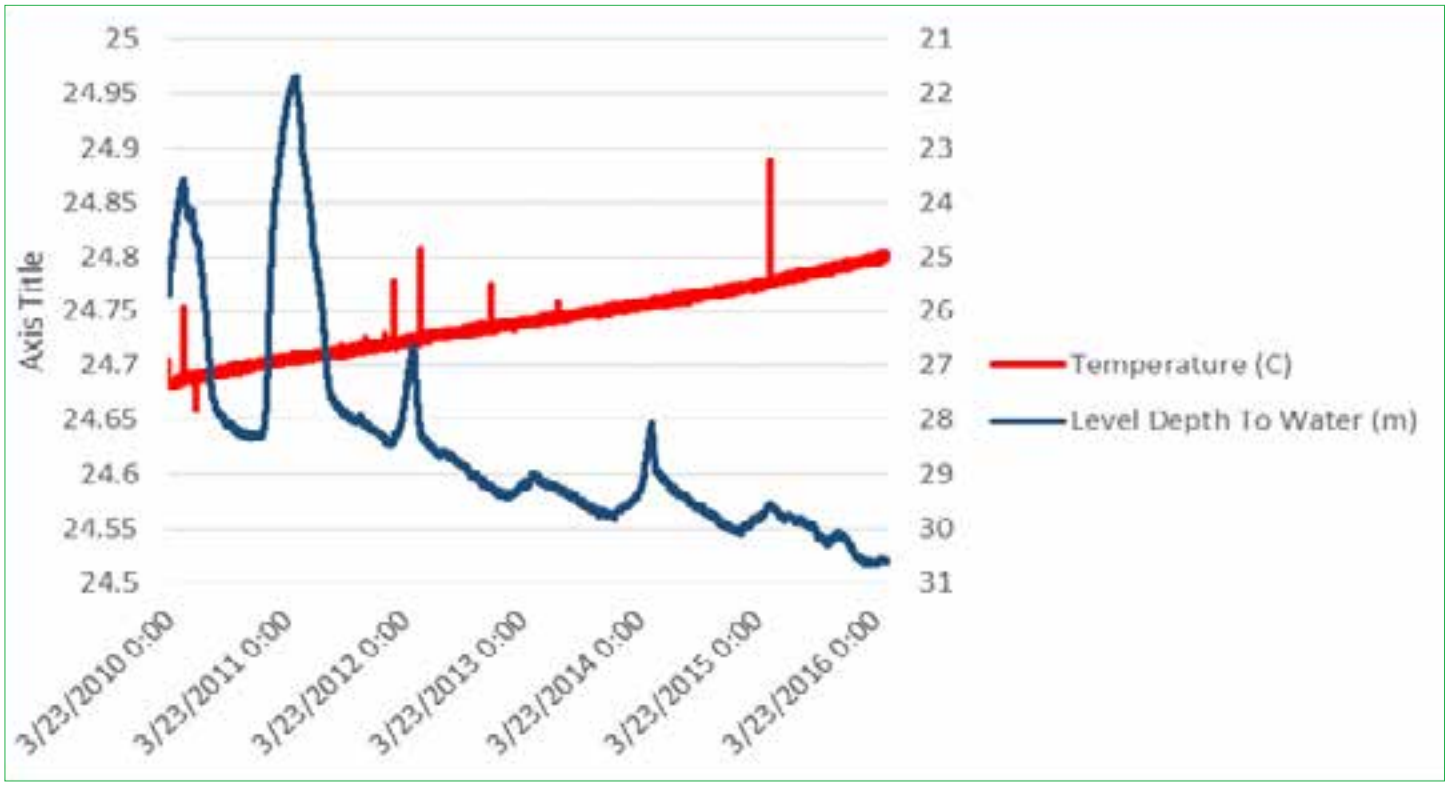
WARMA has now embarked on expanding the groundwater monitoring network. The initial phase involved the drilling 11 deep wells in the upper Kafue catchment and installing data loggers. The loggers will record water levels, temperature, Electrical Conductivity, salinity and Total Dissolved solids. This data collection has been ongoing since December 2016. Map 3.4 shows the location of the new monitoring wells.

Map 3.4: Monitoring Stations for Newly Drilled Groundwater Monitoring Boreholes



The water levels measured so far indicate that groundwater in Lusaka has been on a decline. A typical example is the Chinyanja basic school sitting at 30km west of Lusaka. Figure 3.34 depicts this scenario.

Figure 3.30: Chinyanja Station Temp/Water Level VS Time



Source:

3.6.1.6 Freshwater Abstraction and Use

Fresh water is finite and vulnerable resource, essential to sustain life, development and the environment Water has an economic value in all its competing uses and should be recognised as an economic good that is the reason why WARMA was established in order to manage the resource on behalf of the Zambian people. The data provided in this report is based on the Water Permitting System at WARMA on volumes that were granted to water users for different categories and use. These categories are; Irrigation and Livestock, Hydropower, Mining, Industrials and Municipal Water Supply. The figures indicated 2001 is cumulative starting from the time the Water Board started to grant water rights around 1977. As tabulated in the figure below the volume abstracted is increasing upwards as more applicants were granted the Water Permits to abstract fresh surface water. Between 2011 and 2012 there has been a sharp increase in the abstraction of water of about 340 percent. The increment is due to the increase in social activities that depends on water and other aspect is due to the increase in the capture of data into the Water Permit System. It is important to also note that Groundwater data is scanty because this is the new area of regulation for the country. However, attempt will be made to make data available as and when it is possible.

3.6.1.7 Freshwater Abstractions for Municipal Town Water Supplies

The country currently has eleven commercial utilities that provide municipal water services. The water is used for domestic and industrial use. Due to the absence of groundwater regulation, it was not possible to determine self-supply of groundwater by industry or domestic customers. Analysis of the annual abstractions of ground and surface water shows that the abstractions peaked around 2011 and 2010 (around 370,000,000m3) while 2006 recorded the least production (Source NWASCO, June 2015). (NWASCO National Sector Report, June 2015).

Table 3.29 (a): Freshwater Abstraction ('000,000m3) by Commercial Water Utilities, 2006 - 2015

	2007				2006			
	Total	SW	GW	Loss	Total	SW	GW	Loss
CHWSC	13.6	13.6	0	2.58	9.943	9.943	0	1.406
EWSC	3.186	3.186	0	0.52	3.026	3.026	0	0.343
KWSC	62.168	37.919	24.249	10.4	51.649	29.715	21.934	9.56
LGWS	20.339	20.339	0	2.644	0	0	0	0
LPWSC	0	0	0	0	0	0	0	0
LWSC	80.067	34.324	45.743	7.9	78.881	34.24	44.641	7.9
MWSC	44.739	31.483	13.256	4.946	26.3	16.76	9.54	0.785
NWSC	90.978	78.835	12.143	4.338	121.224	99.176	22.048	4.7
NWWSC	3.406	2.122	1.284	0.17	3.349	2.048	1.301	0.139
SWSC	19.483	18.085	1.398	1.196	18.66	17.919	0.741	1.598
WWSC	5.459	1.747	3.712	0	6.127	1.744	4.383	0
Total	343.425	241.64	101.785	34.694	319.159	214.571	104.588	26.431

Source:

Table 3.29 (b): Freshwater Abstraction ('000,000m3) by Commercial Water Utilities, 2006 - 2015 (Continued)

	2011				2010				2009				2008			
	Total	SW	GW	Loss	Total	SW	GW	Loss	Total	SW	GW	Loss	Total	SW	GW	Loss
CHWSC	16.021	15.415	0.606	0.601	14.429	13.89	0.539	1.075	14.448	12.356	0.092	0.68	19.088	19.088	0	0.954
EWSC	5.093	4.043	1.05	0.065	6.159	5.2	0.959	0.619	5.752	4.938	0.814	0	3.303	3.303	0	0.347
KWSC	67.131	45.618	21.513	7	61.77	43.18	18.59	6.5	59.238	43.371	15.867	6	65.01	41.474	23.536	5.728
LGWS	27.38	14.58	12.8	1.37	24.793	14.881	9.912	7.44	29.394	16.405	12.989	10.441	16.258	10.043	6.215	3.896
LPWSC	3.725	3.587	0.138	0.102	3.956	3.61	0.346	0.346	0	0	0	0	0	0	0	0
LWSC	98.522	46.202	52.32	0	98.593	45.242	53.351	3.352	95.23	47	48.23	1.419	88.006	42.715	45.291	1.67
MWSC	67.022	37.292	29.73	5.926	71.353	43.563	27.79	7.355	68.404	37.518	30.886	8.197	74.68	41.1	33.58	8.877
NWSC	54.094	54.094	0	2.16	57.334	57.334	0	1.56	60.298	58.346	1.952	2.212	63.713	61.423	2.29	2.077
NWWSC	4.393	1.491	2.902	0.525	4.389	1.571	2.818	0.571	3.989	2.484	1.505	0.423	3.859	2.855	1.004	0.34
SWSC	20.584	19.312	1.272	2.433	23.54	22.469	1.071	1.775	23.185	22.236	0.949	2.138	17.901	16.937	0.964	1.87
WWSC	6.761	2.529	4.232	0	7.552	4.777	2.775	3.385	7.62	2.47	5.15	0	6.237	1.827	4.41	0
Total	370.726	244.163	126.563	20.182	373.868	255.717	118.151	33.978	367.558	247.124	118.434	31.51	358.055	240.765	117.29	25.759

Source:

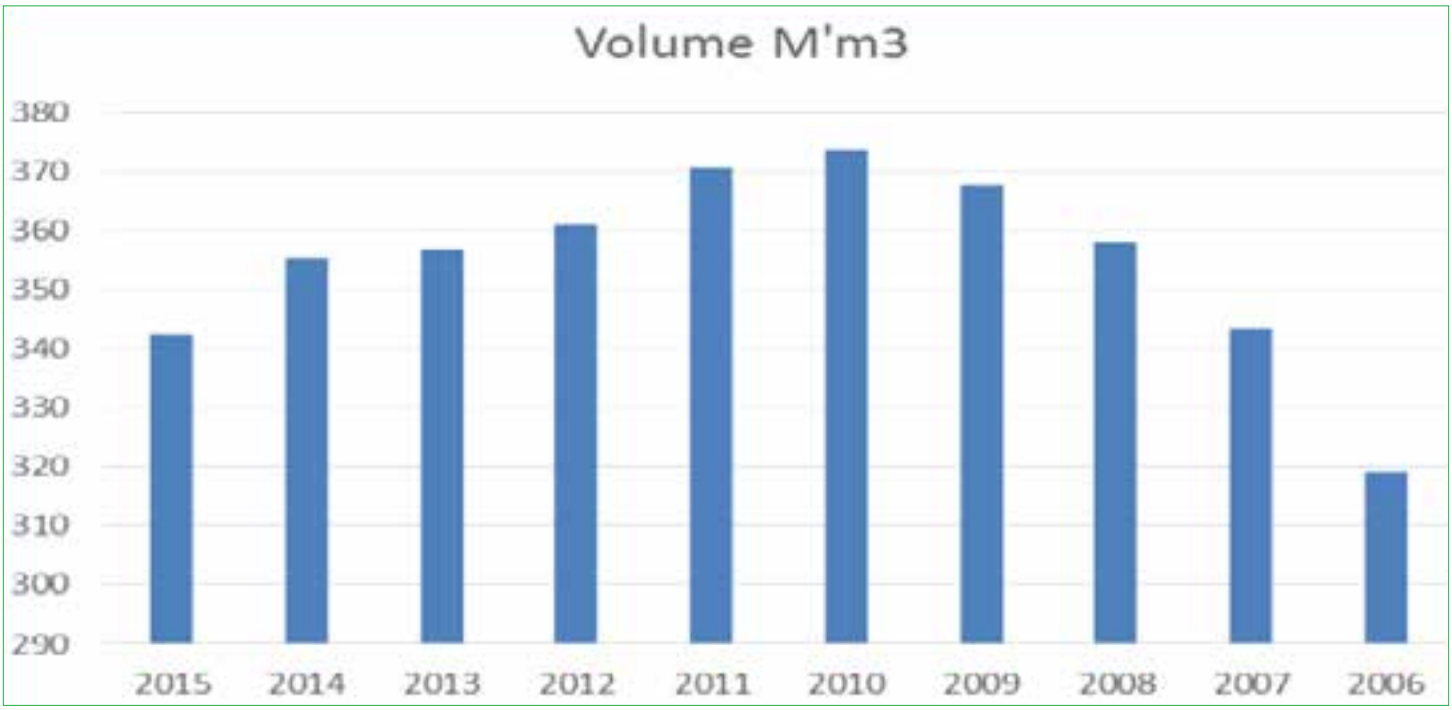
Table 3.29 (c): Freshwater Abstraction ('000,000m3) by Commercial Water Utilities, 2006 - 2015

	2015				2014				2013				2012			
	Total	SW	GW	Loss	Total	SW	GW	Loss	Total	SW	GW	Loss	Total	SW	GW	Loss
CHWSC	12.57	12.26	0.31	1.94	13.23	13.18	0.05	5.8	13.41	13.09	0.32	1.267	12.25	11.9	0.35	0.65
EWSC	5.365	4.049	1.316	0.539	5.906	4.399	1.507	0.45	5.566	4.453	1.113	0.265	5.694	4.582	1.112	0.539
KWSC	71.083	45.337	25.746	7.1	73.444	49.445	23.999	7	67.669	48.076	19.593	6.5	57.374	37.521	19.853	6.5
LGWS	15.59	5.927	9.663	0.296	18.68	5.667	13.013	0.283	21.4	5.104	16.296	1.082	26.27	14.32	11.95	1.314
LPWSC	3.161	2.53	0.631	0.078	3.92	3.02	0.9	0.078	4.175	3.189	0.986	0.128	4.044	3.729	0.315	0.098
LWSC	84.554	44.197	40.357	3.164	90.277	36.168	54.109	0	99.037	46.898	52.139	0	98.798	47.142	51.656	0
MWSC	55.173	27.276	27.897	2.455	61.689	35.384	26.305	5.088	62.303	36.525	25.778	4.073	68.645	40.275	28.37	6.384
NWSC	61.435	61.234	0.201	3.567	55.45	55.218	0.232	2.124	50.688	50.674	0.014	2.032	52.68	52.575	0.105	2.35
NWWSC	5.535	3.211	2.324	0.425	5.373	3.173	2.2	0.47	5.045	2.928	2.117	0.474	4.745	1.524	3.221	0.514
SWSC	21.214	19.925	1.289	2.271	18.008	16.556	1.452	1.908	17.804	16.707	1.097	1.333	20.288	19.054	1.234	2.521
WWSC	6.841	2.982	3.859	0.83	9.347	3.763	5.584	2.299	9.754	3.241	6.513	0	10.313	3.596	6.717	1.265
Total	342.521	228.928	113.593	22.665	355.324	225.973	129.351	25.5	356.851	230.885	125.966	17.154	361.101	236.218	124.883	22.135

Source:

Figure 3.31 below shows the abstractiontrends between 2006 and 2015 for all the commercial utilities.

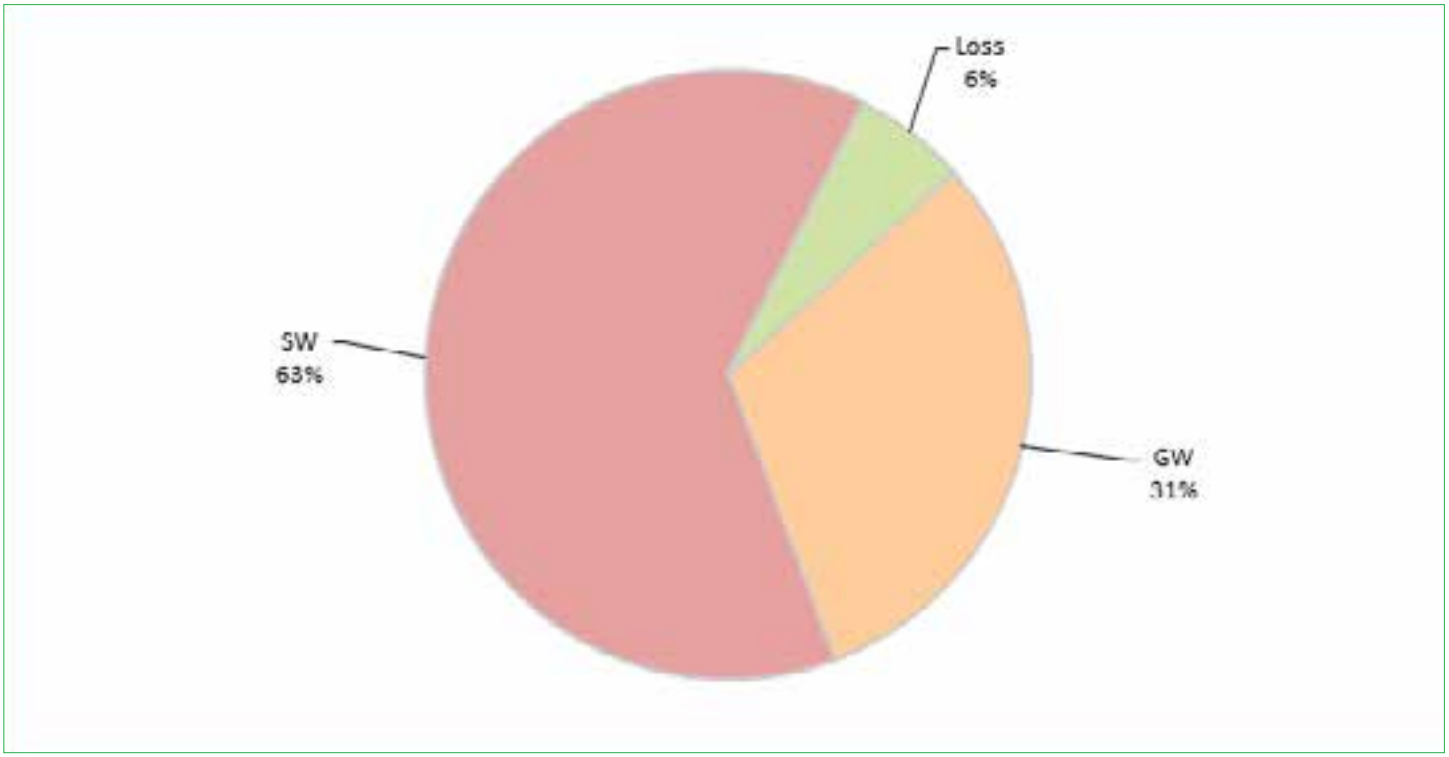
Figure 3.31: Total Quantity of Freshwater Abstracted by Commercial Water UtilitiesAnnually



Source: NWASCO National Sector Report, June 2015

Analysis of data also shows that groundwater accounts for around 30 percent of the abstractions while water losses ranged between 6 percent and 9 percent. Figure 3.36 displays this example.

Figure 3.32: Abstraction Ratio of Raw Water from Commercial Utilities, 2015



3.6.1.8 Water Supply Industries (ISIC 36)

The water supply and sanitation (WSS) sub-sector is divided into two, urban and rural. The urban subsector is predominantly serviced by Commercial Water Utilities (CUs) through reticulated systems. The CUs are joint ventures of local authorities but are privately registered as commercial entities, most of which operate at provincial scale. On the other hand, the rural segment is serviced mainly through community managed borehole schemes that are supported by local government structures.

The focus of this section is on the urban and peri-urban segments where CUs operate. According to CSO (2010), the urban population accounted for 39 percent of the country's total population. Population projections at 2015 put the urban population at about 6.27 million people of which 5.23 million (83.5 percent) people accessed treated piped water supplies. The access rates have been growing steadily over the years from an average of 67 percent in 2005 to 83.5 percent in 2015.

As regards water abstraction and treatment for urban supplies, over 60 percent of all water treated and supplied comes from surface water sources. The water industry had seen a steady rise in treated water volumes up to about 2012 when the trend began reversing. The negative trend could be attributed to partial droughts that the country has been experiencing. Table 3.37 shows the treated water volumes by source of abstraction from 2006 to 2015.

Table 3.30: Treated Water Volumes by Source, 2006 - 2015

Yr/ water source (million m3)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Surface water	211.9	227.1	217.8	223.3	235.7	227.6	217.6	200.1	205.7	212.1
Ground water	104.4	91.2	101.5	118.9	115.0	124.2	118.7	127.8	127.2	107.9
Total	316.3	318.3	319.3	342.2	350.7	351.8	336.3	327.9	332.9	320.0

Source: NWASCO National Sector Report, June 2015

Chapter 4: RESIDUALS

4.0 Introduction

This chapter presents information on Environmental Residuals. The covered residues are Emissions to Air and Generation and Management of Wastewater.

4.1 Environmental Residuals

4.1.1 Emissions of Greenhouse Gases

Zambia, as a Party to the United Nations Framework Convention on Climate Change (UNFCCC), periodically reports to the Convention on the status of implementation of the Convention through the National Communication Reports that highlight the status of GHG emissions and responses the country undertakes to reduce emissions. The Initial National Communication was prepared and published in 1994, the second in the year 2000 and the country is currently in the process of formulating the third report.

As reported in the second national communication report, the total Greenhouse Gas (GHG) emissions increased by 6.2 percent from 51.52 million tonnes CO2e in 1994 to 54.72 million CO2e in 2000. In the year 2000, the largest contribution to GHG emissions came from Land Use, Land Use Change and Forestry (LULUCF) at 73.7 percent followed by agriculture at 18.9 percent. Energy registered 4.8 percent followed by industrial processes and waste at 1.8 percent and 0.8 percent, respectively. Table 4.1 indicates the contribution of sectors to GHG from 1990 to 2011. By gas, the largest contribution came from carbon dioxide (CO_2) at 65.5 percent, followed by methane (CH_4) and Nitrous Oxide (N_2O) at 23.1 percent and 9.9 percent, respectively. Hydrofluorocarbons (HFCs) and Sulfur hexafluoride (SF6) (SF_6) registered the lowest at 1.5 percent and 0.01 percent, respectively.

Table 4.1: GHG Emissions by Sector ('000' tonnes), 1994 and 2000

Year	Total with LULUCF	Total without LULUCF	Energy	Industrial processes	Agriculture	LULUCF	Waste
1994	51,520	13,354	2,778	2,008	8,198	38,165	371
2000	54,716	14,406	2,629	1,006	10,359	40,310	412

Source: Zambia Second National Communication Report, 2014

In the year 1994, the largest contribution to GHG emissions came from Land Use, Land Use Change and Forestry (LULUCF) was estimated at 74.1 percent followed by agriculture at 15.9 percent. Energy registered 5.4 percent followed by industrial processes and waste at 3.9 percent and 0.7 percent, respectively. By gas, the largest contribution came from CO_2 at 74.2 percent, followed by CH4 and N_2O at 13.2 percent and 9.3 percent, respectively. HFCs and SF_6 registered the lowest at 3.2 percent and 0.01 percent, respectively. Table 4.2 indicates the largest to the least contribution of the total GHG emissions by gas.

Table 4.2: GHG Emissions by Gas (Mt CO2e), 1994 and 2000

Base Year	TOTAL	CO2	CH4	N2O	HFCs	SF6
1994	51,520	38,248	6,793	4,811	1,664	4
2000	54,716	35,810	12,648	5,434	819	4

Source: Zambia Second National Communication Report, 2014

Although Zambia is supposed to submit the national communication reports to the UNFCCC Secretariat every four years, the country faces challenges in submitting on time due to various challenges. These are inadequate financial resources, equipment and human capacity to facilitate the timely collection and reporting on quality GHG data. In this regard, Zambia has recently implemented a project titled; Low Emission Capacity Building Project to develop and implement a low GHG emission, climate resilient programme and to strengthen the country's capacity to address the challenge of climate change.

The project which is funded by the European Union, United Nations Development Programme and other partners aims to put in place a Sustainable National GHG Inventory Management system, develop five (5) Nationally Appropriate Mitigation Actions (NAMAs) in energy, agriculture, industrial processes, waste and transport sectors and to develop a monitoring, verification and reporting (MRV) systems designed to support implementation and evaluation of NAMAs. Zambia has also formulated its Nationally Determined Contribution to the global GHG emission reduction agenda stipulating domestic and external efforts aimed at reducing global levels of GHGs. Zambia will reduce its CO2eq emissions by implementing

three (3) programs driven by the country's Climate Response Strategy and supported by national development policies including energy, forestry, agriculture, water, Town and Country Planning, sanitation, and transport.

In terms of statistics on GHG emissions, the following statistics are collected and compiled for the national communication reports:

- Total $C0_2$ per Capita;
- Total emissions characterised as follows:
- Energy activities (total fuel combustion and total fugitive emissions from fuels);
- Industrial Processes;
- Land use, land use change and forestry;
- Agriculture and;
- Waste

4.1.2 Consumption of Ozone Depleting Substances

Management of environment and natural resources is one of the priority areas of the Zambian Government. Zambia through the Zambia Environmental Management Agency (ZEMA) manages, monitors and protects the environment and natural resources against effects resulting from the modification of ozone layer from the stratospheric air pollution.

Zambia is a low-volume consuming (LVC) country of Ozone Depleting Substances (ODS) whose calculated level of consumption was less than 0.3 kg per capita at 22.12 metric tonnes per year according to the baseline data obtained in 1991. However, with the liberalized economy and the sprouting of new industries and other factors there was an increase in the level of ozone depleting substances consumption.

Currently, with the government measures to control Ozone depleting substances, the consumption trend of ODS is decreasing. For example, the consumption of ODS such as Methyl bromide and Chlorofluorocarbons (CFCs) has decreased from 28 ODP t/yr and 23 ODP t/yr, respectively, in 2000 to zero ODP t/yr in 2013. This is because the country switched to an alternative substance, Hydro chlorofluorocarbon (HCFC), with a low ODP.

The consumption of HCFC rose from 1 ODP t/yr in 2000 to 9 t/yr in 2011; then took on a downward trend, with 8.8 ODP t/yr in 2012 and 5 ODP t/yr in 2013.

Table 4.3: Annual ODS Consumption, 2000 - 2013

ODS Consumption	Unit	ODS Consumption/yr													
ODS Name	ODP Tonnes	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Chlorofluorocarbons (CFCs)	t	23.3	11.8	10.6	10.4	10	9.5	6.6	4.11	2	0	0	0	0	0
Hydrochlorofluorocarbons (HCFCs)	t	1	0.5	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	9.2	9.23	8.8	5
Halons	t	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl chloroform	t	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carbon tetrachloride	t	0.4	0.2	0	0	0	0	0	0	0	0	0	0	0	0
Methyl bromide	t	28.5	14.3	12.6	11.7	11.4	10.2	6	6	4.2	3.2	2	0	0	0
Others	t	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: Ozone Secretariat Data Centre

4.1.3 Gaps, further work and improvement

The GHG data collection and compilation should isolate data on fugitive sources of GHGs rather than treat it as a statistic within the energy sector. This is due to the fact that fugitive sources of GHGs are found in other sectors other than the energy sector.

4.1.4 Generation and Management of Wastewater

4.1.4.1 Wastewater Generation and Treatment

Over 40 percent of all water supplied through the public reticulated systems for domestic, commercial and industrial purposes ends up as wastewater. This wastewater is predominantly treated using offsite mechanized treatment works or stabilization ponds and onsite or small sewer systems connected to septic tanks or bio-digesters. As it is only technically feasible to measure or estimate the volume of sewage collected and treated through public offsite treatment works (i.e. mechanized systems and stabilization ponds), the data presented in this section excludes the wastewater that was treated using onsite systems. Suffice to say, that where flow measuring devices are in a disused state, the treated volume of sewage is estimated from plant capacities.

In 2015, the CUs collected and treated about 148.7million m3 of sewage compared to 153.8 million m3 in 2014. Table 4.4 shows volumes of sewage that was collected and treated by CUs in public treatment works between 2007 and 2015.

Table 4.4: Volume of Sewage collected and treated in Public Wastewater Works, 2007 - 2015

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Volume of collected and treated sewage (million m^3)	115.3	132.1	139.2	142.4	157.1	159.1	152.4	153.8	148.7

Source: NWASCO

4.1.4.2 Population Connected to Wastewater Treatment

In the urban and peri-urban sub-sectors, sanitation access considers only the population serviced by offsite, centralised systems and septic tanks. Access rates have been increasing steadily over the years to 61.4 percent in 2015, translating to about 3.85 million people. Of this serviced population, 45 percent was connected to offsite systems while 55 percent was connected to onsite systems. Table 4.5 shows the sanitation access rates from 2002 to 2015.

(N.B: Urban populations depicted in Tables 4.5 and 4.6 are projected from the CSO 2010 census report and consider operational areas of CUs and therefore, may slightly differ from CSO projections).

Table 4.5: Proportion of Urban Population serviced with Piped Water Supplies, 2002 - 2015

Indicator	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Urban Populat	3,331,376	3,597,877	4,176,859	4,903,529	5,046,420	5,104,741	5,161,450	5,423,722	5,559,343	5,620,358	5,760,541	5,965,575	6,122,284	6,270,425
Total Urban Population Served with Water	2,431,904	2,590,471	2,422,578	3,270,745	3,428,572	3,503,441	3,737,703	4,006,810	4,311,149	4,596,959	4,812,279	5,006,510	5,131,657	5,232,698
National Urban Water Coverage	73.00%	72.00%	58.00%	66.70%	67.90%	68.60%	72.40%	73.90%	77.50%	81.80%	83.50%	83.90%	83.80%	83.50%

Source: Nwasco Information System

Table 4.6: Proportion of Urban Population with access to acceptable Sanitation Facilities, 2002 - 2015

Indicator	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Urban Population	3,331,376	3,597,877	4,176,859	4,903,529	5,046,420	5,104,741	5,161,450	5,423,722	5,559,343	5,620,358	5,760,541	5,965,575	6,122,284	6,270,425
Total Urban Population Served with Sewerage	1,066,040	1,331,214	1,420,132	1,569,129	1,463,462	1,480,375	1,754,893	1,985,082	3,007,605	3,186,743	3,302,408	3,503,804	3,704,470	3,847,996
National Urban Sanitation Coverage	32.0%	37.0%	34.0%	32.0%	29.0%	29.0%	34.0%	36.6%	54.1%	56.7%	57.3%	58.7%	60.5%	61.4%

Source Nwasco Information System

Chapter 5: NATURAL EXTREME EVENTS AND DISASTERS

5.0 Introduction

This chapter covers extreme events and disasters that have adversely affected different sectors of the economy in Zambia. The section further highlights the impact of extreme weather events and disasters on the social sector such as health and education. La Nina in Zambia is characterized with above average rainfall totals (December- March) in many areas, particularly in the Southern half of the country resulting in flooding while El Nino is characterized by below normal rainfall resulting in dry spells or droughts in many parts of the country. According to the analysis of historical data using the Climate Hazards Group Infrared Precipitation with Station data (CHIRPS), the Southern half of the region, excluding eastern South Africa, has more consistently had above- average rains during La Nina events. On other hand parts of Southern, Eastern, Central, Western parts of Zambia have had above normal rains in 2/3 of the last nine El Nino events.

