Republic of Namibia

Namibia's National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants

December 2014

Ministry of Environment And Tourism

Foreword

As it is the case throughout the world, the use of chemicals has increased tremendously in Namibia. Over time, however, some of these chemicals have been found to have adverse effects on human health and the environment. A particular group of chemicals referred to as Persistent Organic Pollutants (POPs) is currently a matter of global concern as countries shoulder the challenge to strike the balance between economic growth and sustainable development. To date, the POPs are known to bio-accumulate in fatty tissues of humans and other living organisms, and cause a wide array of health problems. The Stockholm Convention, which was adopted by the world's Governments in 2001 with the aim of protecting human health and the environment from POPs, is a critical global instrument for managing the problem of POPs. The Namibian Government acceded to the Stockholm Convention in June 2005. This move affirms the commitment our Government has embarked upon to protect our people and the environment from the harmful effects of these chemicals.

The Stockholm Convention requires Parties to reduce and ultimately eliminate their production and/or use of POPs. It also requires Parties to develop National Implementation Plans (NIPs) outlining the measures they will take to meet their obligations under the Convention. This Namibian NIP is in response to those fundamental requirements of the Stockholm Convention. The preparation of this NIP has helped our country immensely in assessing the status quo regarding the management of POPs, and has thus enabled us to identify and prioritize what we need to do in order to promote sustainable development while at the same time protecting our people and the environment from the adverse effects of POPs.

This NIP is a guiding document, detailing the measures that Namibia will take towards reducing and ultimately eliminating its usage and/or production of POPs. Preparing the NIP is therefore a fundamental first step in our endeavour to protect the Namibian population from POPs. In order for the NIP to achieve the objective of protecting human health and the environment in Namibia, radical implementation measures must be undertaken. The Government of the Republic of Namibia is thus hereby committed to take the necessary measures to ensure that the recommendations and action plans spelt out in this NIP are implemented. Implementation of this NIP will inherently contribute to the realisation of our country's Vision 2030, as it will involve the implementation of programmes aimed at improving human health and protecting Namibia's natural resources. The implementation of this NIP therefore already fits into our national sustainable development agenda, and I again reiterate that our Government will indeed ensure that its provisions are implemented for the benefit of the Namibian populace at large.

The process of preparing this NIP was coordinated by my Ministry through its Department of Environmental Affairs. There was, however, a broad-based involvement of stakeholders in the entire process. This included the active participation of the multi-stakeholder NIP Steering Committee which provided advice and guidance on the execution of the project. Numerous other stakeholders who were not in the Steering Committee also played the critical role of providing data and information that was required for compiling the NIP.

On behalf of the Government of the Republic of Namibia, I would like to thank all those who contributed to the development of this NIP, for the outstanding level of cooperation they displayed. Additionally, I wish also to express my profound gratitude to the Global Environment Facility for funding the NIP development project, as well as the United Nations Environment Programme for facilitating the implementation of the NIP project.

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Uahekua U. Herunga, MP

MINISTER

Executive Summary

The Stockholm Convention

The Stockholm Convention (SC) is a Multilateral Environmental Agreement (MEA) whose aim is to protect human health and the environment from the highly toxic Persistent Organic Pollutants (POPs). POPs are toxic to both humans and the environment, and are known to cause cancers, as well as disrupt the immune, reproductive, endocrine and nervous systems. They include certain pesticides such as DDT, Chlordane, Dieldrin, Lindane and Endosulfan; industrial chemicals such as Polychlorinated Biphenyls (PCBs) and Brominated Flame Retardants (BFRs); and unintentionally produced POPs such as dioxins and furans.

The SC requires Parties to take measures aimed at reducing (with the goal of ultimately eliminating) the production and use of POPs. Parties are also required to take measures for the sound management of POPs wastes and stockpiles. The SC requires each Party to prepare a National Implementation Plan outlining the measures it will take to meet its obligations under the Convention. This National Implementation Plan outlines the measures that Namibia will take to reduce its production and use of POPs, and also manage its POPs wastes and stockpiles.