In the last three decades Zambia has experienced a number of extreme events and disasters such as floods, droughts, flash floods, epidemics, dry spells, fire accidents, road traffic accidents, earthquake tremors and landslides. Of the most significant extreme events have been floods, flash floods, droughts, dry spells and epidemics. These extreme and disastrous events have impacted negatively on agriculture and food security, health, education, water and sanitation, infrastructure, nutrition, energy and natural resources. The table below shows that Zambia in the last two years experienced two concurrent dry spells affecting all sectors of the economy with the energy sector being the most hit. Although Zambia has been experiencing extreme events and disasters, what has changed is the frequency and magnitude. In other words the frequency and magnitude of floods and droughts has increased thus increasing the number of affected districts and households.

5.1 Natural Extreme Events and Disasters

When extreme events interact with the fragile environment, facilitated by high levels of vulnerability of our populations, a recipe for a disaster occurrence is created (Disaster Management Manual, 2015). Some of the common hazards include droughts, floods, epidemics, pest infestations, environmental degradation, refugees, internally displaced populations and accidents. Therefore, the matrix below highlights some of the key concepts used in this report and their characteristics.

Table 5.1: Understanding Key Disaster Management Concepts and their Characteristics

Key Disaster Management Concepts	What are they and their Characteristics?
Vulnerability	• Refers to a set of conditions and processes resulting from physical, social, economic and environmental factors which increase the susceptibility of a community to the impact of hazards.
Hazards	• It's a potential source of harm that cause loss and/or harm the community, property and environment
	• They translate into disasters when they interact with vulnerable population or environment.
Disasters	• It is an event that is associated with the impact of ahuman-induced or natural hazard which causes a serious disruption in the functioning of a community or society, causing widespread human, material or environmental losses which exceed the ability of the affected community or society to cope with the hazard using its own resources.
Floods	• A flood is a high flow of water, which overtops either the natural or artificial banks of a river. Floods induce disasters when human settlements have an overflow of water beyond the normal confines and humans are unable to cope with the calamity or when they result in the destruction of crops, social and economic infrastructures.
Epidemics	• Refers to an unusually large or unexpected increase in the number of cases of the disease for a given time, place or period.
Droughts	• This is defined as a period of abnormally dry weather that persists long enough to produce a serious hydrologic imbalance (for example crop damage, water supply shortage, etc). The severity of the drought depends upon the degree of moisture deficiency, the duration and the size of the affected area.

Source: Disaster Management Policy, 2015

5.1.1 Occurrence of Natural Extreme Events and Disasters

In the last 15 years, droughts of varying severity have occurred in 1991-92, 1994-95, 2000-01, and 2001-02 and in addition, annual rainfall in the Southern parts of the country over the last 15 years has been particularly varied. The most affected region by floods and droughts is areas in agro- ecological regional I, the Southern half of the country which include districts in Southern Province, Western Province, Lusaka Province, Eastern and Central Province. Many community in the rural parts of Zambia have been vulnerable to the adverse impacts of climate related disasters.

The impacts of extreme events and disasters differs from place to place due to different adaptive capacity of the people. The number of affected districts and provinces have increased both time and space in the last 30 years thereby having a negative bearing on the economic gains made on the country. Relief distribution has equally increased due to increased caseloads of extreme events and disasters.

5.1.2 Extreme Events and Disaster and Social Impact of Disasters

The impacts of extreme weather events on the social sector cannot be over emphasized due to its impact on infrastructure and the affected population. For instance floods have a negative bearing on both the health and education sector with the former resulting into increased disease burden and thelatter recording increased school drop outs and absenteeism. Disasters can force low income households to withdraw school going children from school and concentrate on income generating activities such as farming and piece work. In case of riverline flooding children may be scared to cross flooded rivers until water recedes and case of droughts school going children especially in rural areas resort to staying due to household food insecurity. From the health perspective extreme weather events are associated with increased malaria cases, diarrhoea and coughs. The assessment has shown that malaria, diarrhoea and respiratory tract infections are still the leading causes of illness in the assessed communities. Increased incidences of respiratory tract infections are closely linked to extreme temperatures.

The findings from the 2016 In-depth and Vulnerability Assessment showed that there is a high proportion of stunting in under five children. The survey further showed that from the nutrition perspective 49.5 percent of the children had stunting was while 14.7 percent were under weight. On education, the numbers of children absent from school due to the effects of two years prolonged dry spell did not show a significant change. However, there was a possibility that the trend could change if appropriate interventions are not put in place to reduce the withdrawal of children to handle household chores which include looking for food during hunger peaks and caring for the sick.

Table 5.2 below shows that over the last 15 years, Zambia has been negatively impacted by floods, dry spells, droughts and flash floods. The table further shows that the major hazards affecting both rural and urban communities are flood and dry spells resulting into food insecirity, malnutrition, water borne diseases and infrastructure destruction. According to the 2006 Indepth and Vulnerability Assessment Report, 2005 was the worst year were 1,234,667 households were reported to be food insecure compared to other years under review. According to table 5.2, shows that the flood of 2008 affected about 625,460 households.

Table 5.2: Population Affected by Extreme Weather Events and Disasters in Zambia, by Province 2003 - 2016

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Hazard	Drought		Drought		Floods	Floods	Floods	Flash Floods	Floods	Floods/ Dry Spells	Dry Spells	Floods	Dry Spells	Dry Spells
Central		-	277,632	-		32,232	18,174	3,258	11,048		53,637		4,573	12,063
Copperbelt		-		-		23,582								
Eastern	10,349	-	118,643	-		32,352		9,800	1,946	10,661		26,461	60,498	32,498
Lusaka	2,655	-	49,677	-		211,066		3,753	3,054		19,016			8,967
Luapula		-		-		9,024					18,094	3,436		
Southern	46,935	-	429,132	-		130,086		19,024	12,825	47,097	87,490			75,366
North Western		-	23,774	-	71548	14,490	67,115	2,445	4,470	5,084		748	5,249	
Northern/ Muchinga		-		-	244715	74,028	25,361				16,071	6,128		
Western		-	333,804	-	124603	96,592		34,459	35,833		15,188	18,252	29,805	42,732
TOTAL	61,942	-	1,234,667	-	442873	625,460	112,659	74,749	69,176	64,854	211,509	57,039	102,140	173,642

Source: Disaster Management and Mitigation Unit, 2016

5.1.3 Household Losses due to Extreme Events

Most often, the occurrence of hazards such as floods and droughts lead to adverse losses of not only incomes but also loss of assets and stocks such as bridges, houses, field crops and livestock including human life. The baseline survey (Comprehensive Vulnerability Assessment) which was undertaken in 2010 by the ZVAC revealed that households had experienced losses of property or income as a result of their exposure to floods. Results indicated that the majority of the households (61.2 percent) had experienced a reduction in their income earnings as a result of the effects of flood while 18.1 percent had suffered losses relating to property and income losses and only about 10 percent of the households had maintained their income and asset holding levels in the face of flooding.

About one in every ten households had exclusively lost some assets (10.6 percent). Notably, the proportion of male headed households that had experience no losses at all in their asset and income levels was nearly twice that of their female counterpart, 11 percent compared to 6.4 percent, respectively.

5.2 Impact of Natural Extreme Events and Disasters

The matrix below outlines the common hazards experienced in Zambia and the major threats they pose. Numerous vulnerability assessments undertaken annually by the Zambia Vulnerability Assessment Committee reveals that most of these hazards below are inter linked and cannot be considered in isolation.

Table 5.3: Common Hazards and their Impacts in Zambia

Common Hazards	Impacts
Drought	• Loss of water for human and animal consumption
	• Widespread crop failure resulting into food insecurity
	• Reduced pasture resulting into poor health of animals
Floods	• Increased likelihood of water borne diseases (i.e. cholera, diarrhea and dysentery)
	• Increased water contamination due to deposition of faucal matter into unprotected water sources
	• Destruction of habitations, roads and bridges
	• Disruption
Human Animal Conflict	• Increased risk of exposure to diseases such as sleeping sickness
	• Massive crop destruction
Refugee Influx	• Increased risk of civil strife
	• Increased risk of reversing long term development gains for the locals
HIV/AIDS	• Increased loss of the much needed labour force in key sectors of the economy
	• Reduction in household incomes
	• Increased risk of orphan hood
	• Worsening socioeconomic situation in the country
Internally Displaced Persons (IDPs)	• Increased over population which can result into civil strife
	• Increased risk of disease spread
	• Increased risk of crime
Accidents	• Increased risk in the loss of human life
	• Increased loss of economic assets
Fires	• Destruction of investments that can lead to reversal of long term development gains

Source: Disaster Management and Mitigation Unit, 2016

Chapter 6: ENVIRONMENTAL PROTECTION, MANAGEMENT AND ENGAGEMENT

6.0 Introduction

This chapter presents information on Environmental protection and resource management expenditure; and Environmental Governance and Regulation.

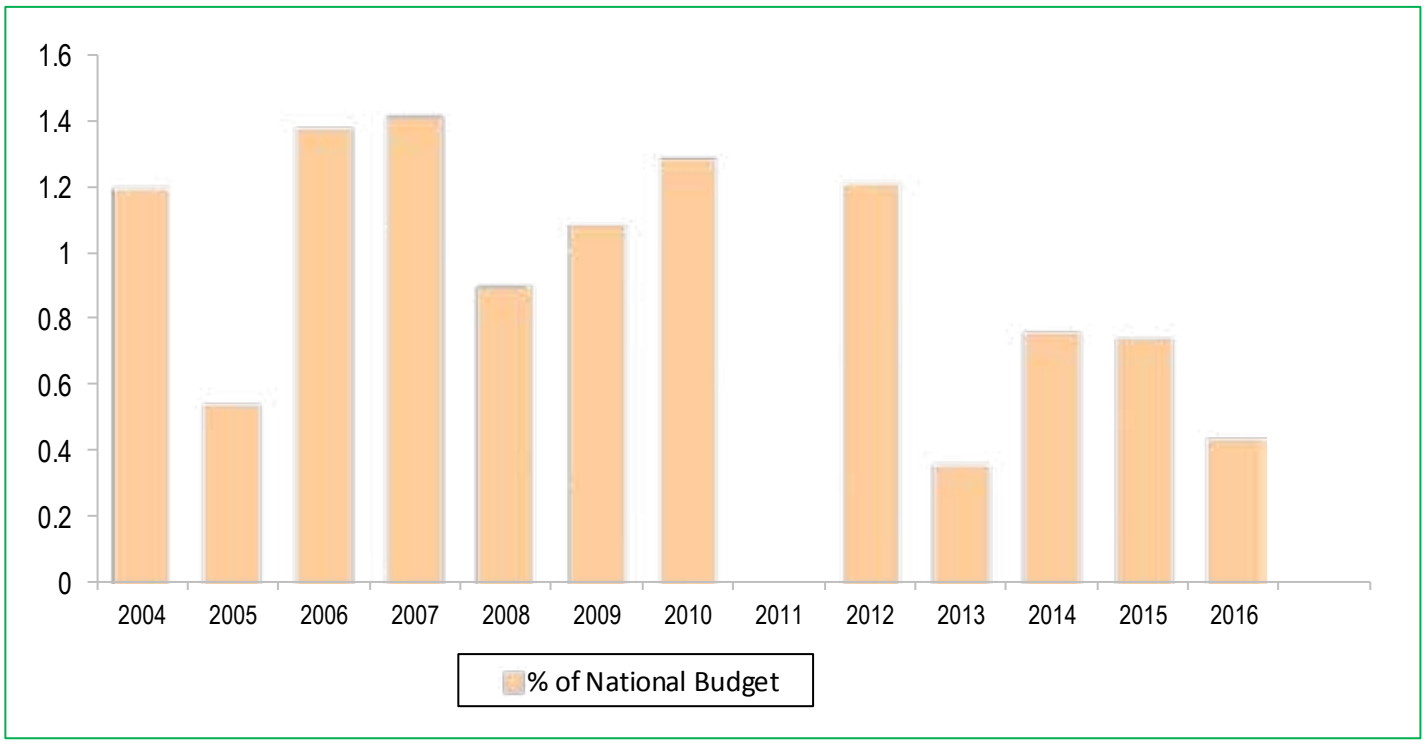
6.1 Environmental Protection, Management and Engagement

6.1.1 Government Environmental Protection and Resource Management Expenditure

The Government of Zambia has continued making annual budget provisions for the protection of the environment, conservation and sustainable use of natural resources. Funding to the sector is through the budgets of environment related Line Ministries, the provision of grants to grant aided institutions and in-kind contributions to the co-financing arrangements of various donor funded environment and natural resources projects. However, this section does not focus on financing for environment related activities in other line Ministries, spending agencies and institutions as most institutions have not mainstreamed environment in their day to day activities therefore making it difficult to extract information. The section looks only at Government funding towards the Ministry responsible for Environment.

An analysis of the Government Yellow-books for the Ministry responsible for environment from 2004 to 2016 reveals that Government financing to the Ministry has been steady although fluctuating between 0.35% to 1.42% of the annual budgets as shown on Figure 6.1. In the recent past the funding has been on the lower end compared to earlier years as Government is now focusing on streamlining resources and concentrating on spending more in priority economic sectors such as Science and Technology, Agriculture, Energy, Infrastructure Development, Health, Education, Water and Sanitation. Cooperating partners have been supplementing Government financing through supporting the capital cost elements in most of the environment and natural resources projects and programmes country-wide.

Figure 6.1: Government Funding to the Ministry of Environment, 2004-2016



6.1.1.1 Gaps, further work and improvement

To be able to assess to a larger extent, Government spending on environment and natural resources, there is need to promote the mainstreaming of environment and natural resources in sectors, Ministries and Spending Agencies. By doing so, it will be easier in the future to extract information on targeted financing for environment in institutions. Currently, institutions are spending directly or contributing to protecting the environment through programmes and activities that do not have an environment aspect attached to them.

6.1.2 Environmental Governance and Regulation

The National Conservation Strategy (NCS) adopted by Government in 1985 was the main policy document on the environment. It led to the establishment of environmental institutions and legislations (NEAP, 1994). The NCS was developed to manage natural resources and the environment in the context of a centrally planned and controlled economy. A decision was made by Government to update the NCS through the National Environmental Action Plan process in 1992 because:

- The economy was undergoing a period of liberalisation;
- The main NCS recommendations had been implemented;
- The technical information in the NCS needed updating
- There was a requirement by the World Bank for a NEAP as a requirement for international development assistance (IDA) loan funding.

The NEAP recognized that there were 23 Line Ministries and 28 laws on the environment at the time which were uncoordinated and to some extent not implemented. The NEAP process also identified the following key environmental problems; Water pollution and inadequate sanitation, Soil Degradation, Air Pollution in the Copper belt, Wildlife depletion (fish and game) and deforestation.

In light of the above environmental problems and challenges in the institutional framework, the following were the major recommendations of the NEAP:

- Ministry responsible for environment, develops Environmental Policies and implements the NEAP recommendations;
- Environmental Impact Assessments (EIA) as mandate for all sector projects;
- Increased Environmental awareness in the Ministry responsible for environment and Education;
- Harmonising of sector laws to the Environmental Protection and Pollution Control Act (EPPCA) of 1990.

Since the NEAP of 1994, new policies and institutions have been developed and adopted to contribute to integrated environmental management, community and private sector participation. The Ministry of Tourism, Environment and Natural Resources (MTENR), the lead institution on environment at the time, facilitated the formulation of the National Policy on Environment of 2007 which was formulated and adopted to act as an overarching policy on environment. The NPE2007 identifies the Ministry responsible for environment as the lead institution in its implementation supported by sector line Ministries, Quasi-Government institutions, Civil Society organisations and the local communities. The NPE recommended that Government reviews existing legislation and establish a comprehensive legal framework for an integrated approach to environmental care. It also recommended that the Government promulgates new legislation to support the Environmental Protection and Pollution Control Act No. 12 of 1990, (Amended in 1999).

In this regard the EPPCA 1990 was amended to the new Environmental Management Act (EMA) No. 12 of 2011 and Environmental Council of Zambia (ECZ) changed its name to Zambia Environmental Management Agency (ZEMA). The Wildlife and Forestry Laws enacted in 1998 and 1999 were also amended to come up with the 2015 Wildlife and Forest Acts. The two pieces of legislation have been harmonised with the EMA in line with recommendations of NEAP and the NPE. Other policies and laws that relate to environment have been amended in line with the NPE. These are the; the Water Resources Management Act of 2011, new Mines and Minerals Act of 2015, Disaster Management and Mitigation Act of 2010, Fisheries Act 2011, Biosafety Act 2007 and Forestry Policy of 2014.

Implementation of the NPE over the past nine years has suffered due to inadequate resources as the investment plan for its implementation has never been implemented. There has been no Monitoring and Evaluation Framework for the policy to review and evaluate the effectiveness of the implementation of the policy

The Environmental Protection and Pollution Control Act No. 12 of 1990 (EPPCA) was the main principle Act for environmental regulation in the country, however it was amended to the Environmental Management Act (EMA) No. 12 of 2011 to enhance integrated environmental management and to cover issues other than pollution control. To implement the EMA, regulations such as the statutory instrument no. 28 of 1997, the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, of 1997 are in place to promote initial environmental assessment for any developmental project to be implemented in any sector of the economy.

As a way of providing for quality environmental standards for air and water, the Government through the EMA has promulgated the Environmental Management (Licensing) Regulations, of 2013 which provides for the licensing system for emissions to air and water, provides for licences for waste (including hazardous waste), pesticides and toxic substances, radioactive materials, chemicals and ozone depleting substances. See Annex .....for the regulated pollutants under the Environmental Management (Licensing) Regulations, of 2013.

Although the EMA is the Principle Act to regulate the environment and natural resources, the piece of legislation is supported by other pieces of legislation such as the Agricultural Lands Act (1960,with amendments in 1994); 2. Forest Act (2015); 3. Mines and Minerals Development Act (2015); 4. Water Resources Management Act (2011); 5. Fisheries Act (2011); 6. Lands Act (1995); 7. Wildlife Act (2015); 8. Disaster Management and Mitigation Act (2010); 9. Energy Regulation Act (1995); 10. Biosafety Act (2007); 11. Local Government Act (1991); 12. Natural Heritage Conservation Commission Act (1989); 13. Natural Resources Conservation Act (1970); 14. Tourism Act (1979); 15. Noxious Weeds Act (1953); 16. Plant Pests and Diseases Act (1959); and Plant and Variety Seeds Act of 1968.

Other sectors have specific pieces of legislation such as the Forest Sector which has the Forest Act of 2015 thatprovides for licensing in the forest sector. The Wildlife Act of 2015 provides for permits and licensing in the wildlife sector.

6.1.4 Participation in MEAs and Environmental Conventions

Zambia is a signatory to approximately 25 regional and international environmental agreements (NBSAP2, 2015) that aim to shape the policies and environmental legislation to achieve sustainable development. These cover aspects such as climate change, biological diversity, drought and desertification, chemicals, bio-safety as well as access and benefit sharing of genetic resources and traditional knowledge. Table 6.1 shows some of the environmental agreements and protocols to which Zambia is a signatory.

List and description (e.g., country's year of participation(d)) of MEAs and other global environmental conventions is shown in Table 6.1.

Table 6.1: List of Multilateral Environmental Agreements and Protocols

List of MEAs & other Global	Description(MEAs & Global conventions)	Year of Participation
Environmental Conventions		
United Nations Framework Convention on Climate Change	Convention that aims at stabilising anthropogenic levels of GHGs in the global atmosphere	Ratified 3rd November, 1992
Kyoto Protocol on Climate Change	Commits Parties in Annex I to set internationally binding emission reduction targets	7th July 2006
Paris Agreement on Climate Change	To deal with GHG emissions, Mitigation, adaptation and finance starting in the year 2020	TBA
United Nations Convention on Biological Diversity	Convention that aims at conserving biological diversity, sustainable utilisation of biological diversity and equitable sharing of the benefits that arise from the use of genetic resources	8-May-93
United Nations Convention to Combat Desertification	Convention aims at reducing the effects of drought in countries experiencing extreme levels of drought	19 September, 1996
RAMSAR Convention on Wetlands of International Importance	Aims to protect Wetlands of International Importance	28th December, 1991
Convention on International Trade in Endangered Species of Fauna and Flora	Convention on international Endangered Species of Fauna and Flora	24th November 1980
Basel Convention on Trans-boundary Movement of Hazardous Waste	Control the trans-boundary movement of hazardous waste	15th November 1994
Rotterdam Convention	Shared responsibilities in relation to international trade of certain hazardous chemicals in order to protect humans and the environment.	28-Jan-11
Vienna Convention for the Protection of the Ozone Layer	Protection of the Ozone Layer	January, 1990
Montreal Protocol on Substances that Deplete the Ozone Layer	Substances that Deplete the Ozone Layer	January, 1990
Minamata Convention on Mercury		11th March 2016
Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their use	To promote equitable sharing of benefits that arise from the use of genetic resources between the provider and user country	18th August 2016
Cartagena Protocol on Bio-safety		

List of regulated pollutants and description (e.g., by year of adoption and maximum allowable levels) is shown in Table 6.2.

Table 6.2: Emission Limits for Ambient Air Pollutants

Year	Pollutant	Description, Number	By media (e.g., water, air, land, soil, oceans)	By ISIC economic activity	Maximum allowable levels
Year	Sulphur Dioxide (SO_2)		Air		10minutes = 500µg/m^3 1hr = 350µg/m^3
2013					
	Sulphur Dioxide (SO_2) in combination with Total Suspended Particulates (TSP)*) and PM10 TSP PM10		Air Air Air		24hrs=125µg/m^3 6months=50µg/m^3 24hrs=120µg/m^3 6months=50µg/m^3 24hrs=70µg/m3
	Respirable Particulate Matter PM_{10} *2 Respirable Particulate Matter $PM_{2.5}$ *2		Air		24hrs=70µg/m^3 12months=15µg/m^3
	Oxides of Nitrogen (NO_x) as Nitrogen dioxide (NO_2)		Air		1hr=400µg/m^3 24hrs=150µg/m^3
	Carbon monoxide (CO)		Air		15min=100µg/m^3 30min=60µg/m^3 1hr=30µg/m^3 8hrs=10µg/m^3
	Ambient lead (Pb)		Air		3months=1.5µg/m^3 12months=1µg/m^3
	Dust Fall		Air		30 days residential and light commercial areas=250mg/m^2/day 30 days non- residential and light commercial areas=500mg/m^2/day

Table 6.3: Emission Limits for Air Pollution by Type of Industry/Process

	Year	Pollutant	Description Number	By media (e.g., water, air, land, soil, oceans)	By ISIC economic activity	Maximum allowable levels
COPPER PRODUCTION Smelters and Converters Concentrate Dryer Heavy Metal Content in Dust	2013	Sulphur Dioxide (SO_2) Dust		Air Air		1000mg/Nm^3 50mg/ Nm^3
		Sulphur Dioxide (SO_2) Dust		Air		500mg/Nm^3 50mg/ Nm^3
		Arsenic (As) Cadmium (Cd) Copper (Cu) Lead (Pb) Mercury (Hg) Uranium Selenium				0.5mg/Nm^3 0.05mg/ Nm^3 1mg/Nm^3 0.2mg/Nm^3 0.05mg/Nm^3
LEAD AND ZINK SMELTING	2013	Sulphur Dioxide (SO_2) Dust Lead Zinc		Air Air		400mg/Nm^3 20mg/ Nm^3 0.5mg/Nm^3 1mg/ Nm^3
MANGANESE SMELTING	2013	Dust Manganese CO SO_2 NO_X		Air		30mg/Nm^3 1mg/Nm^3 175mg/Nm^3 400mg/Nm^3 400mg/Nm^3 600mg/Nm^3
CEMENT AND LIME PRODUCTION Cement Production Lime Production	2013	Dust Sulphur oxides (SO_X) Oxides of nitrogen (NO_X) Carbon Dioxide (CO_2) Dust Sulphur oxides (SO_X) Oxides of nitrogen (NO_X) Carbon Dioxide (CO_2)		Air		50mg/Nm^3 400mg/Nm^3 600mg/Nm^3 .....mg/Nm^3 50mg/Nm^3 .....mg/Nm^3 .....mg/Nm^3 .....mg/Nm^3
NITRIC ACID AND SULPHURIC ACID PRODUCTION Nitric acid production Sulphuric acid production Phosphoric acid	2013	NOX and NO_2 SO_2		Air		100-1400 kg/day 700-4300 kg/day

Table 6.3: Emission Limits for Air Pollution by Type of Industry/Process

	Year	Pollutant	Description Number	By media (e.g., water, air, land, soil, oceans)	By ISIC economic activity	Maximum allowable levels
FERTILISER PRODUCTION	2013			Air		
		Dust				500kg/day
Ammonium nitrate		Dust				50mg/Nm^3
Phosphate fertiliser		Dust				50mg/Nm^3
Blends		NOX				500mg/Nm^3
Coal treatment		Dust				500kg/day
NPK Production		Dust				100kg/day
Urea		Dust				50mg/Nm^3
DYE MANUFACTURING	2013	Chlorine or Chloride VOCs		Air		10mg/Nm^3 20mg/Nm^3
TANNING AND LEATHER FINISHING	2013	VOCs		Air		20mg/Nm^3
Textiles	2013	VOCs		Air		20mg/Nm^3

Table 6.3: Emission Limits for Air Pollution by Type of Industry/Process

	Year	Pollutant	Description Number	By media (e.g., water, air, land, soil, oceans)	By ISIC economic activity	Maximum allowable levels
FOUNDRIES	2013	PM10 Zinc Lead Cadmium Nickel Chromium		Air		20mg/Nm^3 1mg/Nm^3 0.5mg/Nm^3 0.05mg/Nm^3 1mg/Nm^3 0.05mg/Nm^3
GLASS MANUFACTURING Oil fired	2013	Dust NO_X SO_2		Air		50mg/Nm^3 1000mg-2000mg/Nm^3 1800mg/Nm^3
IRON AND STEEL MANUFACTURING	2013	Dust NO_X SO_X		Air		50mg/Nm^3 750mg/Nm^3 500mg/Nm^3
PETROLEUM REFINING Recovery Units Combustion Units	2013	Dust Sulphur dioxide (SO_2) NO_X Sulphur dioxide (SO_2) NO_X		Air		50mg/Nm^3 150mg/Nm^3 460mg/Nm^3 500mg/Nm^3 460mg/Nm^3
SUGAR MANUFACTURING Solid Fuel Liquid Fuel	2013	Dust Sulphur dioxide (SO_2) NO_X NO_X		Air		50mg/Nm^3 500mg/Nm^3 600mg/Nm^3 400mg/Nm^3
THERMAL POWER PLANTS Solid Fuel Liquid Fuel	2013	Dust NO_X SO_X Dust NO_X SO_X		Air		50mg/Nm^3 500mg/Nm^3 600mg/Nm^3 50mg/Nm^3 500mg/Nm^3 400mg/Nm^3
COMBUSTION UNITS BOILERS Oil fired <50 MW (2) Oil fired >50 MW (2) Coal fired <10 MW (2) Coal fired 10-50 MW (2) Coal fired >50 MW (2)	2013	Dust SO_2 CO Dust SO_2 CO Dust SO_2 CO Dust SO_2 CO Dust SO_2 CO		Air		50-150mg/Nm^3 850mg/Nm^3 100mg/Nm^3 100mg/Nm^3 1000mg/Nm^3 100mg/Nm^3 150mg/Nm^3 2000mg/Nm^3 100mg/Nm^3 50mg/Nm^3 1000mg/Nm^3 175mg/Nm^3 50mg/Nm^3 2000mg/Nm^3 175mg/Nm^3

Table 6.3: Emission Limits for Air Pollution by Type of Industry/Process

	Year	Pollutant	Description Number	By media (e.g., water, air, land, soil, oceans)	By ISIC economic activity	Maximum allowable levels
INCINERATORS	2013	Dust		Air		100mg/Nm^3
Oil fired <50 MW (2)		SO_2				850mg/Nm^3
		CO				100mg/Nm^3
		NO_x				460mg/Nm^3
Oil fired >50 MW (2)		Mercury				0.05mg/Nm^3
		Dust				50mg/Nm^3
		SO_2				1500mg/Nm^3
		CO				100mg/Nm^3
		NO_x				750mg/Nm^3
Coal fired <10 MW (2)		Mercury				0.05mg/Nm^3
		Dust				150mg/Nm^3
		SO_2				2000mg/Nm^3
		CO				100mg/Nm^3
		NO_x				750mg/Nm^3
Coal fired 10-50 MW (2)		Mercury				0.05mg/Nm^3
		Dust				50mg/Nm^3
		SO_2				1000mg/Nm^3
		CO				175mg/Nm^3
		NO_x				460mg/Nm^3
Coal fired >50 MW (2)		Mercury				0.05mg/Nm^3
		Dust				50mg/Nm3
		SO_2				2000mg/Nm^3
		CO				175mg/Nm^3
		NO_x				750mg/Nm^3
		Mercury				0.05mg/Nm^3

Table 6.4: Limits for Effluent and Waste Water

PARAMETER	**EFFLUENT AND WASTE WATER INTO AQUATIC ENVIRONMENT**
(A)PHYSICAL	
Temperature (Thermometer)	≤40^0 C at point of entry
Colour (Hazen Units)	≤20 Hazen Units
Odour (threshold odour number)	Must not cause any deterioration in odour as compared to natural state
Turbidity (NTU Scale)	≤15 Nephelometer Turbidity Units
Total suspended solids(Gravimetric method)	≤ 100 mg/L must not cause formation of sludge or scum in receiving water
Settleable matter sedimentation in 2 hours (Imhoff funnel)	≤ 0.5 mg/L in two hours. Must not cause formation of sludge in receiving water
Total Dissolved Solids (Evaporation @ 1050 C and Gravimetric method)	≤ 3000 mg/L The TDS of waste water must not adversely affect surface water
Conductivity (Electrometric method) ≤ 4300 mS/cm	Conductivity (Electrometric method) ≤ 4300 mS/cm
(B) BACTERIOLOGICAL	
Total Coliform/100 ml (Membrane Filtration method)	≤ 25000 cells
Faecal Coliform/100ml (Membrane Filtration method)	≤5000 cells
E. coli counts/100 ml ≤ 10 cells	E. coli counts/100 ml ≤ 10 cells
Algae /100 ml (Colony counter) ≤ 1000 cells	Algae /100 ml (Colony counter) ≤ 1000 cells
(C) CHEMICAL	
pH (0-14 scale) (Electro-metric method)	6.0 - 9.0
Dissolved oxygen mg Oxygen/Litre (Modified Winkler method and membrane electrode method)	Winkler method and membrane electrode method)
	≤ 5 mg/L after complete mixing extreme temperature may result in lower values
Chemical Oxygen Demand (COD) (Dichromat method)	COD based on the limiting values for organic carbon ≤ 90 mg 02/Laverage for 24 hours
Biochemical Oxygen Demand (BOD) (Modified Winkler method and Membrane Electrode method)	≤ 50 mg 02/L(mean value over 24 hoursperiod) According to circumstances in relation to theself-cleaning capacity of waters
Nitrates (NO3 as nitrogen) (Spectrophotometric method and electrometric method)	The nitrates burden must be reduced as far as possible according to circumstances: water course ≤ 50 mg/L; Lakes 20 mg/L
Nitrite (NO2 as nitrogen/LSpectrophotometric sulphanilamide)	≤ 2.0 mg NO2 as N/L
Organic Nitrogen (Spectro-photometric method NKjeldal)	≤ 5.0 mg/L Mean* (* the % of nutrient elements for degradation of BOD should be 0.4 - 1 % for phosphorous (different for processes using algae)
Ammonia and Ammonium(Total) (NH3 as N/L) (Nesslerization method and Electrometric method)	(Nesslerization method and Electrometric method)
	The burden of ammonium salts must be reduced to ≤ 10 mg/L (depending upon temperature, pH and salinity)
Cyanides (Spectrophoto-metric method)	≤ 0.2 mg/L
Phosphorous (Total) (PO4 as P/L) (Colori-metric method)	method)
	Treatment installation located in the catchment area oflakes: ≤ 1.0 mg/L; located outside the catchment area: reduce the load of P as lowas possible (PO4= 6 mg/L)
Sulphates (Turbidimetric method)	≤ 1500 mg/L
Sulfite (Iodometric method)	≤ 0.1 mg/L (presence ofOxygen changes SO3to SO4)
Sulphide (Iodometric and electrometric method)	≤ 0.1 mg/L (depending on temperature, pH and dissolved O2)

Table 6.4: Limits for Effluent and Waste Water	
PARAMETER	**EFFLUENT AND WASTE WATER INTO AQUATIC ENVIRONMENT**
Chlorides Cl/L (Silver nitrate and Mercuric nitrate)	≤ 800 mg/L
Active chloride Cl2/L (Iodometric method)	≤ 0.5 mg/L
Active Bromine (Br2/L)	≤ 0.1 mg/L
Fluorides F/L(Electro-metric method and Colorimetric method with distillation)	≤2 mg/L
(D).METALS	
Aluminium compounds (Atomic Absorption method)	d"2.5mg/L
Antimony (Atomic absorption method)	d"0.5mg/L
Arsenic compounds (Atomic Absorption method)	d"0.05mg/L
Barium compounds (water soluble concentration) (Atomic Absorption method)	d"0.5mg/L
Beryllium salts and compounds (Atomic Absorption method)	d"0.5mg/L
Boron compounds (Spectro photometric method- curcumin method)	d"0.5mg/L
Cadmium compounds (Atomic Absorption method)	d"0.5mg/L
Chromium Hexavelant Trivalent (Atomic absorption method)	d"0.1mg/L
Cobalt compounds (Atomic Absorption method)	d"1.0mg/L
Copper compounds (Atomic Absorption method)	d"1.5mg/L
Iron Compounds (Atomic Absorption method)	d"2.0mg/L
Lead compounds (Atomic Absorption method)	d"0.5mg/L
Magnesium (Atomic Absorption method and flame photometric method)	d"500mg/L
Manganese (Atomic Absorption method)	d"1.0mg/L
Mercury (Atomic Absorption method)	d"0.002mg/L
Molybdenum (Atomic Absorption method)	d"5.0mg/L
Nickel (Atomic Absorption method)	d"0.5mg/L
Selenium (AtomicAbsorption method)	d"0.02mg/L
Silver (AtomicAbsorption method)	d"0.1mg/L
Thallium (Atomic Absorption method)	d"0.5mg/L
Tin compounds (Atomic Absorption method)	d"2.0mg/L
Vanadium compounds (Atomic Absorption method)	d"1.0mg/L
Zinc compounds (Atomic Absorption method)	d"1.0mg/L
Total metals	d"10mg/L
(E) ORGANICS	
Total hydrocarbons (Chromatographic method)	d"10.0mg/L
Oils and grease(Mineral and Crude)(Chromatographic method and Gravimetric method)	d"5.0mg/L
Adsorbable organic halides(AOX)	d"1.0mg/L
Phenols (steam distillable)(Colorimetric method) d"0.2mg/L	d"0.2mg/L
Phenols(Non steam distillable)(Colorimetric method	d"0.05mg/L
Fats and saponifiable oils (Gravimetric method and chromatographic method)	d"20mg/L
Detergents, Surfactants, and other tenside products (Atomic Absorption Spectrophotometric)	d"2.0mg/L
Pesticides and PCBs (Total) (Chromatographic method)	d"0.5mg/L
Trihaloforms(Chromatographic)	d"0.5mg/L
(F) RADIOACTIVE MATERIALS	
Uranium (Mass spectrometry or Laser photometry)	d"0.03mg/L
Any other radioactive material	

Chapter 7: CONCLUSION AND LESSONS LEARNT

7.0 Conclusion

There are a number of multi-lateral environmental conventions, UN agencies and international organizations to which countries such as Zambia are affiliated to that aim at achieving sustainable development at the national, regional and international level. To effectively monitor the progress of each country towards fulfilling the objectives of each multi-lateral environmental convention and now the post 2015 sustainable development goals requires comparable and effective data capturing and compilation at national level. To be specific, to achieve effective policy decision making at country level and to meet international obligations, countries should not only collect data, the information should be collected using the same guidelines, definitions and concepts in order to have a transparent and comparable process. However, this was not the case since there have been different reporting and monitoring guidelines as well as reporting cycles both at national and international levels. This was made worse due to the fact that there is fragmented responsibilities and inadequate coordination regarding the production of environmental statistics in thematic areas such as biodiversity, agriculture, water, land, forestry to mention but a few. It is for this reason that the United Nations Statistics Division developed the Framework for Development of Environment Statistics (FDES 2013) to guide countries in the collection and compilation of environment statistics.

7.1 Lessons Learnt

7.1.1 Inadequate Coordination and Resource Mobilisation for Environmental Statistics

Currently the institution mandated to coordinate the collection, compilation and dissemination of environmental statistics is the Central Statistics Office. However, only statistics on energy resources as well as crop and agriculture statistics are collected. Other cardinal statistics such as biodiversity, climate change, environmental health, natural extreme events, environmental regulation and awareness among others, are not covered. This is due to the fact that environmental statistics is a relatively new subject and a complex one which requires resources and coordination to adequately collect, compile and disseminate. For example, for wildlife, surveys conducted in the past, have only been restricted to South Luangwa and Kafue Protected Area (PA) landscapes due to financial constraints and only providing detailed information on few iconic species. This makes it even more difficult to establish the total number of endemic mammal and other species at national level.

Inadequate coordination due to lack of a framework to guide institutions has led to a situation where statistics are scattered in institutions and sectors with each institution using statistics for their own interests. Leveraging of resources to support institutions has been low as there was no framework such as the FDES. As a policy measure, there is need to use the results of FDES in Zambia as a business case to attract domestic and external funding and to improve coordination.

7.1.2 Inadequate Capacity

During the FDES localisation process, it was evident that certain institutions have low capacity in the collection of environmental statistics. For example WARMA has been facing challenges in the recording of inflow and outflow of fresh water due to using humans as agents for collecting data. This calls for more capacity building by engaging with international cooperating partners to transfer river gauging technology to Zambia. The Government may also consider allocating more resources in the Medium Term Expenditure Framework (MTEF) Budget towards the procurement of more reading devices. Another area facing inadequate capacity is the overall area of biodiversity.

Available data on the status of populations of fauna and flora is lacking due to restricted arial surveys and sample counts. This is also the same on aquatic fauna information which is not adequate. Therefore, there is need for the country to conduct a comprehensive research and assessment at national level to establish total number of fauna species. This also calls for further technical assistance and equipment to improve data collection.

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ANNEXES

Annex1: Mining Location for large Scale Mining Licences

No.	Code	Parties	Commodities	Area(ha)	Validity Period	Map Reference
1	6990-HQ-LML	Enviro Processing ltd	Cu,mn,pb,zn	573.13	25 years	Central province, Kabwe
2	7045-HQ-LML	Ndola lime Company ltd	lst	676.84	25 years	Copperbelt, Masaiti, Ndola
3	7057-HQ-LML	Kansanshi mining plc	Ag,Au,Co,Cu,S,Se,Te	24,864.66	25years	Northwestern, Solwezi
4	7058-HQ-LML	Maamba Collieries ltd	COA	2,664.15	25 years	Southern province, Sinazongwe
5	7060-HQ-LML	First Quantum Mining and Operations ltd	Cu	5,500.29	25 years	Copperbelt Province, Masaiti, Ndola
6	7061-HQ-LML	Lubambe mines	Co,Cu	22,807.37	25 years	Copperbelt province, Chililabombwe
7	7064/5-HQ-LML	Chibuluma	Cu	5,988.13	25 years	Copperbelt, province, Kalulushi and Lufwanyama
8	9069-HQ-LML	NFC Africa mining plc	Cu	10,016.20	25 years	Copperbelt province, Chingola,Kalulushi, Kitwe and Mfulira
9	7071-HQ-LML	Nkana Alloy Smelting Company ltd	Au,Co,Cu,U	70.04	25 years	Copperbelt province, Kitwe
10	7073/7625-HQ-LML	Mopani Copper Mines plc	Cu	30,314.88	25 years	Copperbelt province, Mfulira, Chililabombwe,Kalulushi and Kitwe
11	7074/5/6-HQ-LML	Konkola Copper Mines plc	Cu,Ag,Au,Co,Cu,Se	19,616.87	25 years	Central province, Mumbwa,and Copperbelt province, Chililabombwe, Chingola
12	8074-HQ-LML	Luiri Gold Mines ltd	Ag,CLY,DOL,GRT,LST,MBL,MiC,QTZ,SDG,SIL,STN	3,138.99	25 years	Central province, Kabwe
13	8089-HQ-LML	Lumwana Mining Company	Ag,Au,Co,Cu,S,U	24,451.85	25 years	Northwestern province, Solwezi
14	8097/8392/8393/8394/8395/8396/8404-HQ-LML	CNMC Luanshya	Ag,Au,Bi,Co,Cu,Ni,Pb, Sil,U,Zu	12,977.50	25 years	Copperbelt province, Luanshya
15	8245-HQ-LML	Changfa Resources ltd	Ag,Au,Co,Fe,Pb,Su,Zu	2,184.22	25 years	Copperbelt province, Mfulira
16	8323/5-HQ-LML	Lafarge Cement Zambia plc	PYF,Fe,LST	1,924.20	25 years	Lusaka province, Kafue
17	8353-HQ-LML	Albindon Zambia ltd	Cu	23,869.03	25 years	Southern province, Mazabuka, Mugoto
18	8354/8622-HQQ-LML	Universal mining and chemical industries ltd	Au,Cu,Fe,Ni	10,063.39	25 years	Central province, Mumbwa and Lusaka province, Kafue
19	8403-HQ-LML	Chambishi Copper Smelter ltd	Cu	6.68	25 years	Copperbelt province, Kalulushi
20	8474-HQ-LML	Sinal Meatals Leach Zambia ltd	Co, Cu	23.37	25 years	Copperbelt province, Kalulushi
21	8611-HQ-LML	Zhong Rui Mining Investments	Ms	3,072.28	25 years	Central province , Kabwe
22	8625/8628-HQ-LML	Suhails International ltd	Co,Cu,Fe,Mn,Ni,U	39,076.40	25 years	Copperbelt province, Chililabombwe, Chingola and Northwestern province, Solwezi
23	9000/9001/9002/9003/9004-HQ-LML	Lumwana mines	Ag,Au,Co,Cuu,S,U	94,856.08	25 years	Northwestern province, Solwezi
24	12617-HQ-LML	Jin Ding mining ltd	Cu	2,870.44	25 years	Central Province, Mumbwa
25	12634-HQ-LML	Chirundu Joint Venture Zambia LTD	U	24,806.27	25 years	Southern province, Siavonga
26	12647-HQ-LML	Kenneth Konga	Au,Co,Cu,	24,459.66	25 years	Northwestern province, Kabompo, Mwinilunga
27	12848-HQ-LML	Leorpard Explorations and mining ltd	Pb,Zn,	2,975.34	25 years	Central province, Kabwe
28	12985-HQ-LML	Kronos ltd	Co,Cu,ZN	797.88	25 years	Copperbelt province, Chingola
30	13207-HQ-LML	Macrolink Resources Zambia ltd	Cu	366.95	25 years	Copperbelt province Ndola
31	13283-HQ-LML	TAURIAN Copper ltd	Ag,Au,Cu,Mu,Pb	24,150.63	25 years	Luapula province, Mansa
32	13287/13555-HQ-LML	Luminu Minerals ltd	Ag,Au,Co,Cu,Mu,Pb,Zn	33,689.94	25 yeaars	Luapula Province, Mansa, Milenge
33	13837-HQ-LML	Zhonghui Mining Industries Zambia ltd	Co,Cu	3,165.51	25 years	copperbelt
34	13881-HQ-LML	Denison Mines Zambia Limited (100%)	U	23,751.53	25 years	Southern, Siavonga
35	14182-HQ-LML	Kashime Copper Limited (100%)		23,961.62	25 years	Central, Mkushi
36	14666-HQ-LML	Status Mining & Exploration (100%)	Cu, Mn	2,080.77	25 years	Central, Mkushi
37	14948-HQ-LML	White Lion Enterprises Limited (100%)	Ag, Au, CLY, CLY1, Co, Cu, DOL, GRT, LST, MBL, MIC, Mn, Pb, QTZ, SIL, SST, STN, Zn	24,243.92	25 years	Central, Mumbwa
38	15547-HQ-LML	Mwembeshi Resources Limited (100%)	Ag, Au, Co, Cu, Ni, Pb, PGM, Zn	24,531.14	25 years	Lusaka, Chongwe, Luangwa
39	15868-HQ-LML	Kalumbila Minerals Limited (100%)	Ag, Au, Co, Cu, Fe, Ni, PGM, Se	24,807.13	25 years	North Western, Solwezi
40	15869-HQ-LML	Kalumbila Minerals Limited 25(100%)	Ag, Au, Co, Cu, Fe, Ni, PGM, Se	24,368.79	25 years	North Western, Mwinilunga, Solwezi
41	15870-HQ-LML	Kalumbila Minerals Limited (100%)	Ag, Au, Co, Cu, Fe, Ni, PGM, Se	23,989.98	25 years	North Western, Solwezi
42	15871-HQ-LML	Kalumbila Minerals Limited (100%)	Ag, Au, Co, Cu, Fe, Ni, PGM, Se	7,457.78	25 years	North Western, Solwezi
43	15872-HQ-LML	Kalumbila Minerals Limited (100%)	Ag, Au, Co, Cu, Fe, Ni, PGM, Se	14,101.79	25 years	North Western, Mwinilunga, Solwezi
44	16032-HQ-LML	Longgan Investment Limited (100%)	DOL, LST, STN1	1,052.78	25 years	Central, Chibombo

Annex1: Mining Location for large Scale Mining Licences

No.	Code	Parties	Commodities	Area(ha)	Validity Period	Map Reference
45	16773-HQ-LML	Dangote Quarries Zambia Limited (100%)	LST	1,020.30	25 years	Copperbelt, Masaiti
46	17164-HQ-LML	Arab Contractors Zambia Limited (100%)	GRT, LAT, SDG, SST	408.35	25 years	Lusaka, Kafue
47	17595-HQ-LML	Dhara Manganese Limited (0%)	Co, Cu, Mn, Pb, Zn	19,911.97	25 years	Luapula, Mansa
48	17598-HQ-LML	Dhara Manganese Limited (0%)	Co, Cu, Mn, Pb, Zn	24,653.24	25 years	Luapula, Mansa, Mwense
49	17611-HQ-LML	EMCO Coal Zambia Limited (100%)	COA	1,817.78	25years	Southern, Sinazongwe
50	17868-HQ-LML	Peco Limited (100%)	Mn	9,769.29	25 years	
51	17878-HQ-LML	China Copper Mines Ltd (100%)	Au, Co, Cu	276.91	25 years	Copperbelt, Chingola
52	17894-HQ-LML	L.M. Engineering Limited (100%)	Ag, Au, Co, Cr, Cu, Ni, REE, Ti, U, V	24,919.20	25 years	North Western, Mwinilunga
53	18153-HQ-LML	Sino-Metals Leach Zambia Limited (100%)	Cu	21,967.39	25 years	Copperbelt, Chingola, Kalulushi
54	18659-HQ-LML	Sino-Kasempa Minerals Limited (100%)	Ag, Al, Au, Co, Cu, Fe, U, Zn	24,954.80	25 years	North Western, Kasempa
55	18703-HQ-LML	Mpande Limestone Limited (100%)	LST	10,799.24	25 years	
56	19001-HQ-LML	Lions Group Quarries Limited (100%)	LST, STN	379.29	25 years	Lusaka, Kafue, Lusaka
57	19159-HQ-LML	Neelkanth Lime Limited (100%)	LST	130.04	25 years	Copperbelt, Masaiti
58	19206-HQ-LML	PLR Projects Zambia Ltd (100%)	Mn	2,362.52	25 years	Luapula, Mansa, Milenge
59	19437-HQ-LML	Zambian Gold Tiger Construction and Materials Limited (100%)	DOL, GRT, LST	672.87	25 years	Lusaka, Kafue
60	19456-HQ-LML	Dolomite Aggregate Limited (100%)	DOL	214.4	25 years	Lusaka, Kafue
61	19565-HQ-LML	Phil Resources Ltd (100%)	Mn	2,884.48	25 years	Luapula, Mansa
62	19619-HQ-LML	Sino-Metals Leach Zambia Limited (100%)		10,502.42	25 years	Copperbelt, Chingola, Kalulushi
63	19624-HQ-LML	Buffalo Consortium Limited	LST	24,711.22	25 years	Lusaka, Chongwe, Kafue
64	19725-HQ-LML	Double impacty Construction Company Ltd (100%)	LST, MBL	1,081.89	25 years	Lusaka, Kafue, Lusaka
65	19740-HQ-LML	Arab Contractors Zambia Limited (0%)	DOL, GRT, LAT, LST	3,688.37	25 years	Lusaka, Kafue
66	19820-HQ-LML	Blackthorn Resources Zambia Limited (100%)	Ag, As, Au, Co, Cr, Cu, Fe, Ge, Mn, Mo, Nb, Ni, Pb, REE, S, Sb, Se, Sn, Ta, V, Zn	24,818.83	25 years	Central, Mumbwa
67	20000-HQ-LML	Nizam Crushers Limited (100%)	Au, Co, Cu, GRT, LST	15,679.84	25 years	North Western, Solwezi
68	20059-HQ-LML	Tianyu Mining Zambia Limited (100%)	DOL, GRT, LST	95.54	25 years	Lusaka, Kafue
69	20147-HQ-LML	Vikram Investments Limited (100%)	DOL, LST	7,670.58	25 years	Lusaka, Chongwe, Kafue, Lusaka
70	20282-HQ-LML	Sinozoncha Resources Investment Company (Z) Ltd (100%)	Ag, Au, Co, Cu	5,155.90	25 years	Eastern, Petauke
71	20306-HQ-LML	Astro Quarries Limited	LST	953.57	25 years	Copperbelt, Masaiti
72	20386-HQ-LML	Lu Hang Stone Mining Company Limited (100%)	DOL, LST	95.59	25 years	Lusaka, Kafue
73	20405-HQ-LML	Collum Coal Mining Industries Limited (100%)	COA	1,627.65	25 years	Southern, Sinazongwe
74	20501-HQ-LML	Ndola Quarries Limited (100%)	Ag, Au, Co, Cu, Fe, LST, Mn, Zn	220.29	25 years	North Western, Solwezi
75	20539-HQ-LML	Baudot Cement Zambia Limited (100%)	LST	10,224.92	25 years	Central, Chibombo; Lusaka, Kafue
76	20584-HQ-LML	Ruida Investments Limited (100%)	Cu	53.1	25 years	North Western, Kasempa
77	20809-HQ-LML	Shi and Yan Mining Development Limited	Ag, Au, Co, Cu, Fe, Mn	5,442.46	25 years	Central, Kapiri Mposhi, Mkushi
TOTAL HECTRES				**932,894.13**		

Source: Ministry of Mines, Cadastre Department

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
1	4-HQ-SML	Eastern Gemstone Marketing and Buying Limited (100%)	SML	AQM	Active	120.0141 ha	Eastern, Lundazi
2	86-HQ-SML	Kariba Minerals Limited (100%)	SML	AMT	Active	253.9767 ha	Southern, Kalomo
3	155-HQ-SML	Emmanuel and Joseph Scrap Metal Co. Ltd. (100%)	SML	EM	Active	40.0967 ha	Copperbelt, Lufwanyama
4	171-HQ-SML	Jodam Mining Co. limited (100%), Kankan Mining Co. Limited (0%)	SML	EM	Active	353.2061 ha	Copperbelt, Lufwanyama
5	748-HQ-SML	Ganga Drilling and Exploration Limited (100%)	SML	AMT	Active	478.8952 ha	Central, Mkushi
6	752-HQ-SML	William and Lewin Mining Company Limited (100%)	SML		Active	31.0300 ha	Copperbelt, Lufwanyama
7	757-HQ-SML	Gemfields Holdings Zambia (100%)	SML	Be3Al2(SiO3)6, EM	Active	183.5883 ha	Copperbelt, Lufwanyama
8	758-HQ-SML	Andrew Maybin Chansa (100%)	SML	EM	Active	169.7589 ha	Copperbelt, Mpongwe, Chief Kalunkumya
9	761-HQ-SML	Pritchard Ndhahu Haamuleya (100%)	SML	AQM	Active	472.7901 ha	Southern, Siavonga
10	7030-HQ-SML	Jamii Investments Ltd (100%)	SML	TML	Active	193.6501 ha	Eastern, Lundazi
11	7041-HQ-SML	Mindeco Small Mines Limited (100%)	SML	DOL, LST, MBL	Active	32.9835 ha	Lusaka, Lusaka, Muchinga South Quarries
12	7081-HQ-SML	Enviro Processing Limited (100%)	SML	Co, Cu, Pb, Zn	Active	215.3318 ha	Central, Kabwe
13	7096-HQ-SML	Norodom Mines Limited (100%)	SML	EM	Active	12.8771 ha	Copperbelt, Lufwanyama
14	7164-HQ-SML	Jace Enterprises Limited (100%)	SML	AMT	Active	108.4390 ha	Southern, Kalomo
15	7174-HQ-SML	Maamba Colieries Limited (100%)	SML	PYR	Active	92.2718 ha	Central, Mumbwa
16	7224-HQ-SML	Suyog Natural Resources Limited (100%)	SML	Au, Co, Cu	Active	245.4800 ha	Luapula, Mwense
17	7235-HQ-SML	Yu Wang Ping (0%)	SML	LST	Active	82.4340 ha	Lusaka, Kafue, Lusaka
18	7294-HQ-SML	Scirocco Enterprises Limited (100%)	SML	LST	Active	398.8550 ha	Lusaka, Kafue
19	7314-HQ-SML	Crushed Stone Sales Limited (100%)	SML	LST	Active	118.6827 ha	Lusaka, Kafue
20	7325-HQ-SML	Lusaka Quarry & Rock Blasting Limited (100%)	SML	MBL	Active	260.4785 ha	Lusaka, Kafue, Shantumbu
21	7326-HQ-SML	Bwisa Mines limited (100%)	SML	Be3Al2(SiO3)6, EM	Active	41.4041 ha	Copperbelt, Lufwanyama
22	7327-HQ-SML	Bangweulu Batteries Limited (100%)	SML	Mn	Active	241.9156 ha	Luapula, Mansa
23	7336-HQ-SML	Abar International Investments Limited (100%)	SML	GAR	Active	117.0801 ha	Eastern, Chama
24	7343-HQ-SML	Nkana General Delalers Ltd (100%)	SML	Be3Al2(SiO3)6, EM	Active	49.0644 ha	Copperbelt, Lufwanyama
25	7345-HQ-SML	Mapelo Gemstone Export Co. Limited (100%)	SML	GAR	Active	60.2000 ha	Eastern, Chama
26	7347-HQ-SML	GTM Stones Limited (100%)	SML	MBL	Active	1.0226 km2	Lusaka, Kafue
27	7348-HQ-SML	GTM Stone Limited (100%)	SML	MBL	Active	148.4255 ha	Lusaka, Kafue
28	7359-HQ-SML	Chilanga Cement Limited (100%)	SML	LST	Active	160.0374 ha	Copperbelt, Ndola
29	7361-HQ-SML	Chilanga Cement Limited (100%)	SML	LST	Active	39.5553 ha	Lusaka, Kafue
30	7363-HQ-SML	Chilanga Cement Limited (100%)	SML	LST	Pending Renewal	140.0209 ha	Copperbelt, Ndola
31	7408-HQ-SML	Dabwisa Mining Co-operative Society Limited (100%)	SML	Be3Al2(SiO3)6, EM, TML	Pending Renewal	83.8235 ha	Copperbelt, Lufwanyama
32	7429-HQ-SML	Fitole Gem Mines Limited (100%)	SML	EM	Active	74.9065 ha	Copperbelt, Lufwanyama
33	7438-HQ-SML	Emmanuel J. Chanda (100%)	SML	AMT	Pending Renewal	152.2225 ha	Central, Mumbwa
34	7450-HQ-SML	Gembank Limited (100%)	SML	GYP	Pending Renewal	124.9715 ha	Southern, Monze
35	7476-HQ-SML	Mkushi River Motels (100%)	SML	STN	Active	46.6006 ha	Central, Mkushi, Mkushi River
36	7493-HQ-SML	Abar International Investments Limited (100%)	SML	QTZ	Active	147.2000 ha	Eastern, Chama
37	7515-HQ-SML	Precious Transparency Limited (100%)	SML	AQM, TML	Active	76.4693 ha	Central, Mkushi
38	7526-HQ-SML	Phesto Ndololo Musonda (100%)	SML	STN	Active	180.0048 ha	Copperbelt, Ndola
39	7537-HQ-SML	J.W.J Botha (100%)	SML	Ag, Au, Co, Cu	Active	396.8031 ha	Central, Mumbwa
40	7593-HQ-SML	Match Corporation Limited (100%)	SML	Cu	Active	149.9757 ha	Copperbelt, Luanshya
41	7617-HQ-SML	Summersky Zambia Limited (100%)	SML	MBL	Active	161.8494 ha	Central, Chibombo
42	7677-HQ-SML	Kalubwe Mining Limited (100%)	SML	EM	Active	59.9065 ha	Copperbelt, Lufwanyama
43	7679-HQ-SML	Kabeya Bilolo Mining Ltd (100%)	SML	AMT	Active	101.3092 ha	Southern, Kalomo
44	7683-HQ-SML	Katima Stones Limited (100%)	SML	STN	Active	108.0004 ha	Western, Sesheke
45	7695-HQ-SML	Sable Transport Limited (100%)	SML	STN	Active	392.9348 ha	Eastern, Chama
46	7713-HQ-SML	Tongyi Lead and zinc Mining Zambia Limited (100%)	SML	Mn	Active	398.1455 ha	Central, Kapiri Mposhi
47	7715-HQ-SML	Hi- Qualime Mining Limited (100%)	SML	LST	Active	392.9072 ha	Central, Mkushi
48	7724-HQ-SML	Roads Development Agency (100%)	SML	GRT	Active	242.3856 ha	Northern, Kasama
49	7729-HQ-SML	United Quarries Limited (100%)	SML	LST	Active	95.6688 ha	Lusaka, Chongwe
50	7744-HQ-SML	Eastern Quarry Limited (100%)	SML	LST	Active	79.1000 ha	Lusaka, Lusaka
51	7746-HQ-SML	Sable Transport Limited (100%)	SML	STN	Active	398.6700 ha	Eastern, Chipata
52	7781-HQ-SML	Hamagwe Investments Limited (100%)	SML	AMT	Active	434.0746 ha	Southern, Monze
53	7799-HQ-SML	Hume Stone Limited (100%)	SML	Cu	Active	140.1500 ha	Copperbelt, Mufulira
54	7803-HQ-SML	Nazmul Mining Company Limited (100%)	SML	GEM	Pending Renewal	150.2383 ha	Eastern, Lundazi
55	7805-HQ-SML	Fredrick E. Rumsey (100%)	SML	AQM, EM	Pending Renewal	463.6137 ha	Eastern, Chama
56	7806-HQ-SML	Ringa Investments Limited (100%)	SML	Pb, Zn	Active	135.8272 ha	Central, Kabwe
57	7824-HQ-SML	Zamphos Mineral Resources Limited (100%)	SML	P	Pending Renewal	385.0667 ha	Eastern, Nyimba
58	7828-HQ-SML	Bilonda Mining Limited (100%)	SML	AQM, Au, Cu, Cu2CO3(OH)2, GAR, QTZ, TML	Active	251.4300 ha	Central, Mumbwa