Country Baseline Information

Namibia is an upper middle income country with a vibrant tertiary industry. The industrial sector is also fairly active in Namibia, although its contribution to the economy is significantly less than that of the services industry. The main industrial activities in Namibia are mining and mineral processing, as well as manufacturing of a wide variety of products.

The agricultural sector is an important sector in the Namibian economy, although its contribution to GDP is again fairly small. However, agriculture has been the main source of livelihood for the majority of the rural population, mainly the subsistence rural population. It is estimated that more than 70 per cent of the population in the country depend to a greater or lesser extent, upon the agricultural sector. The presence of a viable agricultural sector means that quite a lot of agrochemicals should be in use, and the Government's drive to increase agricultural activity in the country means that the use of agrochemicals is likely to increase in the near future.

The major environmental concerns in Namibia include land degradation and soil erosion; deforestation; water management; waste and pollution; and climate change. With the increase in industrialisation, the problems of waste and pollution are expected to grow, hence it is important that the growth in industrialisation be matched by improved environmental and chemicals management regimes.

Regulatory, Policy and Institutional Framework for Chemicals Management

Namibia has many pieces of legislation for the management of chemicals, but these are fragmented, and therefore their effective implementation and enforcement is often a big challenge. There is thus need to develop a framework legislation for chemicals management in order to overcome this challenge. Another major weakness that affects the legal infrastructure for chemicals management is the unsustainably long time that it takes to revise / develop Acts. Two very important Acts for chemicals management have been under revision / development for more than 14 years now, which is a worrisome state of affairs for a country that wants to protect its population from the harmful effects of chemicals. The current legislation for pesticide management was produced in 1947. It is extremely out-dated, and has been under revision since 1997, but somehow the revision process is not getting completed. There is also the Pollution Control and Waste Management Bill which has been under development since 1999, but the development process is also not coming to an end. There is a very real need for the Government to prioritise the development of appropriate legislation if it is going to protect its people and environment from the harmful effects of chemicals.

In addition to the local legislation for chemicals management, there also exist several MEAs for chemicals management, such as the Stockholm Convention for POPs, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal. Namibia has ratified these Conventions, but does not have the administrative structures for implementing most of their requirements, hence it fails to realise the benefits of being a Party to the Conventions. It is imperative for the Government to put in place administrative structures for implementing the MEAs.

With there being so many pieces of local legislation for chemicals management, there are equally many Ministries responsible for dealing with chemicals management issues. At times these fail to implement their mandates successfully because there is no coordination between them. This leads to a lot of overlap and oftentimes a lack of clarity of who is actually supposed to do what. There is need to improve coordination among the Government departments that are mandated with the management of chemicals.

Besides the legislation for chemicals management, there are also a number of policies and other non-regulatory instruments that have the potential to result in improved management of chemicals. The uptake of the non-regulatory instruments in Namibia has been low, possibly due to a lack of policy for promoting their uptake. There is need for the Government to put in place programmes and policies for promoting the uptake of such non-regulatory schemes.

Assessment of POPs

POPS Pesticides

POPs pesticides are all banned in Namibia, hence they are not used (except for DDT which is used for malaria vector control). Historically, POPs pesticides such as dieldrin have been used for tsetse control. Despite their ban, statistics showed that they were imported into the country legally as late at 2013. This implies that there are loopholes in the pesticides registration system (since only registered pesticides are allowed to be imported into the country), and also that there is insufficient collaboration among the relevant authorities who have the mandate for controlling the importation of chemicals.

It has been realised that there are a number of challenges regarding the management of all other pesticides in Namibia. These include poor legislative framework for pesticide management, lack of awareness of proper pesticide management practices, poor storage of pesticides and obsolete pesticides stocks, continued reliance on pesticides without using alternatives, and also poor management of pesticide waste.