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
59	7838-HQ-SML	Tanzania Zambia Railways Authority (100%)	SML	STN	Active	520.9415 ha	Northern, Mpika
60	7854-HQ-SML	Kamwachi General dealers (100%)	SML	LST	Active	53.3268 ha	Copperbelt, Luanshya
61	7857-HQ-SML	Chicha Enterprises (100%)	SML	STN1	Active	19.7928 ha	Lusaka, Kafue, Shantumbu
62	7926-HQ-SML	Citadel Minerals Limited (100%)	SML		Active	384.6230 ha	Copperbelt, Luanshya
63	7927-HQ-SML	Muamba and company (100%)	SML	AQM, TML	Pending Renewal	43.2375 ha	Central, Mkushi
64	7931-HQ-SML	LIFUTI INVESTMENTS LIMITED	SML	AMT, QTZ	Active	129.0468 ha	Central, Mumbwa
65	7937-HQ-SML	Sable Transport Limited (100%)	SML	GRT	Active	337.1502 ha	Northern, Luwingu
66	7959-HQ-SML	Benedict Chileshe (100%)	SML	GRT	Pending Renewal	293.8994 ha	Copperbelt, Chililabombwe
67	7964-HQ-SML	Zambezi Natural Stone Company Limited (100%)	SML	STN2	Active	400.4827 ha	Southern, Siavonga
68	7965-HQ-SML	Joseph K. Zulu (100%)	SML	EM	Active	115.4385 ha	Copperbelt, Lufwanyama
69	7970-HQ-SML	Boston Kapala Mutondo (100%)	SML	EM	Active	99.6400 ha	Central, Kapiri Mposhi
70	7972-HQ-SML	Musanya Quarries Limited	SML	SDG	Active	397.5914 ha	North Western, Solwezi
71	7974-HQ-SML	KB and K Gold Limited (100%)	SML	Ag, Au, Zn	Active	397.3580 ha	Central, Kapiri Mposhi
72	7982-HQ-SML	Winter Libbohole (100%)	SML	AQM, TML	Active	309.3569 ha	Central, Mkushi
73	8000-HQ-SML	Lusinde Investments Limited (100%)	SML	DIT	Active	155.3149 ha	Western, Mongu
74	8003-HQ-SML	A and A Allied Investments Limited (100%)	SML	Cu	Pending Renewal	479.7022 ha	North Western, Mufumbwe
75	8005-HQ-SML	Kabuswe Chibesakunda (100%)	SML	EM	Active	120.9387 ha	Eastern, Chama
76	8013-HQ-SML	Kalulushi Clay Bricks (100%)	SML	CLY	Active	453.6378 ha	Copperbelt, Kalulushi
77	8023-HQ-SML	Starfield Minerals Limited (100%)	SML	Ta	Active	392.1233 ha	Southern, Choma
78	8024-HQ-SML	Turtle Agro Mining Limited (100%)	SML	STN	Active	42.6797 ha	Southern, Mazabuka
79	8031-HQ-SML	Sharma Brothers International Limited (100%)	SML	Cu2CO3(OH)2	Active	479.7471 ha	North Western, Mufumbwe
80	8036-HQ-SML	Montauk Mining & Minerals Limited (100%)	SML	Cu2CO3(OH)2	Active	346.6412 ha	Copperbelt, Masaiti, Masaiti
81	8043-HQ-SML	Mutelo Sipaka (100%)	SML	QTZ, SAM	Active	280.3758 ha	Copperbelt, Chingola, Chingola
82	8048-HQ-SML	Prime Marble Ltd (100%)	SML	LST	Active	138.4934 ha	Lusaka, Lusaka
83	8049-HQ-SML	Prime Marble Products (100%)	SML	GRT	Active	29.6680 ha	Lusaka, Kafue
84	8050-HQ-SML	Prime Marble Products (100%)	SML	MBL	Active	13.1985 ha	Lusaka, Kafue
85	8051-HQ-SML	Prime Marble Ltd (100%)	SML	MBL	Active	49.4523 ha	Lusaka, Kafue
86	8052-HQ-SML	WangSheng Mining Comapany Limited (100%)	SML	Cu	Active	262.2540 ha	North Western, Mufumbwe
87	8055-HQ-SML	Rayn Mining Limited	SML	Cu	Active	332.9112 ha	North Western, Solwezi
88	8058-HQ-SML	Montauk Mining & Minerals Limited (100%)	SML	Cu2CO3(OH)2	Active	391.5545 ha	North Western, Mufumbwe
89	8067-HQ-SML	ZAKOR Metals Ltd (100%)	SML	Cu2CO3(OH)2	Active	39.9756 ha	North Western, Kasempa
90	8081-HQ-SML	Kaindulaki Gemstone Mining Limited (100%)	SML	AMT, AQM	Active	29.6598 ha	Southern, Itezhi Tezhi
91	8087-HQ-SML	Mediterranean Mining Limited (100%)	SML	Au, Cu	Active	148.5906 ha	Lusaka, Chongwe
92	8091-HQ-SML	Zambezi Natural Stone Company Limited (100%)	SML	STN	Active	347.9600 ha	Southern, Siavonga
93	8104-HQ-SML	Chisin Mining Company Limited (100%)	SML		Active	333.7163 ha	Eastern, Lundazi
94	8110-HQ-SML	David Chitundu (100%)	SML	EM	Pending Renewal	1567.3717 ha	North Western, Mwinilunga
95	8113-HQ-SML	Munjili Mining and Logistics (100%)	SML	Co, Cu, Fe	Pending Renewal	518.7700 ha	Copperbelt, Mpongwe
96	8133-HQ-SML	Kabulashishi Mine Limited (100%)	SML	Au, Co, Cu, Mn, Pb, Zn	Active	244.2139 ha	Lusaka, Chongwe
97	8137-HQ-SML	Costain Chilala (100%)	SML	SDG	Pending Renewal	471.6965 ha	Central, Kapiri Mposhi
98	8154-HQ-SML	Lunga Minerals and Geological Limited (100%)	SML		Active	46.5920 ha	North Western, Mufumbwe
99	8161-HQ-SML	Pine works Limited (100%)	SML	LST	Active	494.7698 ha	Lusaka, Kafue
100	8164-HQ-SML	Chiman Manufacturing Limited (100%)	SML	Mn	Active	540.1118 ha	Central, Kapiri Mposhi
101	8166-HQ-SML	Zambezi Natural Stone Company Limited (100%)	SML	STN	Active	3.8409 km2	Southern, Siavonga
102	8167-HQ-SML	Walltech Enterprises Limited (100%)	SML	LST	Active	49.4890 ha	Lusaka, Kafue
103	8175-HQ-SML	Lunga Minerals and Exploration Limited (100%)	SML	Cu	Active	106.1747 ha	North Western, Kasempa
104	8181-HQ-SML	Nguwo Industrial Mineral Products Limited (100%)	SML	TLC	Active	133.3707 ha	Copperbelt, Ndola
105	8183-HQ-SML	Miku West Mining Limited (100%)	SML	Co, Cu	Active	390.7532 ha	Copperbelt, Chililabombwe
106	8185-HQ-SML	Razak Ibrahim Kassam Abba (100%)	SML	Cu	Active	92.4163 ha	Central, Mumbwa
107	8201-HQ-SML	chalwe Bwalya Kapeso (100%)	SML	AQM	Active	176.9920 ha	Northern, Mpika
108	8212-HQ-SML	Zambezi Natural Stone Company Limited (100%)	SML	TLC	Active	3.9392 km2	Southern, Siavonga
109	8215-HQ-SML	Trans-Power World (Z) Limited (100%)	SML	Au	Active	677.8523 ha	Central, Mkushi
110	8218-HQ-SML	Jake Mining Engineering Company Limited (100%)	SML	Cu	Active	469.2314 ha	Lusaka, Luangwa
111	8219-HQ-SML	Kasemba Mining Ltd (100%)	SML	Cu	Active	439.1009 ha	North Western, Kasempa
112	8222-HQ-SML	Donalds Investments Limited (100%)	SML	Cu	Pending Transfer	303.5897 ha	Copperbelt, Chingola
113	8228-HQ-SML	William Nsokolo Sichula (100%)	SML	AQM, TML	Active	182.3974 ha	Central, Mkushi
114	8235-HQ-SML	Mwenya Alfred Kambikambi (100%)	SML	AMT, EM, TML	Active	239.6055 ha	Copperbelt, Mpongwe
115	8248-HQ-SML	Zamsort Limited (100%)	SML	Ag, Au, Co, Cu	Active	398.1063 ha	North Western, Mwinilunga
116	8254-HQ-SML	Beanal Import, Export and General Merchants Lim (100%)	SML	Cu	Pending Renewal	40.0206 ha	North Western, Kabompo, Mufumbwe
117	8275-HQ-SML	Scirocco Enterprises Limited (100%)	SML	LST	Active	398.8170 ha	Lusaka, Kafue
118	8281-HQ-SML	Luapula Base Metals Limited (100%)	SML	Cu, Mn, QTZ	Active	398.9920 ha	Luapula, Mansa

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
119	8283-HQ-SML	Luapula Base Metals Limited (100%)	SML	Mn	Pending Renewal	470.1500 ha	Luapula, Mansa
120	8306-HQ-SML	Talang Mining Co. Limited (100%)	SML	QTZ	Pending Renewal	468.3203 ha	Northern, Mpika
121	8310-HQ-SML	Kantobo Mining Limited (0%)	SML	Co, Cu	Active	149.4757 ha	Copperbelt, Mpongwe
122	8311-HQ-SML	Kantobo Mining Company Limited (100%)	SML	Co, Cu	Active	508.2044 ha	Copperbelt, Mpongwe
123	8313-HQ-SML	Francis Talanki (100%)	SML	AQM, EM, QTZ	Pending Renewal	485.0151 ha	Northern, Mpika
124	8318-HQ-SML	Jiaxing Mining Zambia Limited (100%)	SML	Co, Cu, Zn	Active	26.4955 ha	Central, Kabwe
125	8320-HQ-SML	Trade Buffalo Candles Zambia Limited (100%)	SML	Cu	Active	519.4000 ha	Central, Mumbwa, Kakuyu
126	8321-HQ-SML	Bekango Mining Company Limited (100%)	SML	Ag, Au, Cu	Active	319.0603 ha	Central, Chibombo, Kapiri Mposhi
127	8329-HQ-SML	Phoenix Materials Limited (100%)	SML	LWA, STN, STN1	Pending Renewal	383.5800 ha	Copperbelt, Kitwe
128	8330-HQ-SML	ZEBESHA MINING LIMITED (100%)	SML	Cu	Active	395.4240 ha	North Western, Mwinilunga
129	8332-HQ-SML	China Henan International Co-operation Group Ltd (100%)	SML	GRT	Active	3782.1941 ha	Southern, Siavonga
130	8335-HQ-SML	Ital Terrazzo Limited (100%)	SML	Au, Co, Cu	Active	1022.9662 ha	Copperbelt, Masaiti
131	8336-HQ-SML	Ital Terrazzo Limited (100%)	SML	Au, Co, Cu	Active	556.2978 ha	Copperbelt, Masaiti
132	8337-HQ-SML	Ital Terrazzo Limited (100%)	SML	Au, Co, Cu	Active	1445.4338 ha	Copperbelt, Masaiti
133	8339-HQ-SML	Bilole Investments Limited	SML	EM, QTZ	Active	149.5116 ha	Copperbelt, Mpongwe
134	8342-HQ-SML	Central Africa Mining Limited (100%)	SML	Au, Co, Cu	Active	521.2833 ha	Luapula, Chiengi
135	8343-HQ-SML	Central Africa Mining Limited (100%)	SML	Ag, Au, Co, Cu, Zn	Pending Transfer	233.4535 ha	Luapula, Chiengi
136	8349-HQ-SML	Hetro Mining and Ore Dealers Limited (100%)	SML	Cu2CO3(OH)2	Pending Renewal	830.7500 ha	North Western, Mufumbwe
137	8350-HQ-SML	Tunta Mining Limited (100%)	SML	Cu	Pending Renewal	126.6064 ha	North Western, Mufumbwe
138	8363-HQ-SML	Zambezi Portland Cement Limited (100%)	SML	DOL	Active	396.8002 ha	Copperbelt, Ndola, Mpata Hills
139	8364-HQ-SML	Zambezi Portland Cement Limited (100%)	SML	DOL, LST	Active	373.4173 ha	Copperbelt, Ndola
140	8370-HQ-SML	Malcom Argente (100%)	SML	Cu	Active	398.0200 ha	North Western, Mufumbwe
141	8371-HQ-SML	Emmanuel Chisala (100%)	SML	Co, Cu, Fe	Active	3.9941 km2	Luapula, Chiengi
142	8373-HQ-SML	Chiman Manufacturing Limited (100%)	SML	Mn	Active	420.7776 ha	Central, Kapiri Mposhi
143	8374-HQ-SML	Spectra Mining Ventures Limited (100%)	SML	DIT	Active	165.2427 ha	Western, Mongu, Ngonga Plain
144	8383-HQ-SML	Scirocco Enterprises Limited (100%)	SML	Ag, Au, Co, Cu	Pending Renewal	392.7600 ha	Lusaka, Chongwe
145	8385-HQ-SML	Medalise Mining and Exploration Limited (100%)	SML	Be3Al2(SiO3)6, Cu	Active	480.4300 ha	Eastern, Lundazi
146	8386-HQ-SML	Medalise Mining and Exploration Limited (100%)	SML	Be3Al2(SiO3)6	Active	389.7631 ha	Central, Serenje
147	8387-HQ-SML	Medalise Mining and Exploration Limited (100%)	SML	Cu	Active	280.2628 ha	Eastern, Lundazi
148	8388-HQ-SML	Medalise Mining and Exploration Limited (100%)	SML	Be3Al2(SiO3)6, Cu, Ni, Pb, Zn	Active	480.3600 ha	Eastern, Lundazi
149	8389-HQ-SML	Medalise Mining and Exploration Limited (100%)	SML	Be3Al2(SiO3)6, Cu, Ni, Pb, Zn	Active	481.1042 ha	Eastern, Lundazi
150	8390-HQ-SML	Tikumbe Mining Company (100%)	SML	Cu	Pending Renewal	113.4325 ha	Copperbelt, Chingola
151	8401-HQ-SML	DENNIS NGANDWE (100%)	SML	GRT	Active	426.8602 ha	North Western, Kabompo
152	8409-HQ-SML	Jessman Teddy Kasonso (100%)	SML	SAM	Active	481.0100 ha	North Western, Solwezi, Shilenda
153	8412-HQ-SML	Jiaxing Mining Zambia Limited (100%)	SML	Sn	Active	212.1900 ha	Southern, Choma
154	8413-HQ-SML	Mwano Trust Fund (100%)	SML	Au, Cu	Active	428.6300 ha	Lusaka, Chongwe, Nabulungu
155	8414-HQ-SML	Evaristo M. Chitalu (100%)	SML	Au, Co, Cu, DOL	Pending Transfer	83.0416 ha	North Western, Kasempa, Buffalo
156	8420-HQ-SML	Jiaxing Mining Zambia Limited (100%)	SML	Cu	Active	13.2479 ha	Central, Kapiri Mposhi
157	8422-HQ-SML	CLC Mining Corporation Limited (100%)	SML	Cu	Active	397.3600 ha	North Western, Kasempa, Ingwe
158	8423-HQ-SML	Charity Chisha (100%)	SML	Cu	Pending Renewal	506.2200 ha	Central, Mumbwa, Kaindu
159	8426-HQ-SML	Serah Mwila (100%)	SML	Au, Co, Cu	Pending Renewal	481.1143 ha	North Western, Solwezi, Mutanda
160	8427-HQ-SML	Serah Mwila (100%)	SML	Au, Co, Cu	Active	444.3612 ha	North Western, Solwezi, Mutanda
161	8428-HQ-SML	Irene Chipumbu (100%)	SML	Au, Co, Cu	Active	334.0825 ha	North Western, Solwezi, Mutanda
162	8429-HQ-SML	Ngolo construction & mining Ltd (0%)	SML	Ag, Au, Co, Cu	Active	334.0856 ha	North Western, Solwezi, Mutanda
163	8430-HQ-SML	Justine Chilando (100%)	SML	Au, Co, Cu	Pending Renewal	397.5700 ha	North Western, Solwezi, Mutanda
164	8431-HQ-SML	AC and G Njanji Mining Company Limited (100%)	SML	Au, Cu, Zn	Active	535.9892 ha	Central, Mumbwa
165	8432-HQ-SML	Red Jakect Zambia Limited (100%)	SML	Cu	Pending Renewal	397.0186 ha	Central, Mumbwa
166	8433-HQ-SML	BM & K Mining Limited (100%)	SML	Co, Cu, Pb, Zn	Active	152.0228 ha	Northern, Mbala
167	8440-HQ-SML	Zuka Mining Company Limited (100%)	SML		Active	76.7500 ha	Copperbelt, Chingola; Eastern, Mambwe, Ukwimi; Petauke
168	8446-HQ-SML	Diallo Enterprises Limited (100%)	SML	Ag, Cu, Ni	Active	349.7465 ha	Copperbelt, Luanshya
169	8448-HQ-SML	Mil Construction Limited (100%)	SML	LST	Active	66.7400 ha	Copperbelt, Kitwe, Mindolo
170	8456-HQ-SML	Florence Nyirongo (100%)	SML	AQM, TML	Pending Renewal	60.0832 ha	Eastern, Lundazi

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
171	8459-HQ-SML	Apila Limited (100%)	SML	COA, Sn, Ta	Pending Renewal	1053.6900 ha	Southern, Kalomo, Ibula
172	8460-HQ-SML	Apila Limited (100%)	SML	COA, Sn, Ta	Pending Renewal	864.4451 ha	Southern, Kalomo, Siankopo
173	8461-HQ-SML	Jiaxing Mining Zambia Limited (100%)	SML	Cu, F	Active	29.7418 ha	Central, Mumbwa
174	8462-HQ-SML	Godfrey Shamanena (100%)	SML	Fe	Active	479.9100 ha	Copperbelt, Lufwanyama, Chief Nkana
175	8463-HQ-SML	Godfrey Shamanena (100%)	SML	Fe	Active	480.0900 ha	Copperbelt, Lufwanyama, Chief Nkana
176	8466-HQ-SML	Pochy Mining Ltd (100%)	SML	COA	Active	431.3590 ha	Southern, Sinazongwe
177	8469-HQ-SML	Atlantic Lime Products (Z) Limited (100%)	SML	STN	Active	3.9746 ha	Central, Kabwe
178	8471-HQ-SML	Shearzone Resources Limited (100%)	SML	Ag, Au, Co, Cu, Fe	Active	49.5207 ha	Lusaka, Chongwe
179	8472-HQ-SML	Shearzone Resources Limited (100%)	SML	Co, Cu	Active	33.0143 ha	Lusaka, Chongwe
180	8473-HQ-SML	Jin Ding Mining Limited (100%)	SML	Ag, Au, Co, Cu	Active	478.9635 ha	Southern, Livingstone, Sinde
181	8475-HQ-SML	Inga Limited (100%)	SML	Cu	Active	365.3038 ha	North Western, Mwinilunga
182	8476-HQ-SML	Zenjako Trading Limited (100%)	SML	Cu	Active	399.0270 ha	North Western, Mwinilunga
183	8477-HQ-SML	Jiaxing Mining Zambia Limited (100%)	SML	Ag, Co, Cu, Fe	Active	517.3833 ha	Central, Kapiri Mposhi, Mukonchi
184	8479-HQ-SML	Covenant King Mining Limited	SML	Cu	Active	475.1163 ha	North Western, Mufumbwe
185	8487-HQ-SML	Raubex Construction (Z) Ltd (100%)	SML	GRT	Active	801.5384 ha	North Western, Solwezi
186	8488-HQ-SML	Pochy Mining Ltd (100%)	SML	Cu	Active	1150.8995 ha	Lusaka, Chongwe, Rufunsa
187	8489-HQ-SML	Pochy Mining Ltd (100%)	SML	Au, Cu	Active	1186.0114 ha	Lusaka, Chongwe, Luangwa
188	8492-HQ-SML	P.L. Nyimbili Enterprises (100%)	SML	SIL	Active	36.6825 ha	Copperbelt, Kitwe
189	8493-HQ-SML	Eyethu Sonke Mining Limited (100%)	SML	Cu	Pending Renewal	514.3800 ha	Lusaka, Chongwe
190	8499-HQ-SML	MU YANG MINING LIMITED 2 (100%)	SML	Au, Co, Cu, Zn	Active	19.9718 ha	North Western, Kasempa, Kamankulwiba
191	8501-HQ-SML	AMK Mining Zambia Limited (100%)	SML	Au, Cu	Active	7288.0400 ha	Central, Kapiri Mposhi, Kampumba
192	8507-HQ-SML	Triple 'S' Ranch Limited (100%)	SML	Sn	Active	428.1453 ha	Southern, Choma, Muzuma; Sinazongwe
193	8511-HQ-SML	Katoma Copper Mines Limited (100%)	SML	Au, Cu	Active	418.9585 ha	Lusaka, Lusaka, Chongwe
194	8512-HQ-SML	Davies Munsongo (100%)	SML	Au, Co, Cu, Ni	Pending Transfer	439.2568 ha	Copperbelt, Lufwanyama, Fimpampa
195	8514-HQ-SML	Rephidim Mining Supplies Limited (100%)	SML	Cu	Active	257.0340 ha	Copperbelt, Chingola, Luano
196	8515-HQ-SML	EMCO Coal Zambia Limited (100%)	SML	COA	Active	476.8312 ha	Southern, Sinazongwe
197	8516-HQ-SML	Bekazulu Mining Limited	SML	Au, Cu, Fe	Active	395.2779 ha	Eastern, Petauke, Kuomboka
198	8518-HQ-SML	Wilfred Chirwa (100%)	SML	COA, Cu	Active	398.7581 ha	Eastern, Petauke, Mudoza
199	8520-HQ-SML	STARGEM INVESTMENTS LIMITED (100%)	SML	Pb, Zn	Active	751.9650 ha	Central, Kabwe, Chowa South
200	8521-HQ-SML	STARGEM INVESTMENTS LIMITED (100%)	SML	Zn	Active	3.3141 ha	Central, Kabwe, Chowa South
201	8522-HQ-SML	Lungobe Gemstone Mining Co. Limited (100%)	SML	AMT, AQM, Au, Cu, DIA, Fe, GAR, Mn, RBY	Active	399.7400 ha	Central, Mumbwa, Mumbwa
202	8523-HQ-SML	Pochy Mining Ltd (100%)	SML	Cu, Mn, Pb, Zn	Active	468.8998 ha	Central, Kapiri Mposhi, Mkushi
203	8531-HQ-SML	Maosheng Mineral Resources Limited (100%)	SML	Cu	Pending Renewal	399.5111 ha	Central, Mumbwa
204	8534-HQ-SML	AC and G Njanji Mining Company Limited (100%)	SML	Au, Cu, Pb	Active	469.8444 ha	Central, Mumbwa
205	8535-HQ-SML	AC and G Njanji Mining Company Limited (100%)	SML	Au, Cu, Pb, Zn	Active	410.3539 ha	Central, Mumbwa
206	8537-HQ-SML	Lwambimbi Copper Mining Limited (100%)	SML	Cu	Pending Renewal	388.7066 ha	North Western, Mwinilunga
207	8541-HQ-SML	Pochy Mining Ltd (100%)	SML	Co, Cu	Active	30.0400 ha	Copperbelt, Kalulushi, Chambishi
208	8543-HQ-SML	Zamsona Mining Company Limited (100%)	SML	Au, Ba, DIA, EM, RBY	Active	1698.5831 ha	Northern, Mporokoso
209	8546-HQ-SML	Mumbwa Cement Ltd (100%)	SML	LST	Active	399.4462 ha	Central, Mumbwa
210	8550-HQ-SML	Industrade Investment Limited (100%)	SML	Cu, Mn, Zn	Active	79.6471 ha	Central, Kapiri Mposhi
211	8551-HQ-SML	Caltage Enterprises Limited (100%)	SML	Au, Cu, Fe	Active	365.0900 ha	North Western, Mufumbwe
212	8552-HQ-SML	Dickson Sinyangwe (100%)	SML	SIL	Active	13.3312 ha	Copperbelt, Kalulushi, Chibulu-ma Forest
213	8553-HQ-SML	Ngolo construction & mining Ltd (100%)	SML	Au, Co, Cu, Zn	Active	648.5599 ha	Central, Mumbwa, Kaindu
214	8554-HQ-SML	Euro Africa Mining Limited (100%)	SML	Cu	Active	479.6399 ha	North Western, Mufumbwe, Mufumbwe
215	8555-HQ-SML	Euro Africa Mining Limited (100%)	SML	Cu	Active	431.7878 ha	North Western, Mufumbwe
216	8556-HQ-SML	Lendor Limited (100%)	SML	Co, Cu	Active	821.9493 ha	North Western, Mufumbwe
217	8557-HQ-SML	Theresa Ng'oma (100%)	SML	AQM, TML	Active	149.6407 ha	Central, Mkushi, Nkumbi
218	8558-HQ-SML	Mutanda Copper Mines (Z)Limited (100%)	SML	Au, Cr, Cu	Pending Renewal	1768.0257 ha	North Western, Solwezi
219	8559-HQ-SML	Status Mining & Exploration (100%)	SML	COA, Sn, Ta	Active	1131.0000 ha	Southern, Kalomo
220	8566-HQ-SML	Lunga Minerals and Geological Limited (100%)	SML	Cu	Active	255.6018 ha	North Western, Kasempa
221	8568-HQ-SML	Pochy Mining Ltd (100%)	SML	Au, Cu, Ni	Active	1141.0710 ha	Lusaka, Chongwe, Luangwa
222	8571-HQ-SML	Mtonga Ospher Kahwema (100%)	SML	Co, Cu	Active	427.4738 ha	North Western, Solwezi

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
223	8576-HQ-SML	Kronos Limited (100%)	SML	COA, Sn, Ta	Active	3.5866 km2	Southern, Kalomo, Masuku
224	8581-HQ-SML	Jin Ding Mining Limited (100%)	SML	Ag, Au, Co, Cu, Mo, Zn	Active	476.2065 ha	Central, Mumbwa
225	8583-HQ-SML	Sakisa Limited (100%)	SML	Cu	Active	348.8920 ha	North Western, Mufumbwe
226	8586-HQ-SML	Dambo Quarries Zambia Limited (100%)	SML	MBL	Active	102.3508 ha	Central, Mumbwa
227	8587-HQ-SML	Inga Limited (100%)	SML	Sn, Ti	Active	156.5900 ha	Southern, Kalomo, Kabanga
228	8588-HQ-SML	Kasni Investments Limited (100%)	SML	Au, Cu	Active	740.7574 ha	North Western, Mwinilunga
229	8590-HQ-SML	Mukonchi Copper Mining Company Limited (100%)	SML	Cu	Active	175.7708 ha	Central, Kapiri Mposhi, Mukonchi
230	8593-HQ-SML	Quenga Mining Limited (100%)	SML	Au, Cu	Active	713.7200 ha	Central, Chibombo, Namisale
231	8595-HQ-SML	Zamkor Mining Corporation Limited (100%)	SML	Cu	Active	5177.5640 ha	North Western, Mufumbwe
232	8596-HQ-SML	Edward Munyumbwe (100%)	SML	Cu	Active	13.2184 ha	Central, Mumbwa
233	8609-HQ-SML	Betele Small Miners Limited (100%)	SML	Cu	Active	398.4728 ha	North Western, Mufumbwe
234	8612-HQ-SML	D and B Gem-Ores Limited (100%)	SML	Cu, Mn	Active	484.5444 ha	Luapula, Mansa, Katuta
235	8615-HQ-SML	Yaoxin Mining Zambia Limited (100%)	SML	Au, Co, Cu, DIA	Active	389.1200 ha	North Western, Kabompo, Mufumbwe; Western, Kaoma, Lukulu
236	8617-HQ-SML	Lonestar Mining Limited (100%)	SML	Au, Cu	Active	399.4900 ha	North Western, Mufumbwe, Chizera
237	8619-HQ-SML	Yaoxin Mining Zambia Limited (100%)	SML	Co, Cu, Fe	Active	399.6200 ha	Central, Mumbwa
238	8674-HQ-SML	James C M Nyirongo (100%)	SML	AQM, COR, Rb	Active	414.0719 ha	Eastern, Lundazi
239	8677-HQ-SML	Lumweka Investments Limited (100%)	SML	GEM	Active	130.1653 ha	Eastern, Lundazi, Mwanya
240	8720-HQ-SML	Ragha R. Shailendra (100%)	SML	Mn	Active	63.2346 ha	Central, Mkushi, Chiwefwe
241	8721-HQ-SML	Universal Mining and Chemical Industries Limited (100%)	SML	Fe	Active	396.1219 ha	Lusaka, Chongwe
242	8723-HQ-SML	Sensele Enterprises Limited (100%)	SML	Co, Cu	Active	277.0258 ha	Copperbelt, Chingola, Chingola
243	8724-HQ-SML	Sensele Enterprises Limited (100%)	SML	Cu	Active	377.1535 ha	Copperbelt, Chingola
244	8727-HQ-SML	John Zhaimo (100%)	SML	Cu	Active	199.7600 ha	North Western, Mufumbwe
245	8729-HQ-SML	Saxena Kamal (100%)	SML	AQM, Cu, EM	Active	454.1212 ha	Central, Mkushi, Kanyensha
246	8735-HQ-SML	Alms Minerals and Mining Company (Z) Limited (100%)	SML	Mn	Active	456.0012 ha	Central, Mkushi
247	8737-HQ-SML	Boniface Kaluwa (100%)	SML	Pb, Zn	Pending Transfer	311.3956 ha	Central, Kabwe
248	8740-HQ-SML	Constantino Paul Vlahakis (0%)	SML	SDG, STN	Active	345.5126 ha	Southern, Siavonga, Chirundu
249	8758-HQ-SML	Lufubu Iron Mining Company Limited (100%)	SML	Au, Co, Cu, Fe	Active	239.8846 ha	Copperbelt, Luanshya
250	10029-HQ-SML	Unirite Investments Limited (100%)	SML	Cu	Active	399.3468 ha	North Western, Mufumbwe
251	10066-HQ-SML	Mumbi Mwenechanya (100%)	SML	Co, Cu	Active	407.3952 ha	Copperbelt, Chililabombwe
252	10079-HQ-SML	Twampane Enterprises Limited (100%)	SML	Cu	Pending Renewal	328.8725 ha	North Western, Kasempa
253	10080-HQ-SML	Gemodip Mining Enterprises Limited (100%)	SML	AQM	Active	26.3844 ha	Southern, Itezhi Tezhi
254	10117-HQ-SML	P.H. Motors (100%)	SML	Cu	Active	475.5334 ha	Lusaka, Lusaka, Chongwe
255	10212-HQ-SML	Avantech Limited (100%)	SML	Ag, Co, Cu	Active	481.1600 ha	North Western, Solwezi
256	10224-HQ-SML	Anthony Chisanga (100%)	SML	DIA	Active	449.5990 ha	Northern, Chinsali
257	10430-HQ-SML	Triple 'S' Ranch Limited (100%)	SML	Sn, Ta	Active	85.8564 ha	Southern, Kalomo
258	10454-HQ-SML	Agness Chozi Ng'uni (100%)	SML	Zr	Active	404.5735 ha	Eastern, Lundazi
259	10456-HQ-SML	Kasni Investments Limited (100%)	SML	Cu	Active	475.8558 ha	Central, Mumbwa, Kaindu
260	11307-HQ-SML		SML	AQM, TML	Active	353.6868 ha	Eastern, Lundazi
261	11309-HQ-SML	Milbury Mining Limited (100%)	SML	Cu	Pending Transfer	399.8284 ha	
262	11312-HQ-SML	Jin Tudi Investments Limited (100%)	SML	Cu	Active	388.3700 ha	North Western, Mufumbwe
263	11368-HQ-SML	NETRIX LIMITED (100%)	SML	Ag, Au, Co, Cu	Pending Transfer	368.7574 ha	North Western, Mwinilunga
264	11465-HQ-SML	Prudential Mining Limited (100%)	SML	Au, Cu	Active	396.6796 ha	Central, Mumbwa
265	11502-HQ-SML	D and B Gem-Ores Limited (100%)	SML	Co, Cu, Fe, Zn	Active	389.8393 ha	Copperbelt, Lufwanyama
266	11980-HQ-SML	Abar International Investments Limited (100%)	SML	AQM, TML	Active	367.3498 ha	Eastern, Lundazi
267	12097-HQ-SML	Simutili Gladys Milinga (100%)	SML	EM	Active	98.8311 ha	
268	12141-HQ-SML	Workman Mining Industries Zambia Limited (100%)	SML	Au, Cu	Active	400.3500 ha	Central, Mkushi; Lusaka, Chongwe
269	12203-HQ-SML	Daheng Group Zambia Ltd (100%)	SML	Cu	Active	327.7973 ha	North Western, Kasempa
270	12204-HQ-SML	Daheng Group Zambia Ltd (100%)	SML	Cu	Active	327.8333 ha	North Western, Kasempa
271	12233-HQ-SML	Hachi Trading Limited (100%)	SML	EM	Active	56.9144 ha	Copperbelt, Lufwanyama
272	12244-HQ-SML	Kulima Mwono Farming and Mining Development (0%)	SML	Co, Cu, Fe	Active	373.1742 ha	North Western, Mufumbwe, Kamavokwe
273	12246-HQ-SML	SDM Investments Limited (100%)	SML	EM	Active	44.2715 ha	Copperbelt, Lufwanyama
274	12325-HQ-SML	Wabei Walusiku (0%)	SML	Cu	Active	461.4895 ha	North Western, Mwinilunga
275	12491-HQ-SML	African Deposit Limited (100%)	SML	Cu	Active	400.1575 ha	Central, Mumbwa
276	12523-HQ-SML	Husa Mines Limited (100%)	SML	AMT, AQM, Be3Al2(-SiO3)6	Active	3.3422 km2	Eastern, Lundazi
277	12543-HQ-SML	Constine Group Limited (100%)	SML	Cu	Active	332.1600 ha	