The Persistent Organic Pollutant DDT continues to be used for public health purposes – in malaria vector control. Malaria is a major public health threat in Namibia, with 69.8% of the population living in areas where there is risk of malaria transmission. So far, DDT has been found to be the most effective pesticide against the malaria mosquito hence its continued use. It is only used by the Ministry of Health and Social Services for Indoor Residual Spraying, and this is done under very strictly controlled conditions. Large quantities of DDT are used, with an annual average of 175 tonnes having been used over the last three years.

Although malaria is a major public health threat, the continued use of DDT in controlling it (in spite of the known adverse effects of this pesticide), is a serious cause for concern. There is need to promote Integrated Vector Management (IVM), in order to reduce and eventually eliminate the use of DDT for malaria vector control. The DDT waste is also poorly managed, with empty cartons of DDT being burned in trenches in the field, while the plastic sachets are destroyed in hospital incinerators, (which often do not reach the temperatures that are required to prevent dioxin formation).

Regarding quantities of obsolete pesticide stocks in Namibia, two ad hoc inventories have been undertaken by the Ministry of Agriculture, Water and Forestry. The first one, which was conducted in 1999, identified 208 tonnes of the obsolete BHC pesticide. This was later shipped to the UK for final destruction. The second one, which was conducted in 2002 – 2003, identified about 50 tonnes of obsolete pesticides. For the second inventory, no inventory reports were available, implying that there is a poor chemicals management information system in the country. Since 2003, no obsolete pesticides inventory has been undertaken. However, even these two inventories that have been reported on, were not national inventories, but were ad hoc inventories undertaken on Government pesticide stores. Individual farmers and the private sector were excluded. The exact amount and location of

obsolete pesticides in Namibia is therefore unknown, and in such a situation, it is not possible to put in place and implement any programmes for the environmentally sound management of obsolete pesticides. It is thus critical that the Government of Namibia conducts a detailed, national inventory of obsolete pesticides, in order to be able to manage them in an environmentally sound manner.

Polychlorinated Biphenyls (PCBs)

PCBs are found as dielectric fluid in transformers and other electrical equipment such as capacitors. It therefore follows that the electricity provision sector will hold the majority of PCBs. In Namibia, the electricity sector is dominated by the state-owned NamPower, which owns all the country's generation and transmission facilities, as well as some distribution facilities in the rural areas of central and southern Namibia. The bulk of the distribution of electricity is undertaken by the regional electricity distribution companies (REDs)and certain local authorities such as the City of Windhoek, Keetmanshop, Mariental and other smaller towns especially in the south of the country. Currently there are three operational REDs. Ownership of transformers and related electrical equipment is therefore divided between NamPower, these REDs, the said local authorities and some of the older, larger mines, which have their own transformers.

In order to ensure sound management of PCBs, it is necessary to identify PCB-contaminated equipment by way of inventories. A PCB inventory was embarked upon in Namibia in 2011, but is yet to be completed. The slow pace is due to a severe lack of capacity. The inventory has however shown that there are 11,690 transformers and other electrical equipment in Namibia. NamPower owns 6,181 transformers. 588 of these have been tested, of which 72 have been found to be PCB-contaminated, representing a 12.2 % contamination rate. On extrapolation, this implies that there are 1,426 PCB-contaminated transformers in Namibia.

During the assessment of PCBs, a few issues of concern pertaining to PCBs management have been noted. These include poor storage of decommissioned and non-working transformers, as well as a lack of awareness of proper PCB management procedures.

Unintentionally-Produced POPs (U-POPs)

U-POPs such as dioxins and furans arise from combustion of different materials, particularly waste, and also from certain industrial and chemical processes. An inventory of U-POPs was carried out in Namibia in 2014, and it showed that the more common sources of U-POPs include medical waste incineration, accidental fires, coal fired power stations and sewage treatment. Copper smelting and copper production also give rise to U-POPs, but the quantities are much smaller.