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No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
278	12544-HQ-SML	Synite Quarries Zambia Limited (100%)	SML	GRT	Active	351.1573 ha	North Western, Solwezi
279	12580-HQ-SML	Princes Nakatindi Wina Wina (100%)	SML	LWA	Pending Renewal	235.2705 ha	Western, Kaoma
280	12638-HQ-SML	Best Quarry Limited (100%)	SML	GRT, MBL, STN1, TLC	Active	171.5291 ha	
281	12658-HQ-SML	Gunty Enterprises Limited (100%)	SML	EM	Active	246.5836 ha	Copperbelt
282	12710-HQ-SML	South East Gemstone Mining Limited	SML	Be3Al2(SiO3)6, EM, QTZ	Active	23.3290 ha	North Western, Solwezi
283	12713-HQ-SML	Black Horse Limited (100%)	SML	EM	Active	88.1171 ha	Copperbelt, Lufwanyama, Masaiti
284	12865-HQ-SML	Mapompo Investements Limited (100%)	SML	Ca, DOL, Fe, LST, MIC, TLC	Active	75.8149 ha	
285	12869-HQ-SML	Sakeni Mining Limited (100%)	SML	Mn	Active	399.7600 ha	Luapula, Mansa
286	12870-HQ-SML	Luapula Base Metals Limited (100%)	SML	Ag, Au, Co, Cu	Active	383.5641 ha	Luapula, Mwense
287	12871-HQ-SML	Sakeni Mining Limited (100%)	SML	Fe, Mn	Active	67.2219 ha	
288	12954-HQ-SML	Briamatty Agencies Company Limited (100%)	SML	Co, Cu	Active	359.9400 ha	
289	12984-HQ-SML	Issac Mumba (100%)	SML	AQM, TML	Active	46.7455 ha	Eastern, Lundazi
290	13007-HQ-SML	BaseMetals Zambia Limited (100%)	SML	Co, Cu	Active	439.9500 ha	North Western, Kasempa
291	13008-HQ-SML	Base Metalic Zambia Limited (100%)	SML	Co, Cu	Active	439.9500 ha	
292	13012-HQ-SML	Shearzone Resources Limited (100%)	SML	Cu	Active	6.6199 ha	Central, Mumbwa
293	13013-HQ-SML	Shearzone Resources Limited (100%)	SML		Pending Transfer	19.8601 ha	
294	13031-HQ-SML	Wise Focus Mining Limited (100%)	SML	QTZ	Active	190.3940 ha	North Western, Solwezi
295	13092-HQ-SML	Sabi Minerals Limited (100%)	SML	Au	Active	350.3535 ha	Eastern, Lundazi
296	13219-HQ-SML	Kashif Abtone Mphande (100%)	SML	AQM, QTZ	Active	266.8784 ha	Eastern, Lundazi, Chikomene
297	13223-HQ-SML	Leveka Mining Ltd (100%)	SML	Au, Co, Cu, DIA, Mn	Active	241.7900 ha	
298	13227-HQ-SML	kashimuloba Mining Corporation Limited (100%)	SML	Cu	Active	397.3935 ha	
299	13261-HQ-SML	Ramabahi Nayee Sankabhai (100%)	SML	AQM, TML	Active	26.6588 ha	Eastern, Lundazi
300	13273-HQ-SML	Mwase Phiri (100%)	SML	AQM, GAR, TML	Active	53.4091 ha	Eastern, Lundazi
301	13282-HQ-SML	Mweko Enterprises (100%)	SML	AQM, QTZ, TML	Active	404.8800 ha	Northern, Mpika
302	13290-HQ-SML	Kalukana Investments Limited (100%)	SML	Be3Al2(SiO3)6, EM	Active	118.2500 ha	
303	13312-HQ-SML	Dyma Mining Limited (100%)	SML	Co, Cu	Active	392.5200 ha	North Western, Mwinilunga
304	13322-HQ-SML	Luapula Base Metals Limited (100%)	SML	Fe, Mn	Active	336.1600 ha	Luapula, Mwense
305	13329-HQ-SML	Ngolo construction & mining Ltd (100%)	SML	Co, Cu, Zn	Active	420.2534 ha	Central, Mumbwa
306	13334-HQ-SML	Magnum Resources Limited (100%)	SML		Active	20.0015 ha	Copperbelt, Ndola
307	13355-HQ-SML	Naoz & Mukonde Limited (0%)	SML	Cu, Fe, Mn	Active	399.4851 ha	Luapula, Mansa
308	13421-HQ-SML	Joseph Muyangana (100%)	SML	AMT, Be3Al2(SiO3)6, GAR, TML	Active	303.8400 ha	Eastern, Lundazi
309	13441-HQ-SML	Mayfair Mining and Minerals Limited (100%)	SML	AMT	Active pending licence verification	1379.8062 ha	Southern, Kalomo
310	13473-HQ-SML	D and B Gem-Ores Limited (100%)	SML	Ba, Fe, Mn, Pb, Zn	Pending Transfer	408.2800 ha	Luapula, Kawambwa
311	13490-HQ-SML	Chukwuemeka Limited (100%)	SML	AQM	Active	161.5383 ha	Southern, Itezhi Tezhi
312	13546-HQ-SML	Tongyi Lead and zinc Mining Zambia Limited (0%)	SML	Zn	Active	400.9400 ha	Central, Kabwe
313	13556-HQ-SML	S.M.K. Pastor Chiluba (100%)	SML	AQM, GAR, TML	Active pending licence verification	133.5830 ha	Eastern, Lundazi
314	13557-HQ-SML	S.M.K. Pastor Chiluba (100%)	SML	AQM, GAR, TML	Active pending licence verification	526.6914 ha	Eastern, Lundazi
315	13570-HQ-SML	Charles Silaupa Silavwe (100%)	SML	Cu, Fe, Mn	Active	396.1700 ha	Luapula, Mansa
316	13600-HQ-SML	Bottompit Mining Limited (100%)	SML	Au, Co, Cu, Fe	Active	332.8360 ha	
317	13604-HQ-SML	Rodwell Kahona (100%)	SML	AQM, EM	Active	400.4180 ha	Eastern, Lundazi
318	13606-HQ-SML	Kampas Kashala Kanda (100%)	SML	AQM, GAR, TML	Active pending licence verification	250.1500 ha	Eastern, Lundazi
319	13607-HQ-SML	Kampas Kanda Kashala (0%)	SML	AMT	Active pending licence verification	200.0000 ha	Southern, Kalomo
320	13613-HQ-SML	Mwana Lubaba (100%)	SML	AMT, QTZ	Active pending licence verification	200.0000 ha	Southern, Kalomo
321	13629-HQ-SML	Manga Mining Company Limited (100%)	SML	Cu, Mn, Zn	Active	400.8736 ha	Central, Kapiri Mposhi
322	13649-HQ-SML	D & B Gem-Ores (100%)	SML	GYP	Active	116.9259 ha	Northern, Mpika
323	13664-HQ-SML	KG Mining Ltd (100%)	SML	Co, Cu, Zn	Active	394.1170 ha	
324	13704-HQ-SML	Joshua kachibe Chikonde (100%)	SML	Cu, Mn	Active	369.5500 ha	Luapula, Mansa
325	13762-HQ-SML	Universal Minerals Limited (100%)	SML	Gr tourm, TML	Active	362.9958 ha	Central, Mumbwa
326	13763-HQ-SML	Ndashi W. Chitalu (100%)	SML	AQM, GAR, TML	Active	398.0427 ha	Eastern, Nyimba
327	13770-HQ-SML	Kasho Mining Ltd (100%)	SML		Active	333.3459 ha	
328	13772-HQ-SML	Isreal Muzokela (100%)	SML	QTZ	Active	404.6110 ha	Northern, Mpika
329	13828-HQ-SML	Douglas Hachingala (100%)	SML	Ag, Au, Cu	Active	343.1250 ha	Central, Kapiri Mposhi
330	13829-HQ-SML	Diallo Enterprises Limited (100%)	SML	Au, Co, Cu	Active	326.3421 ha	Copperbelt, Luanshya
331	13830-HQ-SML	Agro Tech Zambia Limited (100%)	SML	Cu	Active	441.9867 ha	

Small Scale Mining Licences up to December 2016

No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
332	13918-HQ-SML	Indongo Mining Limited (100%)	SML	COA	Active	169.6004 ha	Southern, Choma, Kalomo, Sinazongwe
333	13919-HQ-SML	Indongo Mining Limited (100%)	SML	COA	Active	326.1254 ha	Southern, Kalomo, Sinazongwe
334	13934-HQ-SML	Amanda Temweke Silavwe (100%)	SML	Co, Cu, Fe	Active	244.8602 ha	Central, Mumbwa
335	13935-HQ-SML	Amanda Temweke Silavwe (100%)	SML	Co, Cu, Fe	Active	198.5663 ha	Central, Mumbwa
336	13936-HQ-SML	Kaisha investements Consortium Limited (0%)	SML	Co, Cu	Active	346.8336 ha	Copperbelt, Lufwanyama
337	13937-HQ-SML	Kaisha investements Consortium Limited (100%)	SML	Co, Cu	Active	346.8336 ha	Copperbelt, Lufwanyama
338	13968-HQ-SML	Hussain Abdulatif Safieddine (100%)	SML	Co, Cu, Zn	Active	329.8700 ha	Central, Mumbwa
339	14043-HQ-SML	Mweko Enterprises (100%)	SML	AQM, TML	Active	404.8500 ha	Northern, Mpika
340	14045-HQ-SML	Everest Investments Limited (100%)	SML	QTZ	Active	150.0309 ha	Central, Mkushi
341	14090-HQ-SML	El-Riphet Enterprises (100%)	SML	AQM	Active pending licence verification	366.7142 ha	Eastern, Lundazi
342	14099-HQ-SML	Kaisha investements Consortium Limited (100%)	SML	Co, Cu	Active	266.7821 ha	Copperbelt, Lufwanyama
343	14111-HQ-SML	Harry Kalaba (100%)	SML	Mn, Pb, Zn	Active	60.4100 ha	Luapula, Mansa
344	14139-HQ-SML	Tawakkal Gems Investments Co. Limited (100%)	SML	AQM	Active pending licence verification	366.9266 ha	Eastern, Lundazi
345	14161-HQ-SML	Northern Star International Limited (100%)	SML	Co, Cu, DIA	Active	396.1449 ha	Northern, Kaputa
346	14220-HQ-SML	Kalch Limited (100%)	SML	Ag, Co, Cu	Active	166.0300 ha	
347	14230-HQ-SML	Zamex Refineries Ltd (100%)	SML	Ag, Au, Co, Cu	Active	13.3300 ha	Copperbelt, Ndola
348	14232-HQ-SML	R & M Prospecting Company Limited (100%)	SML	CLY, LST, MS	Active	49.4375 ha	Lusaka, Kafue
349	14406-HQ-SML	Jimmy Rudolph (100%)	SML	AQM, GAR, QTZ, TML	Active	330.5506 ha	Eastern, Lundazi
350	14427-HQ-SML	Leonard Mulenga Masabo (100%)	SML	Cu, Mn	Active	234.8100 ha	Luapula, Mansa
351	14462-HQ-SML	Calcite Limited (100%)	SML	LST	Active	3.2983 ha	Lusaka, Kafue
352	14566-HQ-SML	Afro Metals Zambia Ltd (100%)	SML	Cu	Active	325.5300 ha	North Western, Kasempa
353	14567-HQ-SML	Afro Metals Zambia Ltd (100%)	SML	Au, Co, Cu, Fe, Mn, U	Active	372.0100 ha	North Western, Kasempa
354	14573-HQ-SML	Gramiraj Investments Ltd (100%)	SML	Cu, Fe	Active	178.3163 ha	Central, Mumbwa
355	14698-HQ-SML	Stork-LL Resources Limited (100%)	SML	Co, Cu, Fe, Mn	Active	336.1326 ha	Luapula, Mwense
356	14706-HQ-SML	Samtrade Limited (100%)	SML	SIL	Active	160.2200 ha	Copperbelt, Mufulira
357	14707-HQ-SML	Samtrade Limited (100%)	SML	SIL	Active	83.4400 ha	Copperbelt, Mufulira
358	14708-HQ-SML	Samtrade Limited (100%)	SML	SIL	Active	133.5100 ha	Copperbelt, Mufulira
359	14709-HQ-SML	Samtrade Limited (100%)	SML	SIL	Active	260.3500 ha	Copperbelt, Mufulira
360	14712-HQ-SML	Tekela Engineering & Supplies Ltd (100%)	SML	SAM, SIL	Active	33.3419 ha	Copperbelt, Kalulushi
361	14774-HQ-SML	Kampelembe CSS Mines Ltd (100%)	SML	Cu, Fe, Mn	Active	335.5700 ha	Luapula, Mansa
362	14825-HQ-SML	Peter Koster Mpongo (100%)	SML	EM, TML	Active	367.4200 ha	North Western, Solwezi
363	14829-HQ-SML	Green Mathews Nguni (100%)	SML	GAR	Active	368.3656 ha	
364	14830-HQ-SML	Green Mathews Nguni (100%)	SML	GAR	Active	368.5082 ha	Eastern, Chama
365	14844-HQ-SML	Charles Silaupa Silavwe (100%)	SML	Cu, Fe, Mn	Pending Transfer	3.7612 km2	Luapula, Mansa, Mwense
366	14845-HQ-SML	Charles Silaupa Silavwe (100%)	SML	Cu, Fe, Mn	Active	335.8300 ha	Luapula, Mansa, Mwense
367	14852-HQ-SML	Musumbulwa Richard Kamima (100%)	SML	AQM, GAR	Active	341.1300 ha	Eastern, Lundazi
368	14857-HQ-SML	Sanctificare Enterprises Ltd (100%)	SML	EM	Active	336.6620 ha	Copperbelt, Lufwanyama
369	14884-HQ-SML	Joseph Shabaya Moyo (100%)	SML	SDG	Active	398.2700 ha	Central, Kapiri Mposhi
370	14938-HQ-SML	Mutemwa Mutemwa (100%)	SML	Co, Cu	Active	337.8500 ha	North Western, Mwinilunga
371	14939-HQ-SML	Mutemwa Mutemwa (100%)	SML	Co, Cu	Active	347.7700 ha	North Western, Mwinilunga
372	14940-HQ-SML	Mutemwa Mutemwa (100%)	SML	Co, Cu	Active	260.9300 ha	North Western, Mwinilunga
373	14972-HQ-SML	Emmanuel Kunda (100%)	SML	Mn	Active	369.1800 ha	Luapula, Mansa
374	14973-HQ-SML	Emmanuel Kunda (100%)	SML	Mn	Active	369.2300 ha	Luapula, Mansa
375	15014-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.3200 ha	Central, Mkushi
376	15015-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	1.8370 ha	Central, Mkushi
377	15046-HQ-SML	ZAKOR Metals Ltd (100%)	SML	Au, Co, Cu, LST	Active	364.7000 ha	North Western, Solwezi
378	15055-HQ-SML	Dorica Jessy Tembo (100%)	SML	Au, Cu, Fe	Active	398.0410 ha	North Western, Mwinilunga
379	15056-HQ-SML	Mwansa Mukuka Leo (100%)	SML	Au, Co, Cu	Active	398.0600 ha	North Western, Mwinilunga
380	15062-HQ-SML	Patricia Nawa (100%)	SML	Au, Co, Cu	Active	401.4179 ha	North Western, Mwinilunga
381	15064-HQ-SML	Ronald Mwambu Nawa (100%)	SML	Cu	Active	0.7348 ha	North Western, Mwinilunga
382	15067-HQ-SML	J.S.Moyo Farms Limited (100%)	SML	Fe, Mn	Active	389.5125 ha	Central, Mkushi
383	15070-HQ-SML	Solomon Anos Tembo (100%)	SML	Fe, Mn	Active	6.6584 ha	Central, Mkushi
384	15093-HQ-SML	Ta yu Mining Ltd (100%)	SML	Mn	Active	399.3518 ha	Central, Mkushi
385	15096-HQ-SML	SOMPROVIDENCE LIMITED (100%)	SML	Co, Cu, Mn	Active	107.5700 ha	Northern, Luwingu
386	15098-HQ-SML	Chankanondo Investments Limited (100%)	SML	Ag, Au, Co, Cu, Mn	Active	371.1400 ha	Luapula, Kawambwa
387	15103-HQ-SML	Mailo kafumbo Mining Limited (100%)	SML	Fe, Mn	Active	373.2900 ha	Central, Serenje
388	15117-HQ-SML	Mamala Enterprises Limited (100%)	SML	Cu	Active	100.1565 ha	North Western, Mwinilunga
389	15134-HQ-SML	Peniel Mining Company (100%)	SML	Ag, Au, Cu, Mn	Active	9.9900 ha	Central, Mkushi

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No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
390	15164-HQ-SML	Hetro Mining and Ore Dealers (100%)	SML	Cu, Cu2CO3(OH)2	Active	398.5272 ha	North Western, Kasempa
391	15230-HQ-SML	Tripple N Mining (100%)	SML	Au, Co, Cu, Fe, Mn	Active	334.0500 ha	North Western, Kabompo
392	15304-HQ-SML	Joseph Mwansa (100%)	SML	AQM, QTZ, TML	Active	367.3418 ha	Eastern, Lundazi
393	15305-HQ-SML	Mahiyodin Abdul Samad (100%)	SML	AQM, GAR, QTZ	Active	13.3800 ha	Eastern, Chama
394	15367-HQ-SML	Chapriju Investments Limited (100%)	SML	EM	Active	269.9139 ha	Copperbelt, Lufwanyama
395	15399-HQ-SML	Emmanuel Kunda (100%)	SML	Mn	Active	399.3900 ha	Luapula, Mansa
396	15405-HQ-SML	Godfrey Mulenga (100%)	SML	AMT, AQM, EM, GAR, TML	Active	45.0824 ha	Copperbelt, Lufwanyama
397	15424-HQ-SML	Chilufya Mulenga (100%)	SML	AQM, GAR	Active	368.4200 ha	Eastern, Chama
398	15431-HQ-SML	Aggregates Limited (100%)	SML	DOL	Active	29.6866 ha	Lusaka, Kafue
399	15450-HQ-SML	Armstrong Nyirongo (100%)	SML	AQM, GAR, TML	Active	2.1703 km2	Eastern, Lundazi
400	15465-HQ-SML	Raphael Mbao (100%)	SML	GRT, SAM, STN1	Active	169.7400 ha	Central, Mkushi
401	15468-HQ-SML	Charles Akufuna Wamulwange (100%)	SML	CLY7	Active	80.0157 ha	Copperbelt, Ndola
402	15471-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.4500 ha	Central, Mkushi
403	15472-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	396.4900 ha	Central, Mkushi
404	15475-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.4800 ha	Central, Mkushi
405	15476-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.4900 ha	Central, Mkushi
406	15510-HQ-SML	SW & GVA Mining Company Ltd (100%)	SML	Cu	Active	396.3600 ha	Central, Mumbwa
407	15517-HQ-SML	Viking Investments Group Limited (100%)	SML	DOL, GRT	Active	0.3628 ha	Lusaka, Kafue
408	15555-HQ-SML	Chilalika Silvia Chiluzya (100%)	SML	AQM, GAR, TML	Active	13.3826 ha	Eastern, Chama
409	15586-HQ-SML	Stache General Contractors (100%)	SML	Au, Co, Cu, Cu-2CO3(OH)2, Fe, LAT, Pb, SAM, SIL, Zn	Active	353.9157 ha	Copperbelt, Chililabombwe, Chingola, Mufulira
410	15589-HQ-SML	Gibson Siachonkoma (100%)	SML	COA	Pending Transfer	303.7400 ha	Southern, Sinazongwe
411	15590-HQ-SML	Black Horse Limited (100%)	SML	Cu, Fe, Mn	Active	401.7000 ha	North Western, Solwezi
412	15633-HQ-SML	Phoenix Materials Ltd (0%)	SML	Cu, STN1	Active	183.3400 ha	
413	15701-HQ-SML	Muamba and company (100%)	SML	AQM, QTZ, TML	Active	349.2800 ha	Central, Mkushi
414	15730-HQ-SML	Pizyenga Zambia Limited (100%)	SML	Be3Al2(SiO3)6, EM, QTZ, TML	Active		
415	15755-HQ-SML	Itcol Mining Limited (100%)	SML	Fe, Mn	Active	93.2086 ha	Central, Mkushi
416	15799-HQ-SML	Stephen Manasseh Nsangayi (100%)	SML	EM, QTZ, SiO2	Active	26.7200 ha	Copperbelt, Chililabombwe
417	15846-HQ-SML	Margie S Musonda (100%)	SML	Mn	Active	396.1700 ha	Central, Mkushi
418	15848-HQ-SML	Margie S Musonda (100%)	SML	Mn	Active	392.8600 ha	Central, Mkushi
419	15860-HQ-SML	Stork-LL Resources Limited (100%)	SML	Cu, Mn	Active	398.8400 ha	Luapula, Mansa
420	15867-HQ-SML	Magec Enterprises Limited (100%)	SML	Au, Co, Cu	Active	401.9400 ha	North Western, Kasempa
421	15933-HQ-SML	Mweko Enterprises (100%)	SML	AMT	Active	330.9500 ha	Central, Mumbwa
422	15958-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	399.5900 ha	Central, Mkushi
423	15959-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.5000 ha	Central, Mkushi
424	15960-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.4800 ha	Central, Mkushi
425	15963-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	299.7100 ha	Central, Mkushi
426	15964-HQ-SML	Jazzman Chikwakwa (100%)	SML	Au, Cu, Fe, Mn	Active	366.4900 ha	Central, Mkushi
427	15992-HQ-SML	Frank Bwacha (100%)	SML	AQM, QTZ, TML	Active	399.4500 ha	Central, Mkushi
428	16036-HQ-SML	Mopti Company Limited (100%)	SML	QTZ	Active	401.8912 ha	Copperbelt, Mpongwe
429	16208-HQ-SML	Chakuza Mining & Exploration Limited (100%)	SML	Mn	Active	4.0080 ha	Central, Mkushi
430	16239-HQ-SML	Synite Quarries Zambia Limited (100%)	SML	SDG, STN	Active	340.4095 ha	North Western, Solwezi
431	16374-HQ-SML	Charles Chitapwa (100%)	SML	AQM, QTZ, TML	Active	330.0100 ha	Northern, Mpika
432	16433-HQ-SML	BigHope Mining Ltd (100%)	SML	AMT, AQM, EM, TML	Active	335.0600 ha	Eastern, Chama
433	16594-HQ-SML	Rajamani Nadar Resources (Z) Ltd (100%)	SML	AQM, QTZ, TML	Active	333.7700 ha	Eastern, Lundazi
434	16605-HQ-SML	Allan Mpundu (100%)	SML	Be3Al2(SiO3)6, EM, QTZ	Active	3.6841 km2	North Western, Mwinilunga
435	16606-HQ-SML	Andrew Siwelwa (100%)	SML	AQM, Be3Al2(SiO3)6	Active	98.8027 ha	Southern, Itezhi Tezhi
436	16651-HQ-SML	CLC Mining Corporation Limited (100%)	SML	Ag, Au, Cu	Active	317.9100 ha	North Western, Kasempa
437	16674-HQ-SML	Fishil Farms Company Limited (100%)	SML	Cu	Active	6.6400 ha	Central, Mkushi
438	16678-HQ-SML	Jolehya Joy Mapani (100%)	SML	Au, Co, Cu, Ni	Active	402.4100 ha	Eastern, Mambwe
439	16730-HQ-SML	Ronald Phiri (100%)	SML	Au, Co, Cu, Mn	Active	402.2400 ha	Central, Serenje
440	16771-HQ-SML	Aguia Minerals Resources Limited (100%)	SML	am, AMT, GAR, KYN, Nb, QTZ, Ta, Ti, TML, W	Active	69.6400 ha	Eastern, Nyimba
441	16858-HQ-SML	Drew Invetsments Limited (100%)	SML	SIL	Active	90.0100 ha	Copperbelt, Kitwe
442	16876-HQ-SML	Classic Lime Limetsone (100%)	SML	LST	Active	313.3300 ha	Lusaka, Kafue
443	16935-HQ-SML	Chibuyu Germstone Mine (100%)	SML	TML	Active	342.8956 ha	Southern, Kalomo, Kazungula
444	16946-HQ-SML	Indongo Mining Limited (100%)	SML	COA	Active	277.1800 ha	Southern, Kalomo
445	17163-HQ-SML	L.M. Engineering Limited (100%)	SML	Mn	Active	201.7300 ha	Northern, Luwingu

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No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
446	17207-HQ-SML	kJ Mining Investments Limited (100%)	SML	AQM, GAR, QTZ, SiO2, TML	Active	399.5200 ha	Central, Mkushi
447	17239-HQ-SML	Kachawa Mines Limited (100%)	SML	AQM, EM, TML	Active	364.7400 ha	Central, Mkushi
448	17667-HQ-SML	Steven Chilufya (100%)	SML	Au, Co, Cu, DOL, LST, Mn	Active	396.0500 ha	Central, Chibombo
449	17668-HQ-SML	Steven Chilufya (100%)	SML	DOL, LST	Active	366.3200 ha	Central, Chibombo
450	17710-HQ-SML	Royal Sesheke Quarry (100%)	SML	SST	Active	52.3200 ha	Western, Sesheke
451	17744-HQ-SML	Bruce Kakoma Mulyata (100%)	SML	AMT, AQM, QTZ	Pending Transfer		
452	17757-HQ-SML	Joseph Chipili (100%)	SML	Cu, Mn	Active	20.1200 ha	Luapula, Milenge
453	17837-HQ-SML	Kameta Mining Ltd (100%)	SML	AMT, AQM, TML	Active	298.1900 ha	Eastern, Katete
454	17906-HQ-SML	Josheal Enterprises Ltd (100%)	SML	QTZ	Active	80.0200 ha	North Western, Solwezi
455	17950-HQ-SML	Zamastone Ltd (100%)	SML	LST	Active	26.3872 ha	Lusaka, Kafue
456	18056-HQ-SML	Mwengwe Yvette Mutenta (100%)	SML	AQM, GAR, QTZ	Active	19.9600 ha	Eastern, Mambwe
457	18087-HQ-SML	David Chikopa (100%)	SML	Au, Co, Cu, Fe, Pb, Zn	Active	6.6100 ha	Central, Mumbwa
458	18231-HQ-SML	BRENDA KUNDA (100%)	SML	STN	Active	50.1500 ha	North Western, Solwezi
459	18440-HQ-SML	Rabya Machining Ltd (100%)	SML	QTZ, SDG, SIL	Active	253.7500 ha	Copperbelt, Mufulira
460	18442-HQ-SML	Petronela Sokontwe (100%)	SML	EM	Pending Transfer	99.9200 ha	Copperbelt, Lufwanyama
461	18559-HQ-SML	African Canary Mining CO. Ltd (100%)	SML	AQM, GAR, TML	Active	86.8097 ha	
462	18868-HQ-SML	Ameys Property Developers Limited (100%)	SML	LST	Active	385.8800 ha	Lusaka, Kafue
463	18919-HQ-SML	Point & Line Technology Ltd (100%)	SML	STN	Active	29.6832 ha	Lusaka, Kafue
464	18946-HQ-SML	Changzhou Zambia Resources Company Limited (100%)	SML	LST, STN	Active	40.0100 ha	Copperbelt, Masaiti, Ndola
465	18947-HQ-SML	Mogoswa Limestone Limited (100%)	SML	LST, STN	Active	6.6700 ha	Copperbelt, Masaiti, Ndola
466	18979-HQ-SML	Manfred Drilling,Blasting & General Delears (100%)	SML	AQM, QTZ, TML	Active	368.6600 ha	Eastern, Chama
467	18983-HQ-SML	Rock of Ages Mining Co. Ltd (100%)	SML	AQM, EM, FLD, QTZ, TML	Active	390.3600 ha	Eastern, Lundazi
468	19007-HQ-SML	Kapetamendo Mineral Resources Ltd (100%)	SML	AQM, GAR, QTZ, TML	Active	119.2193 ha	Eastern, Nyimba
469	19008-HQ-SML	Kapetamendo Mineral Resources Ltd (100%)	SML	AQM, GAR, QTZ, TML	Active	139.0978 ha	Eastern, Nyimba
470	19031-HQ-SML	James Zgambo (100%)	SML	AQM, GAR, QTZ, TML	Active	16.6800 ha	Eastern, Lundazi
471	19108-HQ-SML	GTJ Mining Limited (100%)	SML	AQM, EM, GAR, QTZ, TML	Active	400.5700 ha	Eastern, Nyimba
472	19111-HQ-SML	Maliche Corporation Limited (100%)	SML	AMT, EM, GAR	Active	52.5131 ha	Southern, Kazungula; Western, Sesheke
473	19114-HQ-SML	Ascent Stone Industry Ltd (100%)	SML	GRT	Active	98.9799 ha	Lusaka, Kafue
474	19125-HQ-SML	GTJ Mining Limited (100%)	SML	AQM, EM, GAR, QTZ, TML	Active	92.7260 ha	Eastern, Nyimba
475	19165-HQ-SML	Given Kapalu (100%)	SML	AQM, GAR, TML	Active	88.8792 ha	Southern, Itezhi Tezhi
476	19189-HQ-SML	Mwala Crushing Ltd (100%)	SML	CLY, CLY3, DOL, GRT, LST, SDG	Active	139.0600 ha	Central, Kabwe
477	19223-HQ-SML	F & A Gemstone & Trading Company Limited (100%)	SML	AQM, GAR, TML	Active	396.9700 ha	Eastern, Lundazi
478	19224-HQ-SML	Kitanikwa Trading Enterprises Limited	SML	SDG, SIL	Active	10.0012 ha	Copperbelt, Kalulushi
479	19225-HQ-SML	Davis S Mwanamoya (100%)	SML	AQM, QTZ, TML	Active	6.6700 ha	Eastern, Lundazi
480	19250-HQ-SML	Bengemor Mining Limited (100%)	SML	Au, Cu, Fe, Mn	Active	373.8114 ha	Northern, Mpika
481	19260-HQ-SML	Chama Minerals Resources Limited (100%)	SML	AQM, GAR, QTZ, SiO2, TML	Active	398.7500 ha	Eastern, Chama
482	19271-HQ-SML	Sianyolo Intergrated Resources Mining Company Ltd (100%)	SML	F	Active	393.9700 ha	Southern, Siavonga
483	19281-HQ-SML	Enock Kayula Mundia (100%)	SML	LST	Active	161.4200 ha	Lusaka, Kafue
484	19304-HQ-SML	Nisco Industtries Ltd (100%)	SML	DOL, GRT, LST, STN1	Active	326.7500 ha	Central, Chibombo
485	19305-HQ-SML	Daniel Chola Ponde (100%)	SML	SIL	Active	6.6685 ha	Copperbelt, Kalulushi
486	19307-HQ-SML	MWEKO Industries Limited (100%)	SML	AMT, QTZ	Active	358.2269 ha	Northern, Mpika
487	19329-HQ-SML	Nizam minerals Limited (100%)	SML	LST	Active	3.5344 km2	Copperbelt, Masaiti, Ndola
488	19342-HQ-SML	Mercury Lines Limited (100%)	SML	DOL, GRT, LST	Active	39.5300 ha	Lusaka, Kafue
489	19356-HQ-SML	Bottom Pit Mining Limited (100%)	SML	Ag, Au, Co, Cu, Fe, P, REE	Active		North Western, Mufumbwe
490	19378-HQ-SML	Nkinsu Gold and Platinum Enterprises Limited (100%)	SML	Au, Cu, PGM	Active	399.1016 ha	North Western, Mwinilunga
491	19419-HQ-SML	Chizi Namuchimba (100%)	SML	AQM, GAR, QTZ	Active		Northern, Kasama, Luwingu
492	19423-HQ-SML	Uniturtle Industries Zambia Limited (100%)	SML	DOL, LST	Active	247.4110 ha	Lusaka, Kafue
493	19442-HQ-SML	Flight Mining Limited (100%)	SML	GEM	Active	3.9257 km2	Central, Mkushi
494	19462-HQ-SML	Mercy Mayani (100%)	SML	AQM, EM, GAR, QTZ, TML	Active	372.5439 ha	Central, Mkushi
495	19523-HQ-SML	Peggy Zulu (100%)	SML	SDG, STN	Active	362.9819 ha	Central, Chibombo; Lusaka, Kafue

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No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
496	19530-HQ-SML	Mercy Mayani (100%)	SML	AQM, TML	Active	136.3200 ha	Central, Mkushi
497	19577-HQ-SML	Zamstone Quarries Ltd (100%)	SML	GRT, LST	Active	393.4000 ha	Southern, Choma
498	19578-HQ-SML	Zamstone Quarries Ltd (100%)	SML	GRT, LST	Active	393.4200 ha	Southern, Choma
499	19588-HQ-SML	Mukamandu Mining Limited (100%)	SML	Co, Cu	Active	176.6820 ha	Copperbelt, Ndola
500	19630-HQ-SML	Remmy Mubanga (100%)	SML	AQM, QTZ	Active	40.1734 ha	Northern, Mpika
501	19633-HQ-SML	Kamengo Mining Limited (0%)	SML	Au, Co, Cu, Fe	Active	325.7804 ha	Copperbelt, Mpongwe
502	19638-HQ-SML	Emmanuel Mulenga (100%)	SML	Ag, Au, Co, Cu	Active	23.3347 ha	Copperbelt, Ndola
503	19645-HQ-SML	John Kalenga (100%)	SML	Sn, Ta	Active	16.2878 ha	Southern, Kalomo
504	19661-HQ-SML	kasompe Mining Limited (100%)	SML	LAT	Active	10.0150 ha	Copperbelt, Chingola
505	19688-HQ-SML	Jordan Mbulo (100%)	SML	AQM, TML	Active	372.2077 ha	Central, Mkushi
506	19699-HQ-SML	Charizma Enterprises Limited (100%)	SML	DOL, LST	Active	0.4617 km2	Lusaka, Kafue
507	19714-HQ-SML	Mwengwe Yvette Mutenta (100%)	SML	AQM, GAR, QTZ, TML	Active	53.4256 ha	Eastern, Lundazi
508	19738-HQ-SML	Patrick Kangoma (0%)	SML	AMT, AQM, GAR, QTZ, TML	Active	213.7888 ha	Eastern, Lundazi
509	19757-HQ-SML	Reuben Tedy Sambo (100%)	SML	AQM, Be3Al2(SiO3)6, QTZ, TML	Active	13.2997 ha	Central, Mkushi
510	19779-HQ-SML	MWEKO Industries Limited (100%)	SML	AMT, FLD, GAR, QTZ, TML	Active	1.6407 km2	Northern, Mpika
511	19786-HQ-SML	Lyapa Manza (100%)	SML	COA	Active	3.7803 km2	Southern, Kalomo, Sinazongwe
512	19790-HQ-SML	Samson Chibaye (100%)	SML	AQM, GAR, QTZ, TML	Active	1.5723 km2	Eastern, Chama
513	19825-HQ-SML	Mercy Mayani (100%)	SML	QTZ	Active	63.5442 ha	Northern, Mpika
514	19843-HQ-SML	Winter Libbohole (100%)	SML	AQM, GAR, QTZ, TML	Active	83.3464 ha	Central, Serenje
515	19852-HQ-SML	Dalobelt Zambia Limited (100%)	SML	Au, Co, Cu, Mn, Pb, Zn	Active	387.0464 ha	Central, Chibombo
516	19853-HQ-SML	Dalobelt Zambia Limited (100%)	SML	Au, Co, Cu, Mn, Pb, Zn	Active	387.0854 ha	Central, Chibombo
517	19854-HQ-SML	Anson Enterprises (Z) Limited (100%)	SML	QTZ	Active	110.0715 ha	North Western, Solwezi
518	19855-HQ-SML	Meckie Shisholeka Mwamuchena (100%)	SML	AQM	Active	6.6308 ha	Central, Mkushi
519	19857-HQ-SML	JBK Mining Compant LTD (100%)	SML	am, AQM, GAR, QTZ, TML	Active	256.1911 ha	Central, Serenje
520	19862-HQ-SML	Kovichi Contractors and Suppliers Limited (100%)	SML	SDG, SIL	Active	26.6990 ha	Copperbelt, Mufulira
521	19863-HQ-SML	Kovichi Contractors and Suppliers Limited (100%)	SML	SDG, SIL	Active	20.0265 ha	Copperbelt, Mufulira
522	19871-HQ-SML	Joseph Lwando Chipili (100%)	SML	Mn	Active	305.1317 ha	Luapula, Milenge
523	19887-HQ-SML	Gumba Gemstones Mining Limited (100%)	SML	AQM	Active	387.5638 ha	Southern, Siavonga
524	19893-HQ-SML	Lemmy Mutema (100%)	SML	AQM, Be3Al2(SiO3)6, GAR, QTZ, TML	Active	366.8809 ha	Eastern, Lundazi
525	19899-HQ-SML	Chichoke Investments Limited (100%)	SML	Cu, SIL	Active	50.0103 ha	Copperbelt, Kalulushi, Kitwe
526	19915-HQ-SML	Anyikenu Mining Company Limted (100%)	SML	AMT, QTZ	Active	23.0588 ha	Southern, Itezhi Tezhi
527	19932-HQ-SML	Kyulu Development Trust (100%)	SML	SST	Active	3.0066 km2	North Western, Solwezi
528	19946-HQ-SML	Muchenga Industrial Minerals Limited (100%)	SML	LWA, STN1	Active	393.5799 ha	Copperbelt, Lufwanyama
529	19947-HQ-SML	Mwala Crushing Limited (100%)	SML	CLY, DOL, GRT, LAT, LST, MS, SDG	Active	83.4295 ha	Copperbelt, Kalulushi, Mufulira
530	19991-HQ-SML	Lwanda Mulwanda Simfukwe (100%)	SML	AMT, GAR, QTZ, TML	Active	371.2789 ha	Northern, Mbala
531	20013-HQ-SML	Fleuve Stones Limited (100%)	SML	am, AMT, QTZ, TML	Active	99.4570 ha	Eastern, Nyimba
532	20014-HQ-SML	Joint Mining Limited	SML	DOL, GRT, LST, STN	Active	177.9927 ha	Lusaka, Kafue
533	20035-HQ-SML	Princica Chabanga (100%)	SML	DOL, GRT, LST, LWA	Active	360.1863 ha	Central, Serenje
534	20058-HQ-SML	Blue Dream Investment Limited (100%)	SML	DOL, GRT, LAT, LST	Active	2.2430 km2	Lusaka, Kafue
535	20101-HQ-SML	Annanual Mining Limited (100%)	SML	AQM, GAR, TML	Active	295.1028 ha	Western, Sesheke
536	20102-HQ-SML	Nchimunya Mooba (100%)	SML	AMT, GAR, QTZ, TML	Active	399.4924 ha	Central, Chibombo
537	20103-HQ-SML	Elohim Copperfields Limited (100%)	SML	Au, Co, Cu, GRT, SIL	Active	3.9720 km2	Copperbelt, Mufulira
538	20120-HQ-SML	Brebner Changala (100%)	SML	GYP	Active	391.3558 ha	Southern, Monze
539	20121-HQ-SML	Brebner School Chalk Limited (100%)	SML	GYP	Active	3.8473 km2	Southern, Monze
540	20208-HQ-SML	Silchil Construction Solutions Ltd (100%)	SML	LWA, SST	Active	2.6071 km2	Southern, Kazungula
541	20212-HQ-SML	Make Makweja Farming and Construction Limited. (100%)	SML	GRT	Active	13.0345 ha	Southern, Kazungula
542	20220-HQ-SML	CHALWE PHIRI (100%)	SML	AQM, TML	Active	100.1832 ha	Eastern, Lundazi
543	20231-HQ-SML	Kathel Mining Limited (100%)	SML	am, AMT, QTZ, TML	Active	399.3196 ha	Central, Serenje
544	20235-HQ-SML	Zamanfour Minerals Limited (100%)	SML	Fe, Mn	Active	259.9417 ha	Central, Mkushi
545	20247-HQ-SML	Shen Zhou Investment Compmay Limited (100%)	SML	GRT, LST, STN1	Active	39.6017 ha	Central, Chibombo
546	20276-HQ-SML	Kabololwe Gem Minerals Limited (100%)	SML	AQM, QTZ, TML	Active	397.9434 ha	Central, Mkushi
547	20277-HQ-SML	Andrew Mwape (100%)	SML	AQM, QTZ, TML	Active	397.9328 ha	Central, Mkushi
548	20293-HQ-SML	Kabula Exploration Limited (100%)	SML	STN	Active	29.4972 ha	Western, Sesheke

Small Scale Mining Licences up to December 2016							
No.	Code	Parties	Type	Commodities	Status	Area	Map Reference
549	20313-HQ-SML	Strong Tower Mining Ltd (100%)	SML	AQM, QTZ	Active	120.0064 ha	Eastern, Lundazi
550	20336-HQ-SML	Kathel Mining Limited (100%)	SML	am, AMT, AQM, QTZ, TML	Active	99.6006 ha	Eastern, Petauke
551	20372-HQ-SML	Supremacy Investment Limited (100%)	SML	GRT, LAT, STN, STN1	Active	166.8977 ha	Copperbelt, Chingola
552	20411-HQ-SML	African Pearl Estates Limited (100%)	SML	AMT, AQM, EM, QTZ, TML	Active	297.8873 ha	North Western, Mwinilunga
553	20429-HQ-SML	Leslie Serra (100%)	SML	Au	Active	329.5845 ha	Lusaka, Kafue
554	20437-HQ-SML	Anyikenu Mining Company Limited (100%)	SML	AMT, QTZ	Active	23.0835 ha	Southern, Itezhi Tezhi
555	20478-HQ-SML	Sunday Sinyangwe (100%)	SML	am, AQM, GAR, QTZ, TML	Active	99.4557 ha	Eastern, Nyimba
556	20537-HQ-SML	Freddy Shakwamba (100%)	SML	AQM, GAR, QTZ, Rh, TML	Active	117.0766 ha	Eastern, Chama
557	20604-HQ-SML	Richarz General Dealers Limited (100%)	SML	AQM, GAR, QTZ, TML	Active	187.0862 ha	Eastern, Lundazi
558	20629-HQ-SML	King Edward Mining Services Limited	SML	Au, Cu	Active	16.6987 ha	Copperbelt, Mufulira
559	20634-HQ-SML	Chilufya Mulenga	SML	AMT, AQM, QTZ	Active	367.4700 ha	Eastern, Lundazi
560	20654-HQ-SML	Jazzman Chikwakwa	SML	Mn	Active	187.9006 ha	Luapula, Mansa
561	20695-HQ-SML	Sunday Sinyangwe	SML	am, AQM, GAR, QTZ, TML	Active	99.5717 ha	Eastern, Petauke
562	20749-HQ-SML	Alethia Belt Capital Limited	SML	am, AMT, AQM, QTZ	Active	325.2574 ha	Eastern, Petauke
563	20855-HQ-SML	Sew Rara Minerals Zambia Limited	SML	Ag, Au, Co, Cu	Active	3.8384 km2	Central, Chibombo
564	20856-HQ-SML	Sew Rara Minerals Zambia Limited	SML	Ag, Au, Co, Cu	Active	393.7637 ha	Central, Chibombo
565	20934-HQ-SML	Adam Issa Iqubal (100%)	SML	AQM, GAR, QTZ	Active	240.1438 ha	Eastern, Lundazi
566	21020-HQ-SML	Bendu Transport Limited (100%)	SML	SDG, SIL	Active	66.6746 ha	Copperbelt, Ndola
567	21028-HQ-SML	Blue Oceans Minerals & Metals Ltd	SML	Mn	Active	393.2928 ha	Luapula, Samfya
568	21029-HQ-SML	Blue Ocean Minerals and Metals Limited	SML	Mn	Active	349.5366 ha	Luapula, Samfya
569	21031-HQ-SML	Blue Oceans Minerals & Metals Ltd	SML	Mn	Active	346.2274 ha	Luapula, Samfya
570	21038-HQ-SML	ZAHAV FLAGE MINING LIMITED	SML	Au, Cu, Mn	Active	399.2219 ha	Central, Mkushi
571	21103-HQ-SML	SEW Minerals Zambia Limited	SML	Ag, Au, Co, Cu	Active	377.0485 ha	Central, Chibombo
572	21104-HQ-SML	SEW Minerals Zambia Limited	SML	Ag, Au, Co, Cu	Active	377.0894 ha	Central, Chibombo
573	21280-HQ-SML	Simmer Enterprises Limited	SML	LST	Active	342.9618 ha	Central, Mumbwa; Lusaka, Kafue
574	21344-HQ-SML	Sunshine Eagle Mining Ltd	SML	Co, Cu	Active	3.9877 km2	North Western, Mwinilunga
575	21425-HQ-SML	Universal Mining and Chemical Industries Limited (100%)	SML	Au, Cu, Fe, Mn	Active	389.2558 ha	Central, Chibombo; Lusaka, Kafue
576	21448-HQ-SML	Sew Base Metals Zambia Limited (100%)	SML	Ag, Au, Co, Cu, Pt, Ti, W	Active	383.6818 ha	Central, Chibombo
577	21536-HQ-SML	Jayline Investments Limited	SML	GRT, LST, MBL	Active	293.9598 ha	North Western, Solwezi

Annex 3: Small Scale Mining Location Site

No	Code	Parties	Type	Commodities	Status	Area	Map Reference
1	8664-HQ-AMR	Emmanuel Chanda (100%)	AMR		Active	6.7171 ha	Luapula, Mansa, Mulaye Farm
2	8762-HQ-AMR	George Daka (100%)	AMR	AMT, EM, QTZ	Active	6.6553 ha	Copperbelt, Masaiti
3	10068-HQ-AMR	Pascal Kalwambisha (100%)	AMR	Cu	Active	6.6823 ha	North Western, Solwezi, Chief Mulonga
4	10215-HQ-AMR	Kabunda Joseph Mwape (100%)	AMR	TML	Active	6.7150 ha	Luapula, Mansa
5	12600-HQ-AMR	Leatetia Hamooba (100%)	AMR	MS	Active	6.5748 ha	Southern, Mazabuka
6	13056-HQ-AMR	Simion Mwanamambo (100%)	AMR	QTZ, TML	Active	6.5906 ha	Southern, Itezhi Tezhi
7	13800-HQ-AMR	Allan kimbani (100%)	AMR	MS	Active	6.6837 ha	
8	13801-HQ-AMR	Steven Pezulu Kajimanga (100%)	AMR	SDG	Active	6.6837 ha	
9	13802-HQ-AMR	Godfrey Kikome (100%)	AMR	MS	Active	6.6826 ha	
10	13930-HQ-AMR	Brian Mulopu (100%)	AMR	SDG	Active	6.6839 ha	
11	13999-HQ-AMR	Hurry Ntanga (100%)	AMR	SDG	Active	6.6826 ha	
12	14012-HQ-AMR	Doctor Siabusu Joinery (100%)	AMR	Cu, Cu2CO3(OH)2	Active	3.3209 ha	Eastern, Petauke
13	14036-HQ-AMR	john Kamalamba (100%)	AMR	SDG	Active	6.6828 ha	North Western, Solwezi
14	14387-HQ-AMR	Epiphania Kaundula (100%)	AMR	Fe	Active	6.6116 ha	Central, Chibombo
15	14544-HQ-AMR	Jennipher Mwale Chisala (0%)	AMR	Cu, Fe, Mn	Active	6.7228 ha	Northern, Luwingu
16	15308-HQ-AMR	Getrude NsofwaTuchula Chila (100%)	AMR	GRT, SDG	Active	6.5944 ha	Lusaka, Kafue
17	15479-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu, Zn	Active	3.3383 ha	Copperbelt, Chingola
18	15669-HQ-AMR	Henry Lukanga (100%)	AMR	Fe, Pb, Zn	Active	3.3136 ha	Central, Kabwe
19	15768-HQ-AMR	Henry Lukanga (100%)	AMR	DOL	Active	6.6258 ha	Central, Kabwe
20	16037-HQ-AMR	Stephen Mutale (100%)	AMR	Co, Cu, Fe	Active	6.6802 ha	Copperbelt, Mufulira
21	16165-HQ-AMR	Rabby Mulela (100%)	AMR	QTZ, SIL	Active	3.3400 ha	Copperbelt, Mufulira
22	16182-HQ-AMR	Betha Mwanza (100%)	AMR	Au, Co, Cu, Fe, Mn	Active	3.3298 ha	Central, Mkushi
23	16476-HQ-AMR	Eddah R Kanukula (100%)	AMR		Active	6.6300 ha	North Western, Kasempa
24	16762-HQ-AMR	Kenneth Simbeye (100%)	AMR	Mn	Active	6.6855 ha	Northern, Mpika
25	17185-HQ-AMR	Cyprian Phiri (100%)	AMR	MS, SIL	Active	6.6700 ha	Copperbelt, Kitwe
26	17410-HQ-AMR	Malani Ngambi (100%)	AMR	QTZ	Active	6.6600 ha	Central, Mkushi
27	17411-HQ-AMR	Jameson Mwitwa (100%)	AMR	QTZ	Active	6.6591 ha	Central, Mkushi
28	17741-HQ-AMR	Sandy Kamzimbi (100%)	AMR	Cu, Mn	Active	6.7222 ha	
29	17761-HQ-AMR	Dassywell Kapambwe (100%)	AMR	Co, Cu	Active	6.6700 ha	Copperbelt, Ndola
30	17779-HQ-AMR	Zamiwe Kausu (100%)	AMR	Ag, Au, Cu, Fe, LST	Active	6.6900 ha	North Western, Solwezi
31	17780-HQ-AMR	Zamiwe Kausu (100%)	AMR	Ag, Au, Cu, Fe, LST	Active	6.6900 ha	North Western, Solwezi
32	17793-HQ-AMR	Richard Banda (100%)	AMR	Ag, Co, Cu, LST, Zn	Active	6.6886 ha	North Western, Solwezi
33	17794-HQ-AMR	Richard Banda (100%)	AMR	Ag, Co, Cu, LST, Zn	Active	6.6900 ha	North Western, Solwezi
34	18163-HQ-AMR	Alfred Muchimba (100%)	AMR	AMT, AQM	Active	3.3400 ha	Eastern, Lundazi
35	18168-HQ-AMR	Beatrice Musuwa (100%)	AMR	Ag, Au, Co, Cu, Mn, QTZ, Zn	Active	0.0663 km2	Central, Kapiri Mposhi
36	18181-HQ-AMR	Syamate Simalele (100%)	AMR	SDG	Active	6.5750 ha	Southern, Mazabuka
37	18301-HQ-AMR	Lewin Makafu Salimu (100%)	AMR	GRT	Active	3.3400 ha	Copperbelt, Ndola
38	18527-HQ-AMR	Richard Banda (100%)	AMR	Co, Cu, LST, Ni	Active	6.6700 ha	Copperbelt, Ndola
39	18530-HQ-AMR	James Mkandawire (100%)	AMR	Co, Cu, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
40	18531-HQ-AMR	Alfred Zulu (100%)	AMR	Co, Cu, LST, Ni	Active	6.6700 ha	Copperbelt, Ndola
41	18533-HQ-AMR	Alfred Zulu (100%)	AMR	Co, Cu, LST, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
42	18534-HQ-AMR	Ria Banda (100%)	AMR	Co, Cu, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
43	18547-HQ-AMR	James M Mumbi (100%)	AMR	Co, Cu, LST, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
44	18550-HQ-AMR	Edward Tembo (100%)	AMR	Au, Co, Cu, Fe, Mg, Mn	Active	6.6900 ha	North Western, Solwezi
45	18638-HQ-AMR	Marvis Ngoma (100%)	AMR	Fe, Sn, Ta	Active	6.5200 ha	Southern, Kalomo
46	18639-HQ-AMR	Puta Mwambi (100%)	AMR	Fe, Sn, Ta	Active	6.5200 ha	Southern, Kalomo
47	18761-HQ-AMR	David Mulenga (100%)	AMR	SDG	Active	6.6800 ha	Copperbelt, Chingola
48	18773-HQ-AMR	Eunice K. Anamela (100%)	AMR	Co, Cu, Fe, Mn, Zn	Active	6.7100 ha	Luapula, Mansa
49	18774-HQ-AMR	Eunice K. Anamela (100%)	AMR	Co, Cu, Fe, Mn, Zn	Active	6.7100 ha	Luapula, Mansa
50	18899-HQ-AMR	Lewis Mandeya (100%)	AMR	MS	Active	6.6800 ha	North Western, Solwezi
51	18901-HQ-AMR	Shadreck Kalima (100%)	AMR	Mn	Active	6.6272 ha	Central, Kapiri Mposhi
52	18940-HQ-AMR	Happy Chimbamanga (100%)	AMR	MS	Active	6.6800 ha	North Western, Solwezi
53	19169-HQ-AMR	MULENGA ANGELA CHITALU (100%)	AMR	CLY1, GYP, LST	Active	6.6826 ha	Northern, Mpika
54	19236-HQ-AMR	Christopher Sondoyi (100%)	AMR	SDG	Active	6.6851 ha	North Western, Solwezi
55	19308-HQ-AMR	Chibwe Chama (100%)	AMR	Au, Cu, Fe, Mn	Active	0.0667 km2	Northern, Mpika
56	19325-HQ-AMR	Mukupa Patrick Malama (100%)	AMR	Cu, EM	Active	6.6928 ha	Northern, Mpika
57	19376-HQ-AMR	Lucia Mupeta (100%)	AMR	Au	Active	6.6100 ha	Lusaka, Chongwe
58	19416-HQ-AMR	Joel Mulule Ngo (100%)	AMR	SLA, STN, STN1	Active		Northern, Kasama
59	19450-HQ-AMR	Gideon Kajoba (100%)	AMR	QTZ	Active	6.6681 ha	North Western, Solwezi
60	19460-HQ-AMR	Delax Chilumbu (100%)	AMR	Au, Cu, LST	Active	3.3361 ha	Copperbelt, Masaiti, Ndola

Annex 3: Small Scale Mining Location Site

No	Code	Parties	Type	Commodities	Status	Area	Map Reference
61	19474-HQ-AMR	Dorothy Kaonga (100%)	AMR	Au, GRF	Active	6.7298 ha	Northern, Isoka
62	19543-HQ-AMR	Lubilo Mate (100%)	AMR	SDG	Active	6.6800 ha	North Western, Solwezi
63	19591-HQ-AMR	Solomon Anos Tembo (100%)	AMR	Au, Cu, Fe, Mn, Pb, Zn	Active	6.6591 ha	Central, Mkushi
64	19647-HQ-AMR	Evans Kunda Musunsa (100%)	AMR	AQM, QTZ, TML	Active	0.0666 km2	Central, Serenje
65	19676-HQ-AMR	Augustine Kafwafwa Kasongo (100%)	AMR	SAM	Active	0.0668 km2	North Western, Solwezi
66	19683-HQ-AMR	Ackson Chitofu (100%)	AMR	SAM	Active	6.6836 ha	North Western, Solwezi
67	19722-HQ-AMR	Joseph Shabaya Moyo (100%)	AMR	GRT, SAM, STN	Active	0.0666 km2	Central, Mkushi
68	19750-HQ-AMR	Bubala Namakobo (100%)	AMR	Ag, Au, Co, Cu, Fe, Mn, Pb, Pt, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
69	19766-HQ-AMR	Richard Kombe (100%)	AMR	AMT, AQM, GAR, QTZ, TML	Active	6.6678 ha	Eastern, Lundazi
70	19792-HQ-AMR	Goodson Mwape (100%)	AMR	Mn	Active	6.7223 ha	Luapula, Samfya
71	19830-HQ-AMR	Jigneshi P.Soni (100%)	AMR	Au, Co, Cu, GRT	Active	6.6763 ha	North Western, Solwezi
72	19831-HQ-AMR	Jignesh P.Soni (100%)	AMR	Au, Co, Cu, GRT	Active	6.6788 ha	North Western, Solwezi
73	19832-HQ-AMR	Katie Evanthia Stavron (100%)	AMR	SIL	Active	6.6772 ha	Copperbelt, Chingola
74	19849-HQ-AMR	Messiah Sekani (100%)	AMR	Ag, Au, Co, Cu	Active	6.6166 ha	Central, Chibombo
75	19850-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu	Active	6.6166 ha	Central, Chibombo
76	19851-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu	Active	6.6167 ha	Central, Chibombo
77	19901-HQ-AMR	Mulandu Matoka (100%)	AMR	SDG	Active	6.6846 ha	North Western, Solwezi
78	19952-HQ-AMR	Peter Sito Kalikeka Mwanza (100%)	AMR	Cu, Ti	Active	6.6421 ha	Eastern, Petauke
79	19972-HQ-AMR	Misheck Mutumbwe (100%)	AMR	AQM, QTZ, TML	Active	6.6451 ha	Central, Mkushi
80	19981-HQ-AMR	Godfrey, Robert Kayukwa (100%)	AMR	AQM, QTZ, TML	Active	6.5915 ha	Southern, Itezhi Tezhi
81	19989-HQ-AMR	Albertina Kalembwe Kababa (100%)	AMR	AMT, AQM, Au, Co, Cu, Fe, LST, Mn, QTZ, TML, Zn	Active	6.6587 ha	Central, Mkushi
82	20003-HQ-AMR	Gift Sanyinda (100%)	AMR	GRT	Active	6.5466 ha	Southern, Choma
83	20004-HQ-AMR	Clement Hantumbu (100%)	AMR	GRT	Active	6.5582 ha	Southern, Choma
84	20005-HQ-AMR	Clement Hantumbu (100%)	AMR	GRT	Active	6.5583 ha	Southern, Choma
85	20074-HQ-AMR	Sylvia Bubala Chikale Mang'ola (100%)	AMR	F, LAT, LST2, STN1, STN2	Active	6.5686 ha	Southern, Siavonga
86	20075-HQ-AMR	Sylvia Bubala Chikale Mang'ola (100%)	AMR	F, LAT, LST2, STN1, STN2	Active	6.5687 ha	Southern, Siavonga
87	20108-HQ-AMR	Messres Davis Mwanamoya (100%)	AMR	AQM, QTZ, TML	Active	6.6780 ha	Eastern, Lundazi
88	20118-HQ-AMR	Beatrice Musuwa (100%)	AMR	Ag, Au, Co, Cu, Mn, QTZ, Zn	Active	6.6683 ha	Central, Serenje
89	20119-HQ-AMR	Winter Libbohole (100%)	AMR	AQM, EM, TML	Active	6.6683 ha	Central, Serenje
90	20153-HQ-AMR	Cyprus Tembo (100%)	AMR	AQM, GAR, TML	Active	6.6339 ha	Eastern, Nyimba
91	20156-HQ-AMR	Bubala Namakobo (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6784 ha	Copperbelt, Chililabombwe
92	20157-HQ-AMR	kabaso Babba Mulenga (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
93	20158-HQ-AMR	kabaso Babba Mulenga (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
94	20173-HQ-AMR	Casient Siamatika (100%)	AMR	AMT, AQM, GAR, STN	Active	6.5637 ha	Southern, Siavonga
95	20174-HQ-AMR	Nthambose Jackueline Mhlanga (100%)	AMR	GRT, SDG, STN	Active	6.6564 ha	Central, Mkushi
96	20191-HQ-AMR	Elias kangwa (100%)	AMR	STN	Active	6.5842 ha	Southern, Mazabuka
97	20214-HQ-AMR	Ngowani Makasa (100%)	AMR	SDG, SIL	Active	0.0667 km2	Copperbelt, Kitwe
98	20221-HQ-AMR	Edward Simukonda (100%)	AMR	Sn, Tl	Active	0.0652 km2	Southern, Kalomo
99	20222-HQ-AMR	David Bowa (100%)	AMR	Sn, Ta	Active	3.2582 ha	Southern, Kalomo
100	20245-HQ-AMR	Dennis Daniel Vlahakis (100%)	AMR	GRT, LAT, SAM, STN, STN2	Active	6.5818 ha	Southern, Siavonga
101	20255-HQ-AMR	Kennedy Katongo (100%)	AMR	SAM, SDG	Active	6.7175 ha	Northern, Chinsali
102	20303-HQ-AMR	Edward Lungu (100%)	AMR	Cu, Fe	Active	6.6277 ha	Eastern, Nyimba
103	20307-HQ-AMR	Ackson.L. Shanzi (100%)	AMR	STN	Active	6.6312 ha	Eastern, Katete
104	20308-HQ-AMR	Ackson.L. Shanzi (100%)	AMR	STN	Active	6.6311 ha	Eastern, Katete
105	20333-HQ-AMR	Dickson Kasamata Ngosa (100%)	AMR	Mn	Active	6.7230 ha	Luapula, Samfya
106	20388-HQ-AMR	Bettson Mukuka (100%)	AMR	SDG	Active	6.7202 ha	Northern, Chinsali
107	20399-HQ-AMR	Alice Mambwe Chabuka (100%)	AMR	am, GRT, LST, Mn	Active	6.6732 ha	Central, Serenje
108	20530-HQ-AMR	Alice Mambwe Chabuka (100%)	AMR	am, DOL, GRT, LST	Active	6.6709 ha	Central, Serenje
109	20531-HQ-AMR	Comas Mwanashiku (100%)	AMR	Ag, AMT, Au, Co, COA, Cu, EM, Mn, TML, Zn	Active	6.5357 ha	Southern, Choma

Annex 3: Small Scale Mining Location Site

No	Code	Parties	Type	Commodities	Status	Area	Map Reference
110	20532-HQ-AMR	Mathews .Z. Siabasimbi (100%)	AMR	Ag, AMT, Au, Co, COA, Cu, EM, Fe, LST, Mn, TML, Zn	Active	6.5358 ha	Southern, Choma
111	20559-HQ-AMR	Mostain Hakalomba Chinyama (100%)	AMR	Fe, Mn, QTZ	Active	6.6715 ha	Central, Serenje
112	20573-HQ-AMR	Betty Mathews Tembo (100%)	AMR	Au, Cu	Active	6.5855 ha	Lusaka, Kafue
113	20589-HQ-AMR	David Mubanga (100%)	AMR	Ag, Au, Cu, Fe, Mn	Active	6.6194 ha	Central, Mkushi
114	20602-HQ-AMR	Iain Findlay	AMR	GRT	Active	6.6818 ha	North Western, Solwezi
115	20603-HQ-AMR	Troy Philip Simutunda	AMR	QTZ	Active	6.6729 ha	Central, Serenje
116	20650-HQ-AMR	Kalunga Chola	AMR	Cu, Fe	Active	6.6211 ha	Eastern, Nyimba
117	20701-HQ-AMR	Kafwana Kapokoso	AMR	SDG	Active	6.6836 ha	North Western, Solwezi
118	20715-HQ-AMR	Luke Phiri	AMR	Au, Co, Cu, Zn	Active	6.6489 ha	Central, Serenje
119	20716-HQ-AMR	Masauso Phiri	AMR	Au, Co, Cu, Zn	Active	6.6489 ha	Central, Serenje
120	20740-HQ-AMR	Yuri Mubanga Sinyanwe	AMR	Co, Cu, SIL	Active	6.6684 ha	Copperbelt, Kalulushi
121	20743-HQ-AMR	Cliver Gondwe	AMR	AQM, QTZ, TML	Active	6.6644 ha	Eastern, Lundazi
122	20755-HQ-AMR		AMR	SDG, SIL	Active	6.6646 ha	Copperbelt, Luanshya
123	20767-HQ-AMR	Lameck Tembo	AMR	Cu, GAR, TML	Active	6.6504 ha	Eastern, Mambwe
124	20812-HQ-AMR	Mulonda Ngenda	AMR	Ag, Au, Co, COA, Cu, Fe, Mn, Pb, Zn	Active	6.6340 ha	Central, Mkushi
125	20875-HQ-AMR	Mulonda Ngenda	AMR	QTZ, TML	Active	6.6344 ha	Central, Mkushi
126	20883-HQ-AMR	Lamius Nyeleti	AMR	QTZ	Active	0.0665 km2	Copperbelt, Mpongwe
127	20884-HQ-AMR	Timothy Lubelenga	AMR	SDG	Active	0.0665 km2	North Western, Kasempa
128	20885-HQ-AMR	Timothy Lubelenga	AMR	QTZ	Active	0.0665 km2	North Western, Kasempa
129	21055-HQ-AMR	John Siyabonga Bungane	AMR	Ag, Au, Bi, Co, Cu, Fe, Mn, Pb, Pt, Rh, Se, V, Zn	Active	0.0331 km2	Central, Kabwe
130	21069-HQ-AMR	Patrick Mumba	AMR	Ag, Au, Cu	Active	3.3316 ha	Central, Mkushi
131	21107-HQ-AMR	Dorica Phiri	AMR	AQM, QTZ, TML	Active	6.6584 ha	Central, Mkushi
132	21114-HQ-AMR	Malikuki Elia	AMR	Cu	Active	6.6812 ha	North Western, Solwezi
133	21115-HQ-AMR	Fisonge Ilufya Small Scale Mining Cooperative Club	AMR	AMT, AQM, Be3Al2(-SiO3)6, GAR, QTZ	Active	6.6913 ha	Northern, Mpika
134	21132-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5890 ha	Lusaka, Kafue
135	21149-HQ-AMR	Michael Pasquini	AMR	TLC	Active	6.5938 ha	Lusaka, Kafue
136	21176-HQ-AMR	Humphrey Nsalamba	AMR	SIL	Active	6.6763 ha	Copperbelt, Mufulira
137	21184-HQ-AMR	Yvette Mwengwe Mutenta	AMR	AQM, GAR, Gr tourm, QTZ	Active	6.6965 ha	Eastern, Chama
138	21192-HQ-AMR	Moffat Mwale	AMR	Au	Active	6.6137 ha	Central, Chibombo
139	21193-HQ-AMR	Victor Siame	AMR	Au	Active	6.6140 ha	Central, Chibombo
140	21203-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5890 ha	Lusaka, Kafue
141	21208-HQ-AMR	Mathews Kalikiti	AMR	Au, Cu	Active	6.7488 ha	Northern, Mbala
142	21241-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5877 ha	Lusaka, Kafue
143	21285-HQ-AMR	Joseph Mwansa	AMR	AQM, TML	Active	6.6781 ha	Eastern, Lundazi
144	21339-HQ-AMR	Doreen Masuwa Kalenda	AMR	Au, Cu, Mn	Active	6.6638 ha	Central, Mkushi
145	21340-HQ-AMR	Andrew Kalenda Kayonde	AMR	Au, Cu, Mn	Active	6.6637 ha	Central, Mkushi
146	21394-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	0.0662 km2	Eastern, Nyimba
147	21419-HQ-AMR	Albertina Mwansa Kashiba	AMR	Ag, Au, Co, Cu, Zn	Active	3.3381 ha	Copperbelt, Chingola

Source: Ministry of Mines, Cadastre Department

Mining Sites for Artisanal Mining Permits

No	Code	Parties	Type	Commodities	Status	Area	Map Reference
1	8664-HQ-AMR	Emmanuel Chanda (100%)	AMR		Active	6.7171 ha	Luapula, Mansa, Mulaye Farm
2	8762-HQ-AMR	George Daka (100%)	AMR	AMT, EM, QTZ	Active	6.6553 ha	Copperbelt, Masaiti
3	10068-HQ-AMR	Pascal Kalwambisha (100%)	AMR	Cu	Active	6.6823 ha	North Western, Solwezi, Chief Mulonga
4	10215-HQ-AMR	Kabunda Joseph Mwape (100%)	AMR	TML	Active	6.7150 ha	Luapula, Mansa
5	12600-HQ-AMR	Leatetia Hamooba (100%)	AMR	MS	Active	6.5748 ha	Southern, Mazabuka
6	13056-HQ-AMR	Simion Mwanamambo (100%)	AMR	QTZ, TML	Active	6.5906 ha	Southern, Itezhi Tezhi
7	13800-HQ-AMR	Allan kimbani (100%)	AMR	MS	Active	6.6837 ha	
8	13801-HQ-AMR	Steven Pezulu Kajimanga (100%)	AMR	SDG	Active	6.6837 ha	
9	13802-HQ-AMR	Godfrey Kikome (100%)	AMR	MS	Active	6.6826 ha	
10	13930-HQ-AMR	Brian Mulopu (100%)	AMR	SDG	Active	6.6839 ha	
11	13999-HQ-AMR	Hurry Ntanga (100%)	AMR	SDG	Active	6.6826 ha	
12	14012-HQ-AMR	Doctor Siabusu Joinery (100%)	AMR	Cu, Cu2CO3(OH)2	Active	3.3209 ha	Eastern, Petauke
13	14036-HQ-AMR	john Kamalamba (100%)	AMR	SDG	Active	6.6828 ha	North Western, Solwezi
14	14387-HQ-AMR	Epiphania Kaundula (100%)	AMR	Fe	Active	6.6116 ha	Central, Chibombo
15	14544-HQ-AMR	Jennipher Mwale Chisala (0%)	AMR	Cu, Fe, Mn	Active	6.7228 ha	Northern, Luwingu
16	15308-HQ-AMR	Getrude NsofwaTuchula Chila (100%)	AMR	GRT, SDG	Active	6.5944 ha	Lusaka, Kafue
17	15479-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu, Zn	Active	3.3383 ha	Copperbelt, Chingola
18	15669-HQ-AMR	Henry Lukanga (100%)	AMR	Fe, Pb, Zn	Active	3.3136 ha	Central, Kabwe
19	15768-HQ-AMR	Henry Lukanga (100%)	AMR	DOL	Active	6.6258 ha	Central, Kabwe
20	16037-HQ-AMR	Stephen Mutale (100%)	AMR	Co, Cu, Fe	Active	6.6802 ha	Copperbelt, Mufulira
21	16165-HQ-AMR	Rabby Mulela (100%)	AMR	QTZ, SIL	Active	3.3400 ha	Copperbelt, Mufulira
22	16182-HQ-AMR	Betha Mwanza (100%)	AMR	Au, Co, Cu, Fe, Mn	Active	3.3298 ha	Central, Mkushi
23	16476-HQ-AMR	Eddah R Kanukula (100%)	AMR		Active	6.6300 ha	North Western, Kasempa
24	16762-HQ-AMR	Kenneth Simbeye (100%)	AMR	Mn	Active	6.6855 ha	Northern, Mpika
25	17185-HQ-AMR	Cyprian Phiri (100%)	AMR	MS, SIL	Active	6.6700 ha	Copperbelt, Kitwe
26	17410-HQ-AMR	Malani Ngambi (100%)	AMR	QTZ	Active	6.6600 ha	Central, Mkushi
27	17411-HQ-AMR	Jameson Mwitwa (100%)	AMR	QTZ	Active	6.6591 ha	Central, Mkushi
28	17741-HQ-AMR	Sandy Kamzimbi (100%)	AMR	Cu, Mn	Active	6.7222 ha	
29	17761-HQ-AMR	Dassywell Kapambwe (100%)	AMR	Co, Cu	Active	6.6700 ha	Copperbelt, Ndola
30	17779-HQ-AMR	Zamiwe Kausu (100%)	AMR	Ag, Au, Cu, Fe, LST	Active	6.6900 ha	North Western, Solwezi
31	17780-HQ-AMR	Zamiwe Kausu (100%)	AMR	Ag, Au, Cu, Fe, LST	Active	6.6900 ha	North Western, Solwezi
32	17793-HQ-AMR	Richard Banda (100%)	AMR	Ag, Co, Cu, LST, Zn	Active	6.6886 ha	North Western, Solwezi
33	17794-HQ-AMR	Richard Banda (100%)	AMR	Ag, Co, Cu, LST, Zn	Active	6.6900 ha	North Western, Solwezi
34	18163-HQ-AMR	Alfred Muchimba (100%)	AMR	AMT, AQM	Active	3.3400 ha	Eastern, Lundazi
35	18168-HQ-AMR	Beatrice Musuwa (100%)	AMR	Ag, Au, Co, Cu, Mn, QTZ, Zn	Active	0.0663 km2	Central, Kapiri Mposhi
36	18181-HQ-AMR	Syamate Simalele (100%)	AMR	SDG	Active	6.5750 ha	Southern, Mazabuka
37	18301-HQ-AMR	Lewin Makafu Salimu (100%)	AMR	GRT	Active	3.3400 ha	Copperbelt, Ndola
38	18527-HQ-AMR	Richard Banda (100%)	AMR	Co, Cu, LST, Ni	Active	6.6700 ha	Copperbelt, Ndola
39	18530-HQ-AMR	James Mkandawire (100%)	AMR	Co, Cu, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
40	18531-HQ-AMR	Alfred Zulu (100%)	AMR	Co, Cu, LST, Ni	Active	6.6700 ha	Copperbelt, Ndola
41	18533-HQ-AMR	Alfred Zulu (100%)	AMR	Co, Cu, LST, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
42	18534-HQ-AMR	Ria Banda (100%)	AMR	Co, Cu, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
43	18547-HQ-AMR	James M Mumbi (100%)	AMR	Co, Cu, LST, Mn, Ni	Active	6.6700 ha	Copperbelt, Ndola
44	18550-HQ-AMR	Edward Tembo (100%)	AMR	Au, Co, Cu, Fe, Mg, Mn	Active	6.6900 ha	North Western, Solwezi
45	18638-HQ-AMR	Marvis Ngoma (100%)	AMR	Fe, Sn, Ta	Active	6.5200 ha	Southern, Kalomo
46	18639-HQ-AMR	Puta Mwambi (100%)	AMR	Fe, Sn, Ta	Active	6.5200 ha	Southern, Kalomo
47	18761-HQ-AMR	David Mulenga (100%)	AMR	SDG	Active	6.6800 ha	Copperbelt, Chingola
48	18773-HQ-AMR	Eunice K. Anamela (100%)	AMR	Co, Cu, Fe, Mn, Zn	Active	6.7100 ha	Luapula, Mansa
49	18774-HQ-AMR	Eunice K. Anamela (100%)	AMR	Co, Cu, Fe, Mn, Zn	Active	6.7100 ha	Luapula, Mansa
50	18899-HQ-AMR	Lewis Mandeya (100%)	AMR	MS	Active	6.6800 ha	North Western, Solwezi
51	18901-HQ-AMR	Shadreck Kalima (100%)	AMR	Mn	Active	6.6272 ha	Central, Kapiri Mposhi
52	18940-HQ-AMR	Happy Chimbamanga (100%)	AMR	MS	Active	6.6800 ha	North Western, Solwezi
53	19169-HQ-AMR	MULENGA ANGELA CHITALU (100%)	AMR	CLY1, GYP, LST	Active	6.6826 ha	Northern, Mpika
54	19236-HQ-AMR	Christopher Sondoyi (100%)	AMR	SDG	Active	6.6851 ha	North Western, Solwezi
55	19308-HQ-AMR	Chibwe Chama (100%)	AMR	Au, Cu, Fe, Mn	Active	0.0667 km2	Northern, Mpika
56	19325-HQ-AMR	Mukupa Patrick Malama (100%)	AMR	Cu, EM	Active	6.6928 ha	Northern, Mpika
57	19376-HQ-AMR	Lucia Mupeta (100%)	AMR	Au	Active	6.6100 ha	Lusaka, Chongwe
58	19416-HQ-AMR	Joel Mulule Ngo (100%)	AMR	SLA, STN, STN1	Active		Northern, Kasama
59	19450-HQ-AMR	Gideon Kajoba (100%)	AMR	QTZ	Active	6.6681 ha	North Western, Solwezi
60	19460-HQ-AMR	Delax Chilumbu (100%)	AMR	Au, Cu, LST	Active	3.3361 ha	Copperbelt, Masaiti, Ndola
61	19474-HQ-AMR	Dorothy Kaonga (100%)	AMR	Au, GRF	Active	6.7298 ha	Northern, Isoka
62	19543-HQ-AMR	Lubilo Mate (100%)	AMR	SDG	Active	6.6800 ha	North Western, Solwezi
63	19591-HQ-AMR	Solomon Anos Tembo (100%)	AMR	Au, Cu, Fe, Mn, Pb, Zn	Active	6.6591 ha	Central, Mkushi

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No	Code	Parties	Type	Commodities	Status	Area	Map Reference
64	19647-HQ-AMR	Evans Kunda Musunsa (100%)	AMR	AQM, QTZ, TML	Active	0.0666 km2	Central, Serenje
65	19676-HQ-AMR	Augustine Kafwafwa Kasongo (100%)	AMR	SAM	Active	0.0668 km2	North Western, Solwezi
66	19683-HQ-AMR	Ackson Chitofu (100%)	AMR	SAM	Active	6.6836 ha	North Western, Solwezi
67	19722-HQ-AMR	Joseph Shabaya Moyo (100%)	AMR	GRT, SAM, STN	Active	0.0666 km2	Central, Mkushi
68	19750-HQ-AMR	Bubala Namakobo (100%)	AMR	Ag, Au, Co, Cu, Fe, Mn, Pb, Pt, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
69	19766-HQ-AMR	Richard Kombe (100%)	AMR	AMT, AQM, GAR, QTZ, TML	Active	6.6678 ha	Eastern, Lundazi
70	19792-HQ-AMR	Goodson Mwape (100%)	AMR	Mn	Active	6.7223 ha	Luapula, Samfya
71	19830-HQ-AMR	Jigneshi P.Soni (100%)	AMR	Au, Co, Cu, GRT	Active	6.6763 ha	North Western, Solwezi
72	19831-HQ-AMR	Jignesh P.Soni (100%)	AMR	Au, Co, Cu, GRT	Active	6.6788 ha	North Western, Solwezi
73	19832-HQ-AMR	Katie Evanthia Stavron (100%)	AMR	SIL	Active	6.6772 ha	Copperbelt, Chingola
74	19849-HQ-AMR	Messiah Sekani (100%)	AMR	Ag, Au, Co, Cu	Active	6.6166 ha	Central, Chibombo
75	19850-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu	Active	6.6166 ha	Central, Chibombo
76	19851-HQ-AMR	Joseph Phiri (100%)	AMR	Ag, Au, Co, Cu	Active	6.6167 ha	Central, Chibombo
77	19901-HQ-AMR	Mulandu Matoka (100%)	AMR	SDG	Active	6.6846 ha	North Western, Solwezi
78	19952-HQ-AMR	Peter Sito Kalikeka Mwanza (100%)	AMR	Cu, Ti	Active	6.6421 ha	Eastern, Petauke
79	19972-HQ-AMR	Misheck Mutumbwe (100%)	AMR	AQM, QTZ, TML	Active	6.6451 ha	Central, Mkushi
80	19981-HQ-AMR	Godfrey, Robert Kayukwa (100%)	AMR	AQM, QTZ, TML	Active	6.5915 ha	Southern, Itezhi Tezhi
81	19989-HQ-AMR	Albertina Kalembwe Kababa (100%)	AMR	AMT, AQM, Au, Co, Cu, Fe, LST, Mn, QTZ, TML, Zn	Active	6.6587 ha	Central, Mkushi
82	20003-HQ-AMR	Gift Sanyinda (100%)	AMR	GRT	Active	6.5466 ha	Southern, Choma
83	20004-HQ-AMR	Clement Hantumbu (100%)	AMR	GRT	Active	6.5582 ha	Southern, Choma
84	20005-HQ-AMR	Clement Hantumbu (100%)	AMR	GRT	Active	6.5583 ha	Southern, Choma
85	20074-HQ-AMR	Sylvia Bubala Chikale Mang'ola (100%)	AMR	F, LAT, LST2, STN1, STN2	Active	6.5686 ha	Southern, Siavonga
86	20075-HQ-AMR	Sylvia Bubala Chikale Mang'ola (100%)	AMR	F, LAT, LST2, STN1, STN2	Active	6.5687 ha	Southern, Siavonga
87	20108-HQ-AMR	Messres Davis Mwanamoya (100%)	AMR	AQM, QTZ, TML	Active	6.6780 ha	Eastern, Lundazi
88	20118-HQ-AMR	Beatrice Musuwa (100%)	AMR	Ag, Au, Co, Cu, Mn, QTZ, Zn	Active	6.6683 ha	Central, Serenje
89	20119-HQ-AMR	Winter Libbohole (100%)	AMR	AQM, EM, TML	Active	6.6683 ha	Central, Serenje
90	20153-HQ-AMR	Cyprus Tembo (100%)	AMR	AQM, GAR, TML	Active	6.6339 ha	Eastern, Nyimba
91	20156-HQ-AMR	Bubala Namakobo (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6784 ha	Copperbelt, Chililabombwe
92	20157-HQ-AMR	kabaso Babba Mulenga (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
93	20158-HQ-AMR	kabaso Babba Mulenga (100%)	AMR	Ag, Au, Co, Cu, Mn, Pb, Zn	Active	6.6786 ha	Copperbelt, Chililabombwe
94	20173-HQ-AMR	Casient Siamatika (100%)	AMR	AMT, AQM, GAR, STN	Active	6.5637 ha	Southern, Siavonga
95	20174-HQ-AMR	Nthambose Jackueline Mhlanga (100%)	AMR	GRT, SDG, STN	Active	6.6564 ha	Central, Mkushi
96	20191-HQ-AMR	Elias kangwa (100%)	AMR	STN	Active	6.5842 ha	Southern, Mazabuka
97	20214-HQ-AMR	Ngowani Makasa (100%)	AMR	SDG, SIL	Active	0.0667 km2	Copperbelt, Kitwe
98	20221-HQ-AMR	Edward Simukonda (100%)	AMR	Sn, Tl	Active	0.0652 km2	Southern, Kalomo
99	20222-HQ-AMR	David Bowa (100%)	AMR	Sn, Ta	Active	3.2582 ha	Southern, Kalomo
100	20245-HQ-AMR	Dennis Daniel Vlahakis (100%)	AMR	GRT, LAT, SAM, STN, STN2	Active	6.5818 ha	Southern, Siavonga
101	20255-HQ-AMR	Kennedy Katongo (100%)	AMR	SAM, SDG	Active	6.7175 ha	Northern, Chinsali
102	20303-HQ-AMR	Edward Lungu (100%)	AMR	Cu, Fe	Active	6.6277 ha	Eastern, Nyimba
103	20307-HQ-AMR	Ackson.L. Shanzi (100%)	AMR	STN	Active	6.6312 ha	Eastern, Katete
104	20308-HQ-AMR	Ackson.L. Shanzi (100%)	AMR	STN	Active	6.6311 ha	Eastern, Katete
105	20333-HQ-AMR	Dickson Kasamata Ngosa (100%)	AMR	Mn	Active	6.7230 ha	Luapula, Samfya
106	20388-HQ-AMR	Bettson Mukuka (100%)	AMR	SDG	Active	6.7202 ha	Northern, Chinsali
107	20399-HQ-AMR	Alice Mambwe Chabuka (100%)	AMR	am, GRT, LST, Mn	Active	6.6732 ha	Central, Serenje
108	20530-HQ-AMR	Alice Mambwe Chabuka (100%)	AMR	am, DOL, GRT, LST	Active	6.6709 ha	Central, Serenje
109	20531-HQ-AMR	Comas Mwanashiku (100%)	AMR	Ag, AMT, Au, Co, COA, Cu, EM, Mn, TML, Zn	Active	6.5357 ha	Southern, Choma
110	20532-HQ-AMR	Mathews .Z. Siabasimbi (100%)	AMR	Ag, AMT, Au, Co, COA, Cu, EM, Fe, LST, Mn, TML, Zn	Active	6.5358 ha	Southern, Choma
111	20559-HQ-AMR	Mostain Hakalomba Chinyama (100%)	AMR	Fe, Mn, QTZ	Active	6.6715 ha	Central, Serenje
112	20573-HQ-AMR	Betty Mathews Tembo (100%)	AMR	Au, Cu	Active	6.5855 ha	Lusaka, Kafue
113	20589-HQ-AMR	David Mubanga (100%)	AMR	Ag, Au, Cu, Fe, Mn	Active	6.6194 ha	Central, Mkushi
114	20602-HQ-AMR	Iain Findlay	AMR	GRT	Active	6.6818 ha	North Western, Solwezi
115	20603-HQ-AMR	Troy Philip Simutunda	AMR	QTZ	Active	6.6729 ha	Central, Serenje
116	20650-HQ-AMR	Kalunga Chola	AMR	Cu, Fe	Active	6.6211 ha	Eastern, Nyimba
117	20701-HQ-AMR	Kafwana Kapokoso	AMR	SDG	Active	6.6836 ha	North Western, Solwezi
118	20715-HQ-AMR	Luke Phiri	AMR	Au, Co, Cu, Zn	Active	6.6489 ha	Central, Serenje
119	20716-HQ-AMR	Masauso Phiri	AMR	Au, Co, Cu, Zn	Active	6.6489 ha	Central, Serenje
120	20740-HQ-AMR	Yuri Mubanga Sinyanwe	AMR	Co, Cu, SIL	Active	6.6684 ha	Copperbelt, Kalulushi
121	20743-HQ-AMR	Cliver Gondwe	AMR	AQM, QTZ, TML	Active	6.6644 ha	Eastern, Lundazi
122	20755-HQ-AMR		AMR	SDG, SIL	Active	6.6646 ha	Copperbelt, Luanshya

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No	**Code**	**Parties**	**Type**	**Commodities**	**Status**	**Area**	**Map Reference**
123	20767-HQ-AMR	Lameck Tembo	AMR	Cu, GAR, TML	Active	6.6504 ha	Eastern, Mambwe
124	20812-HQ-AMR	Mulonda Ngenda	AMR	Ag, Au, Co, COA, Cu, Fe, Mn, Pb, Zn	Active	6.6340 ha	Central, Mkushi
125	20875-HQ-AMR	Mulonda Ngenda	AMR	QTZ, TML	Active	6.6344 ha	Central, Mkushi
126	20883-HQ-AMR	Lamius Nyeleti	AMR	QTZ	Active	0.0665 km2	Copperbelt, Mpongwe
127	20884-HQ-AMR	Timothy Lubelenga	AMR	SDG	Active	0.0665 km2	North Western, Kasempa
128	20885-HQ-AMR	Timothy Lubelenga	AMR	QTZ	Active	0.0665 km2	North Western, Kasempa
129	21055-HQ-AMR	John Siyabonga Bungane	AMR	Ag, Au, Bi, Co, Cu, Fe, Mn, Pb, Pt, Rh, Se, V, Zn	Active	0.0331 km2	Central, Kabwe
130	21069-HQ-AMR	Patrick Mumba	AMR	Ag, Au, Cu	Active	3.3316 ha	Central, Mkushi
131	21107-HQ-AMR	Dorica Phiri	AMR	AQM, QTZ, TML	Active	6.6584 ha	Central, Mkushi
132	21114-HQ-AMR	Malikuki Elia	AMR	Cu	Active	6.6812 ha	North Western, Solwezi
133	21115-HQ-AMR	Fisonge Ilufya Small Scale Mining Cooperative Club	AMR	AMT, AQM, Be3Al2(SiO3)6, GAR, QTZ	Active	6.6913 ha	Northern, Mpika
134	21132-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5890 ha	Lusaka, Kafue
135	21149-HQ-AMR	Michael Pasquini	AMR	TLC	Active	6.5938 ha	Lusaka, Kafue
136	21176-HQ-AMR	Humphrey Nsalamba	AMR	SIL	Active	6.6763 ha	Copperbelt, Mufulira
137	21184-HQ-AMR	Yvette Mwengwe Mutenta	AMR	AQM, GAR, Gr tourm, QTZ	Active	6.6965 ha	Eastern, Chama
138	21192-HQ-AMR	Moffat Mwale	AMR	Au	Active	6.6137 ha	Central, Chibombo
139	21193-HQ-AMR	Victor Siame	AMR	Au	Active	6.6140 ha	Central, Chibombo
140	21203-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5890 ha	Lusaka, Kafue
141	21208-HQ-AMR	Mathews Kalikiti	AMR	Au, Cu	Active	6.7488 ha	Northern, Mbala
142	21241-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	6.5877 ha	Lusaka, Kafue
143	21285-HQ-AMR	Joseph Mwansa	AMR	AQM, TML	Active	6.6781 ha	Eastern, Lundazi
144	21339-HQ-AMR	Doreen Masuwa Kalenda	AMR	Au, Cu, Mn	Active	6.6638 ha	Central, Mkushi
145	21340-HQ-AMR	Andrew Kalenda Kayonde	AMR	Au, Cu, Mn	Active	6.6637 ha	Central, Mkushi
146	21394-HQ-AMR	Masauso Phiri	AMR	Ag, Au, Co, Cu	Active	0.0662 km2	Eastern, Nyimba
147	21419-HQ-AMR	Albertina Mwansa Kashiba	AMR	Ag, Au, Co, Cu, Zn	Active	3.3381 ha	Copperbelt, Chingola

Source: Ministry of Mines, Cadastre Department

APPENDIX 2 (a): Area, Production and Yield by Type of Crop , 2000 to 2007

Crop	Year	Agricultural Season							
		2000	2001	2002	2003	2004	2005	2006	2007
Maize	Area Planted (ha)	561,491	583,855	575,685	699,276	1,868,205	834,981	784,524	872,812
	Area Harvested (ha)			411,662	557,562	531,623	465,832	618,955	586,503
	Production (Tonnes)	850,466	801,889	601,606	1,157,860	1,213,202	866,187	1,424,439	1,366,158
	Yield (Ton/ha)	1.51	1.37	1.05	1.66	1.93	1.04	1.82	1.57
Sorghum	Area Planted (ha)	32,504	583,855	30,033	37,054	47,390	57,432	43,626	31,596
	Area Harvested (ha)			21,782	30,335	42,226	21,791	32,021	19,427
	Production (Tonnes)	22,962	30,245	16,802	20,300	24,467	18,714	21,047	12,773
	Yield (Ton/ha)	0.71	0.05	0.56	0.67	0.52	0.33	0.48	0.4
Rice	Area Planted (ha)	9,804	14,321	12,926	10,305	12,379	18,243	14,359	20,067
	Area Harvested (ha)			9,270	7,452	9,684	10,368	10,631	12,110
	Production (Tonnes)	8,168	8,430	11,645	10,743	11,699	13,337	13,964	18,317
	Yield (Ton/ha)	0.83	0.88	0.9	1.04	0.95	0.73	0.97	0.91
Millet	Area Planted (ha)	61,073	70,129	66,045	56,750	59,081	63,411	69,529	56,817
	Area Harvested (ha)			50,298	49,320	50,887	39,210	52,091	44,294
	Production (Tonnes)	42,743	46,875	37,615	35,332	39,784	29,583	48,159	21,707
	Yield (Ton/ha)	0.7	0.67	0.57	0.62	0.67	0.47	0.69	0.38
Sunflower	Area Planted (ha)	11,622	37,388	20,833	1,688	30,689	31,191	39,416	28,829
	Area Harvested (ha)			17,186		26,729	18,007	34,521	23,170
	Production (Tonnes)	6,393	19,002	9,364	1,333	13,857	8,112	15,003	8,953
	Yield (Ton/ha)	0.55	0.5	0.45	0.79	0.45	0.26	0.38	0.31
Groundnuts	Area Planted (ha)	70,018	137,108	129,473	150,460	116,494	161,962	144,251	147,320
	Area Harvested (ha)			108,748	135,623	106,797	108,245	131,921	124,578
	Production (Tonnes)	23,447	57,753	41,421	82,551	69,696	74,218	84,010	55,215
	Yield (Ton/ha)	0.33	0.38	0.32	0.55	0.6	0.46	0.58	0.37
Soyabeans	Area Planted (ha)	2,554	16,754	3,998	17,402	33,186	65,170	44,034	38,947
	Area Harvested (ha)			3,889		32,407	54,767	42,175	34,468
	Production (Tonnes)	1,839	28,311	2,350	42,119	54,687	89,660	57,815	55,194
	Yield (Ton/ha)	0.72	1.69	0.59	2.42	1.65	1.38	1.31	1.42
Wheat	Area Planted (ha)	-	-	-	16,942	13,543	22,323	9,714	19,188
	Area Harvested (ha)				16,633	13,543	22,033	9,519	18,833
	Production (Tonnes)	-	-	74,527	99,500	82,585	136,833	93,482	115,843
	Yield (Ton/ha)				5.73	6.12	6.13	5.51	6.04
Mixed Beans	Area Planted (ha)	21,043	51,025	36,577	44,001	45,270	50,496	54,532	55,663
	Area Harvested (ha)			32,943	38,174	40,561	38,984	50,663	47,428
	Production (Tonnes)	9,841	21,349	16,619	24,097	18,161	23,098	27,697	24,164
	Yield (Ton/ha)	0.47	0.4	0.45	0.55	0.4	0.46	0.51	0.43
Cotton	Area Planted (ha)	_	_	_	86,431	121,593	176,217	152,262	89,312
	Area Harvested (ha)	_	_	_	78,407	109,991	120,605	137,944	74,347
	Production (Tonnes)	-	-	116,000	118,000	144,307	155,213	118,425	54,886
	Yield (Ton/ha)	_	_	_	7.83	1.19	0.88	0.78	0.84
Virginia Tobacco	Area Planted (ha)	_	_	_	_	5,464	15,630	8,521	8,265
	Area Harvested (ha)	_	_	_	_	5,382	13,871	8,057	7,504
	Production (Tonnes)	3,066	3,707	5,080	7,522	14,608	23,211	14,685	15,562
	Yield (Ton/ha)	_	_	_	_	2.34	1.49	1.72	1.44
Burley Tobacco	Area Planted (ha)	_	_	_	3,944	8,328	9,804	6,439	55,508
	Area Harvested (ha)	_	_	_	3,921	8,003	7,976	6,200	47,335
	Production (Tonnes)	7,610	3,608	8,901	12,513	15,363	13,094	7,742	24,011
	Yield (Ton/ha)				50.3	1.14	1.34	1.2	0.46
Sweet Potatoes	Area Planted (ha)	39,356	74,063	33,570	33,846	29,783	27,232	33,148	29,476
	Area Harvested (ha)			29,720	32,464	28,160	22,437	32,127	27,314
	Production (Tonnes)	324,737	76,098	59,349	101,582	109,489	66,926	101,287	75,664
	Yield (Ton/ha)	8.25	1.03	1.77	3	3.68	2.46	3.06	2.57
Maize for Seed	Area Planted (ha)	_	_	_	_	_	_	_	_
	Area Harvested (ha)	_	_	_	_	_	_	_	_
	Production (Tonnes)	_	_	_	_	_	_	_	_
	Yield (Ton/ha)	_	_	_	_	_	_	_	_
Maize for Sillage	Area Planted (ha)	_	_	_	_	_	_	_	_
	Area Harvested (ha)	_	_	_	_	_	_	_	_
	Production (Tonnes)	_	_	_	_	_	_	_	_
	Yield (Ton/ha)	_	_	_	_	_	_	_	_

APPENDIX 2 (a): Area, Production and Yield by Type of Crop , 2000 to 2007

Crop	Year	Agricultural Season							
		2000	2001	2002	2003	2004	2005	2006	2007
Barley	Area Planted (ha)	_	_	_	_	_	_	_	_
	Area Harvested (ha)	_	_	_	_	_	_	_	_
	Production (Tonnes)	_	_	_	_	_	_	_	_
	Yield (Ton/ha)	_	_	_	_	_	_	_	_
Irish Potatoes	Area Planted (ha)	_	_	_	_	_	1,120	932	3,305
	Area Harvested (ha)	_	_	_	_	_	973	929	3,241
	Production (Tonnes)	_	_	_	_	_	14,035	2,388	22,771
	Yield (Ton/ha)	_	_	_	_	_	12.53	0.39	2.92
Mbabara Nuts	Area Planted (ha)	_	_	_	_	_	3,407	2,387	4,408
	Area Harvested (ha)	_	_	_	_	_	2,401	2,128	3,331
	Production (Tonnes)	_	_	_	_	_	1,237	1,593	2,371
	Yield (Ton/ha)	_	_	_	_	_	0.36	1.5	0.57
Cowpeas	Area Planted (ha)	_	_	4,045	_	8,486	6,687	7,120	_
	Area Harvested (ha)	_	_	2,042	_	7,063	2,704	5,509	_
	Production (Tonnes)	_	_	1,141	_	2,907	1,249	3,146	_
	Yield (Ton/ha)	_	_	0.28	_	0.34	0.19	0.44	_
Velvet Beans	Area Planted (ha)	_	_	_	_	_	_	463	115
	Area Harvested (ha)	_	_	_	_	_	_	449	48
	Production (Tonnes)	_	_	_	_	_	_	218	37
	Yield (Ton/ha)	_	_	_	_	_	_	0.46	0.98
Paprika	Area Planted (ha)	_	_	_	_	_	320	577	1,239
	Area Harvested (ha)	_	_	_	_	_	279	505	1,160
	Production (Tonnes)	_	_	_	_	_	728	284	1,559
	Yield (Ton/ha)	_	_	_	_	_	2.28	0.5	0.96
Pineapples	Area Planted (ha)	_	_	_	_	_	53	603	310
	Area Harvested (ha)	_	_	_	_	_	48	505	310
	Production (Tonnes)	_	_	_	_	_	-	_	-
	Yield (Ton/ha)	_	_	_	_	_	-	_	-
Castor beans	Area Planted (ha)	_	_	_	_	_	1	_	1
	Area Harvested (ha)	_	_	_	_	_	1	_	1
	Production (Tonnes)	_	_	_	_	_	0	_	1
	Yield (Ton/ha)	_	_	_	_	_	0.03	_	1.23
Popcorns	Area Planted (ha)	_	_	_	_	_	_	_	_
	Area Harvested (ha)	_	_	_	_	_	_	_	_
	Production (Tonnes)	_	_	_	_	_	_	_	_
	Yield (Ton/ha)	_	_	_	_	_	_	_	_
Non-Industrial Sugar Cane	Area Planted (ha)	_	_	_	_	_	_	_	_
	Area Harvested (ha)	_	_	_	_	_	_	_	_
	Production (Tonnes)	_	_	_	_	_	_	_	_
	Yield (Ton/ha)	_	_	_	_	_	_	_	_
Cassava	Area Planted (ha)	_	309,004	348,009	327,560	311,683	361,026	362,355	_
	Area Harvested (ha)	_	116,277	133,218	140,251	208,100	243,360	4,239,549	_
	Production (Tonnes)	_	903,837	1,017,926	981,757	3,646,693	4,224,000	1,059,887	_
	Yield (Ton/ha)								

APPENDIX 2 (b): Area, Production and Yield by Type of Crop, 2008 to 2014

Crop/Area/Haverst/Production		2008	2009	2010	2011	2012	2013	2014
Maize	Area Planted (ha)	928,224	1,125,466	1,242,268	1,355,764	1,274,983	1,312,402	1,419,326
	Area Harvested (ha)		911,492	1,080,558	1,101,785	1,074,658	997,880	1,205,202
	Production (Tonnes)	1,211,566	1,887,010	2,795,483	3,020,380	2,852,687	2,532,800	3,350,671
	Yield (Ton/ha)	1.3	1.7	2.25	2.73	2.24	1.93	2.36
Sorghum	Area Planted (ha)	24,349	40,485	34,251	26,854	18,685	23,112	17,335
	Area Harvested (ha)		32,212	28,908	22,446	15,714	15,611	14,035
	Production (Tonnes)	9,992	21,829	27,732	18,458	15,379	14,971	11,557
	Yield (Ton/ha)	0.41	0.54	0.81	0.72	0.82	0.65	0.67
Rice	Area Planted (ha)	25,177	31,032	35,841	33,995	31,388	38,520	40,974
	Area Harvested (ha)		25,582	30,788	27,496	26,265	31,621	33,207
	Production (Tonnes)	24,023	41,929	51,656	49,410	45,321	44,747	49,640
	Yield (Ton/ha)	0.95	1.35	1.44	1.73	1.44	1.16	1.21
Millet	Area Planted (ha)	45,508	61,626	56,789	42,663	35,828	33,834	39,535
	Area Harvested (ha)		55,951	50,808	39,282	29,295	29,230	34,484
	Production (Tonnes)	33,934	48,967	47,997	37,644	28,446	23,942	30,504
	Yield (Ton/ha)	0.75	0.47	0.85	0.75	0.79	0.71	0.77
Sunflower	Area Planted (ha)	32,491	71,290	54,450	40,894	40,870	66,515	66,616
	Area Harvested (ha)		65,417	51,602	36,886	38,297	63,089	63,076
	Production (Tonnes)	12,662	33,653	26,420	21,954	20,468	33,733	34,264
	Yield (Ton/ha)	0.39	0.47	0.49	0.81	0.5	0.51	0.51
Groundnuts	Area Planted (ha)	144,201	216,126	268,803	224,121	184,397	207,249	249,432
	Area Harvested (ha)		204,073	255,782	209,237	176,162	194,099	237,423
	Production (Tonnes)	70,527	120,564	164,602	139,388	113,026	106,792	143,591
	Yield (Ton/ha)	0.49	0.56	0.61	0.66	0.61	0.52	0.58
Soyabeans	Area Planted (ha)	32,404	64,680	62,331	61,422	86,223	124,858	116,515
	Area Harvested (ha)		62,877	60,777	59,988	84,809	121,351	113,759
	Production (Tonnes)	56,839	118,794	111,888	116,539	203,038	261,063	214,179
	Yield (Ton/ha)	1.75	1.84	1.8	1.3	2.35	2.09	1.84
Wheat	Area Planted (ha)	19,480	34,296	27,192	37,637	37,230	41,810	28,161
	Area Harvested (ha)		97,144	27,192	37,631	37,209	41,810	28,159
	Production (Tonnes)	113,242	87,018	172,256	237,336	253,522	273,584	201,504
	Yield (Ton/ha)	5.81	5.7	6.33	6.03	6.81	6.54	7.16
Mixed Beans	Area Planted (ha)	59,588	83,627	85,177	71,544	88,673	104,177	110,739
	Area Harvested (ha)		79,270	81,575	68,239	86,828	98,619	104,681
	Production (Tonnes)	44,463	46,729	65,265	47,070	55,301	56,411	61,749
	Yield (Ton/ha)	0.75	0.56	0.77	0.68	0.62	0.54	0.56
Cotton	Area Planted (ha)		103,154	85,073	131,857	314,497	172,160	133,975
	Area Harvested (ha)		97,144	81,706	125,108	299,814	154,512	124,888
	Production (Tonnes)	71,820	87,018	72,482	121,908	269,502	139,583	120,314
	Yield (Ton/ha)			0.85	0.98	0.86	0.81	0.9
Virginia Tobacco	Area Planted (ha)		11,638	11,984	15,080	10,725	11,348	15,292
	Area Harvested (ha)		11,084	11,758	14,946	10,501	11,167	14,975
	Production (Tonnes)	12,500	18,487	22,074	27,146	24,250	21,195	26,105
	Yield (Ton/ha)			1.84	1.89	2.26	1.87	1.71
Burley Tobacco	Area Planted (ha)		7,785	8,618	10,122	3,161	7,091	7,297
	Area Harvested (ha)		7,727	8,381	9,536	3,067	7,071	7,144
	Production (Tonnes)	4,659	8,758	9,809	11,141	7,067	8,704	9,564
	Yield (Ton/ha)			1.14	1.12	2.24	1.23	1.31
Sweet Potatoes	Area Planted (ha)	32,436	64,341	70,755	45,335	42,847	48,454	47,689
	Area Harvested (ha)		60,638	68,993	43,211	41,725	46,420	45,677
	Production (Tonnes)	106,522	200,450	252,867	146,614	163,484	188,355	150,158
	Yield (Ton/ha)	3.28	3.12	3.57	3.96	3.82	3.89	3.15
Maize for Seed	Area Planted (ha)	_	_	6,328	13,922	5,511	6,903	5,926
	Area Harvested (ha)	_	_	6,284	13,765	5,470	6,837	5,898
	Production (Tonnes)	_	_	37,550	69,166	30,003	35,190	28,968
	Yield (Ton/ha)	_	_	6	5	5	5	5
Maize for Sillage	Area Planted (ha)	_	_	1,608	2,012	1,928	1,682	1,759
	Area Harvested (ha)	_	_	1,545	2,007	1,869	1,668	1,660
	Production (Tonnes)	_	_	-	-	-	-	455
	Yield (Ton/ha)	_	_	-	-	-	-	0

APPENDIX 2 (b): Area, Production and Yield by Type of Crop, 2008 to 2014

Crop/Area/Haverst/Production		2008	2009	2010	2011	2012	2013	2014
Barley	Area Planted (ha)	_	_	181	1,206	2,142	1,528	1,130
	Area Harvested (ha)	_	_	181	1,206	2,142	1,528	1,128
	Production (Tonnes)	_	_	1,089	8,878	15,295	11,524	8,425
	Yield (Ton/ha)	_	_	6	7	7	8	7
Irish Potatoes	Area Planted (ha)	1,058	1,305	1,425	1,806	1,903	1,757	1,759
	Area Harvested (ha)	1,009	1,233	1,415	1,764	1,898	1,724	1,707
	Production (Tonnes)	10,196	21,285	22,940	27,563	32,066	22,038	33,833
	Yield (Ton/ha)	4.53	_	16.1	9.74	16.85	12.54	19.23
Mbabara Nuts	Area Planted (ha)	2,204	_	6,375	5,750	5,181	5,155	6,765
	Area Harvested (ha)		_	6,083	5,621	1,866	4,787	6,493
	Production (Tonnes)	2,513	_	6,298	7,209	4,712	4,842	7,140
	Yield (Ton/ha)	0.84	_	0.99	1.15	0.91	0.94	1.06
Cowpeas	Area Planted (ha)	3,688	12,967	6,416	2,089	4,869	7,873	7,952
	Area Harvested (ha)	2,121	11,189	6,026	1,992	4,235	6,694	7,244
	Production (Tonnes)	1,506	7,462	2,722	1,376	2,139	4,143	5,301
	Yield (Ton/ha)	0.52	_	0.42	0.62	0.44	0.53	0.67
Velvet Beans	Area Planted (ha)	12	_	_	63		33	
	Area Harvested (ha)	12	_	_	63		33	
	Production (Tonnes)	3	_	_	39		11	
	Yield (Ton/ha)	0.32	_	_	0.86		0.35	
Paprika	Area Planted (ha)	434	312	363	302	680	418	67
	Area Harvested (ha)	420	291	351	302	676	418	65
	Production (Tonnes)	995	1,020	533	600	965	605	52
	Yield (Ton/ha)	1.44		1.47	0.96	1.42	1.45	0.77
Pineapples	Area Planted (ha)	_	_	_	64	1,198	669	
	Area Harvested (ha)	_	_	_	64	1,185	599	
	Production (Tonnes)	_	_	_	105	4,689	7,751	
	Yield (Ton/ha)	_	_	_	1.63	3.92	11.58	
Castor beans	Area Planted (ha)	13	_	_	12	1		
	Area Harvested (ha)	13	_	_	12	1		
	Production (Tonnes)	11	_	_	1			
	Yield (Ton/ha)	0.8	_	_	0.06			
Popcorns	Area Planted (ha)	_	_	5,597	3,275	2,033	5,562	6,280
	Area Harvested (ha)	_	_	5,149	2,954	1,969	4,730	5,795
	Production (Tonnes)	_	_	7,846	4,408	2,150	7,203	4,377
	Yield (Ton/ha)	_	_	1.4	1.5	1.06	1.3	0.7
Non-Industrial Sugar Cane	Area Planted (ha)	_	_	_	99		231	164
	Area Harvested (ha)	_	_	_	99		231	164
	Production (Tonnes)	_	_	_	1,942		1,137	813
	Yield (Ton/ha)	_	_	_	13.1		4.93	4.97
Cassava	Area Planted (ha)	4,209,391	_	403,302	387,062	378,219	381,054	314,358
	Area Harvested (ha)	5,926,421	_	168,816	148,909	153,254	167,804	116,106
	Production (Tonnes)	37,454,229	_	4,718,629	4,528,624	4,425,168	4,458,333	3,677,987
	Yield (Ton/ha)							

APPENDIX 2 (c): Area, Production and Yield of Maize by Province, 2001 to 2007

Province/Area/Production		2001	2002	2003	2004	2005	2006	2007
Central	Area Planted	89,494	83,047	129,262	118,340	130,130	147,916	143,762
	Area Harvested	68,655	68,106	112,414	104,770	73,181	118,667	112,064
	Production	162,272	130,655	342,856	331,856	204,230	416,835	405,282
	Yield	1.81		2.65	2.8	1.57	2.82	2.82
Copperbelt	Area Planted	33,273	36,410	62,122	57,250	64,598	71,048	64,945
	Area Harvested	27,735	33,090	54,755	51,027	44,071	61,282	47,235
	Production	68,080	64,300	144,458	141,483	118,737	165,329	130,601
	Yield	2.05	1.77	2.33	2.47	1.84	2.33	2.01
Eastern	Area Planted	178,688	170,302	186,789	168,853	202,373	206,570	208,319
	Area Harvested	150,368	162,137	155,517	147,387	112,342	179,436	149,168
	Production	196,317	202,385	201,521	260,469	169,315	285,519	225,178
	Yield	1.1	1.19	1.08	1.54	0.84	1.38	1.08
Luapula	Area Planted	12,869	10,052	10,264	12,798	23,252	19,205	20,721
	Area Harvested	10,500	9,734	8,777	11,690	19,950	17,314	15,522
	Production	14,998	15,714	14,860	20,462	31,883	37,774	32,225
	Yield	1.17	1.56	1.45	1.6	1.37	1.97	1.56
Lusaka	Area Planted	28,482	25,629	50,518	19,785	29,322	26,787	38,005
	Area Harvested	24,193	21,759	45,629	17,910	16,858	24,059	28,467
	Production	58,127	48,355	177,865	58,590	33,061	61,180	84,127
	Yield	2.04	1.89	3.52	2.96	1.13	2.28	2.21
Muchinga	Area Planted							
	Area Harvested							
	Production							
	yield							
Northern	Area Planted	41,533	31,396	50,859	53,730	92,685	68,599	75,000
	Area Harvested	35,539	28,648	46,942	50,599	81,383	62,115	59,050
	Production	43,496	38,022	79,881	91,878	118,017	123,239	138,057
	Yield	1.05	1.21	1.57	1.71	1.27	1.8	1.84
North Western	Area Planted	18,469	18,187	22,736	28,911	34,977	42,515	55,269
	Area Harvested	14,624	15,707	19,573	23,720	25,541	38,785	40,544
	Production	19,184	19,558	33,114	47,783	40,814	71,971	70,765
	Yield	1.04	1.08	1.46	1.65	1.17	1.69	1.28
Southern	Area Planted	131,840	148,723	139,468	117,477	172,746	150,875	178,162
	Area Harvested	104,536	50,405	82,260	87,935	63,987	92,941	98,466
	Production	211,281	63,093	127,277	211,976	120,518	230,105	238,570
	Yield	1.6	0.42	0.91	1.8	0.7	1.53	1.34
Western	Area Planted	49,202	51,940	47,259	53,937	84,897	51,010	88,629
	Area Harvested	30,743	22,076	31,695	36,586	28,518	24,356	35,986
	Production	28,120	19,525	36,028	49,102	29,612	32,487	41,353
	Yield	0.57	0.38	0.76	0.91	0.35	0.64	0.47

APPENDIX 2(c) : Area, Production and Yield of Maize by Province, 2008 to 2014

Province/Area/Production		2008	2009	2010	2011	2012	2013	2014
Central	Area Planted	168,913	188,753	237,386	211,185	184,048	217,001	256,406
	Area Harvested	100,246	144,704	208,443	169,993	156,386	159,371	217,440
	Production	329,294	399,719	717,444	558,493	494,215	478,734	723,761
	Yield	1.95	2.12	3.02	2.64	2.69	2.21	2.82
Copperbelt	Area Planted	62,728	83,028	97,849	102,653	95,215	80,196	86,334
	Area Harvested	51,658	72,305	85,453	89,348	85,065	71,070	79,078
	Production	150,248	177,629	233,223	250,190	248,624	208,544	235,416
	Yield	2.4	2.14	2.38	2.44	2.61	2.6	2.73
Eastern	Area Planted	199,715	291,431	289,334	310,043	277,625	297,394	333,183
	Area Harvested	156,635	265,217	263,306	282,264	246,611	267,227	302,977
	Production	267,596	401,343	540,553	584,415	577,525	572,289	745,580
	Yield	1.34	1.38	1.87	1.88	2.08	1.92	2.24
Luapula	Area Planted	20,593	28,083	30,373	44,283	46,827	37,116	45,943
	Area Harvested	19,205	25,206	27,307	42,536	43,090	32,927	43,334
	Production	40,008	57,005	69,363	124,885	128,776	94,033	131,747
	Yield	1.94	2.03	2.28	2.82	2.75	2.53	2.87
Lusaka	Area Planted	30,646	35,568	43,441	49,881	36,936	43,667	47,876
	Area Harvested	15,077	27,659	36,701	38,956	33,123	36,334	41,560
	Production	41,199	72,219	121,740	109,523	96,823	96,907	148,291
	Yield	1.34	2.03	2.8	2.2	2.62	2.22	3.1
Muchinga	Area Planted					70,144	71,066	78,895
	Area Harvested					65,659	64,356	75,022
	Production					226,989	205,412	244,978
	yield					3.24	2.89	3.11
Northern	Area Planted	80,081	103,090	114,607	151,944	98,576	80,429	101,985
	Area Harvested	70,540	98,577	109,762	137,949	94,165	72,038	94,854
	Production	171,232	258,236	308,078	506,989	271,380	210,479	283,756
	Yield	2.14	2.5	2.69	3.34	2.75	2.62	2.78
North Western	Area Planted	41,123	59,993	66,562	73,004	64,305	59,198	68,124
	Area Harvested	34,994	52,446	59,345	64,961	60,311	51,052	61,541
	Production	60,561	98,804	130,860	150,820	156,077	132,527	160,866
	Yield	1.47	1.65	1.97	2.07	2.43	2.24	2.36
Southern	Area Planted	214,610	245,099	274,184	315,655	309,557	330,234	311,914
	Area Harvested	60,372	172,133	221,531	64,961	232,584	195,587	235,974
	Production	115,421	365,226	582,984	639,541	573,176	453,532	597,999
	Yield	0.54	1.49	2.13	2.03	1.85	1.37	1.92
Western	Area Planted	109,815	90,422	88,532	97,117	91,751	96,101	89,165
	Area Harvested	42,632	53,245	68,712	54,405	57,664	47,918	53,420
	Production	36,007	56,828	91,238	95,524	79,103	80,343	78,277
	Yield	0.33	0.63	1.03	0.98	0.86	0.84	0.88

APPENDIX 2 (d): Area, Production and Yield of Sorghum by Province, 2001 - 2007

Province/Area/Production		2001	2002	2003	2004	2005	2006	2007
Central	Area Planted	8,024	2,758	6,459	4,031	4,937	3,625	3,049
	Area Harvested	7,589	2,626	5,722	3,948	2,109	2,973	2,395
	Production	4,627	1,835	3,972	3,459	2,240	2,082	1,354
	Yield	0.58	0.67	0.61	0.86	0.45	0.57	0.44
Copperbelt	Area Planted	3,455	7,103	2,410	3,240	3,313	1,265	1,182
	Area Harvested	3,175	5,984	2,224	3,084	2,546	1,247	936
	Production	2,680	4,297	1,388	2,143	2,690	802	501
	Yield	0.78	0.6	0.58	0.66	0.81	0.63	0.42
Eastern	Area Planted	2,394	1,182	2,350	2,693	2,782	2,807	3,313
	Area Harvested	2,101	1,182	1,801	2,436	1,142	2,655	2,102
	Production	3,393	854	1,768	1,438	880	1,856	1,474
	Yield	1.42	0.72	0.75	0.53	0.32	0.66	0.45
Luapula	Area Planted	886	330	2,122	851	969	809	2,409
	Area Harvested	810	330	2,101	819	613	798	2,215
	Production	778	363	976	707	543	709	1,796
	Yield	0.88	1.1	0.46	0.83	0.56	0.88	0.75
Lusaka	Area Planted	332	26	146	234	535	372	285
	Area Harvested	332	26	146	199	177	333	134
	Production	163	32	135	64	139	831	63
	Yield	0.49	1.22	0.93	0.27	0.26	2.23	0.22
Muchinga	Area Planted							
	Area Harvested							
	Production							
	yield							
Northern	Area Planted	11,153	2,909	3,397	3,750	1,145	2,377	476
	Area Harvested	10,837	2,592	3,107	3,635	983	2,339	324
	Production	7,750	2,487	1,868	2,240	856	1,958	180
	Yield	0.69	0.85	0.55	0.6	0.75	0.82	0.38
North Western	Area Planted	4,468	4,521	5,492	4,516	4,727	4,826	2,742
	Area Harvested	3,906	4,294	5,053	4,166	3,888	4,617	2,426
	Production	3,031	3,359	4,239	4,896	4,013	3,727	1,552
	Yield	0.68	0.74	0.77	1.08	0.85	0.77	0.57
Southern	Area Planted	6,938	4,597	8,842	10,200	20,165	15,380	9,669
	Area Harvested	5,538	1,247	6,020	8,847	2,399	11,393	4,441
	Production	4,902	735	3,610	3,564	1,994	5,338	3,680
	Yield	0.71	0.16	0.41	0.35	0.1	0.35	0.38
Western	Area Planted	5,704	6,610	5,835	17,877	18,860	12,165	8,471
	Area Harvested	4,993	3,501	4,163	15,093	7,932	5,666	4,454
	Production	2,920	2,840	2,344	5,955	5,359	3,745	2,172
	Yield	0.51	0.43	0.4	0.33	0.28	0.31	0.26

APPENDIX 2 (d): Area, Production and Yield of Sorghum by Province, 2008 - 2014

Province/Area/Production		2008	2009	2010	2011	2012	2013	2014
Central	Area Planted	2,677	3,648	3,559	1,721	829	715	898
	Area Harvested	2,395	3,569	3,433	1,560	664	674	841
	Production	972	2,786	4,223	1,322	1,110	964	456
	Yield	0.36	0.76	1.19	0.77	1.34	1.35	0.51
Copperbelt	Area Planted	678	1,681	1,126	1,562	949	639	612
	Area Harvested	582	1,442	1,114	1,492	949	543	612
	Production	310	806	1,009	1,398	679	520	587
	Yield	0.46	0.48	0.9	0.89	0.72	0.81	0.96
Eastern	Area Planted	1,765	2,585	2,307	1,890	12	66	199
	Area Harvested	1,509	2,323	2,184	1,794	12	16	199
	Production	984	1,986	2,409	2,392	7	18	200
	Yield	0.56	0.77	1.04	1.27	0.56	0.27	1.01
Luapula	Area Planted	1,954	1,987	1,895	1,189	357	188	190
	Area Harvested	1,839	1,952	1,856	1,134	318	181	190
	Production	1,885	1,866	1,421	1,062	345	232	106
	Yield	0.96	0.94	0.75	0.89	0.97	1.23	0.56
Lusaka	Area Planted	428	184	247	717	703	1,300	469
	Area Harvested	139	81	230	704	394	1,072	283
	Production	65	73	558	149	539	883	320
	Yield	0.15	0.4	2.26	0.21	0.77	0.68	0.68
Muchinga	Area Planted					2,681	2,909	2,294
	Area Harvested					2,488	2,909	2,246
	Production					2,705	3,442	3,119
	yield					1.01	1.18	1.36
Northern	Area Planted	519	697	3,030	1,221	232	77	506
	Area Harvested	505	679	2,871	1,201	232	77	358
	Production	370	576	2,418	880	185	47	284
	Yield	0.71	0.83	0.8	0.72	0.8	0.61	0.56
North Western	Area Planted	2,893	2,928	3,204	1,668	1,761	1,460	1,325
	Area Harvested	2,561	2,758	3,165	1,622	1,739	1,338	1,247
	Production	1,669	2,586	2,237	1,282	1,403	1,429	1,038
	Yield	0.58	0.88	0.7	0.77	0.8	0.98	0.78
Southern	Area Planted	8,500	20,179	14,306	14,226	7,068	13,316	9,075
	Area Harvested	3,677	14,812	9,807	10,799	5,571	7,413	6,763
	Production	2,221	8,457	10,413	8,506	6,818	6,561	4,695
	Yield	0.26	0.42	0.73	0.6	0.96	0.49	0.52
Western	Area Planted	4,935	6,596	4,577	2,660	4,094	2,442	1,766
	Area Harvested	2,963	4,597	4,250	2,141	3,348	1,387	1,317
	Production	1,516	2,692	3,045	1,467	1,588	875	755
	Yield	0.31	0.41	0.67	0.55	0.39	0.36	0.43

PERSONS INVOLVED IN THE PRODUCTION OF THE REPORT

FDES COORDINATING TEAM

Doreen G. Tembo
Abel Siampale
Allan Dauchi
Obed Kawanga
Pasco Mumba
Chanda Bwalya

COMESA CONSULTANT

Anand Sookun

COMESA SUPPORT STAFF

Temba Munalula
Wilson Chizebuka

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Joseph Tembo	Acting Deputy Director, Economic Statistics Division
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Charles Masange	Timber Producers Association of Zambia/Community Based Natural Resources Management
Noah Zimba	Green Basin Naturals
Nancy Ngoma	Centre for Energy, Environment and Engineering of Zambia
Boyd Mankemba	Timber Producers Association of Zambia

TOPIC

AUTHORS

Weather and Atmosphere
Miyanda Syabwengo
Munalula Mate

Energy Resources

Kasongo Chiwama
Beatrice Mukala
Aggrey Siuluta

Mineral Resources

Kelvin Mulenga
Brian Mulenga

Water
Levy Museteka
Violet Mkandawire
Kasenga Hara
Emmanuel Sakeyo
Curtice Muleya

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Mweemba Chijoka

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Moses Mutambala

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Lusajo Ambukege

Environmental Protection, Management and Engagement
Allan Dauch

DESKTOP PUBLISHING

Perry Musenge