Poor waste management (involving burning of waste) has often been found to be one of the most significant sources of U-POPs in many countries. However, the Namibian capital Windhoek, as well as some of the larger municipalities in Namibia, were found to have good

waste management facilities, and there was insignificant burning of waste. The waste management practices in these bigger cities are therefore not expected to contribute much to dioxin formation.

On the other hand, some of the smaller towns were found to have very poor waste management facilities, with as much as 90% of the domestic waste being burned. This points to very high levels of dioxin emissions form the waste management sector in these small towns. These small towns did not provide data on the quantities of waste that are produced (as they do not measure the quantities), hence the total amount of dioxin produced could not be ascertained. The levels are expected to be significant though, given that most of the waste that is generated in some of these towns, is burned.

Electronic Waste (E-Waste)

Electronic waste (E-Waste), also referred to as Waste Electrical and Electronic Equipment (WEEE), is currently the fastest growing waste stream globally, and is already posing a serious challenge to many Governments. E-waste contains Brominated Flame Retardants (BFRs), which are POPs. Burning of E-waste (which is often carried out to recover some useful components) also results in the formation of Unintentionally Produced POPs.

An E-waste inventory was recently conducted in Namibia in order to find out the extent of the E-waste problem, with a view to coming up with solutions to the problem. It was estimated that about 2,629 tonnes of E-waste are generated in Namibia annually.

The inventory process also identified a number of serious problems pertaining to the management of E-waste in Namibia. The problems include unsustainably high volumes of e-waste being generated, lack of capacity to manage e-waste in institutions and among individuals, insufficient data on e-waste, and the unavailability of legal and technical infrastructure for sound management of e-waste. These problems need to be addressed, especially in light of the fast-growing volumes of E-waste being produced in Namibia.

Current Level of Awareness among Members of the Public and Workers

It was observed that levels of awareness of chemicals management issues in general, and POPs in particular, among the public, are quite low in Namibia. The lack of awareness makes the public very vulnerable to exposure to POPs, as they are unaware of the dangers, hence they are unaware of how to protect themselves from these POPs and other hazardous chemicals. Raising awareness among members of the public is a fundamental first step in protecting the population of Namibia from POPs.

Awareness of chemicals management among workers is much better than among the public, as there is a legislative requirement for the workers to be educated in chemical safety. There

are thus several organisations that provide training, education and awareness raising for workers in chemical safety.

Technical Infrastructure for POPs Assessment

Namibia has a number of laboratories which conduct analyses for various environmental parameters. These include both Governmental and private laboratories. Assessment of the capacity of these laboratories to conduct analyses involving POPs showed that the capacity is low, both in terms of equipment and human resources. They need to be capacitated in order for them to be able to conduct analyses involving POPs.

In addition to the environmental analytical laboratories, Namibia has 58 clinical laboratories spread throughout the country. These public health laboratories have an extremely important role to play in chemicals management, as they will be able to test for pesticide exposure, test for workplace exposure to other chemicals, and also test for presence of POPs in humans. If these analyses can be carried out, and the results be made available to policy makers, this would provide the most effective impetus for compelling policy makers to come up with policies and legislation that would adequately protect human health and the environment from POPs and other harmful chemicals. A very detailed assessment of the public health laboratory system was carried out, and issues of concern, as well as measures for addressing them, were articulated in the National Public Health Laboratory (NPHL) Policy, and the NPHL Strategic Plan of 2012. Implementation of the Policy and the Strategic Plan should result in a marked improvement of the Public Health Laboratory System.

Assessment of Impacted Populations

Identification and assessment of populations who may have been affected by POPs has not taken place in Namibia. There are several populations that have been exposed to POPs, and are likely to have been impacted by POPs. These include workers who work with transformer oil, populations living in areas where DDT continues to be sprayed, populations living in the vicinity of areas where Dieldrin was sprayed for tsetse control, populations living in the vicinity of facilities whose operations may give rise to dioxins, such as hospitals and metal processing industries, workers who work in facilities whose operations may give rise to dioxins, such as hospitals incinerators and metal processing industries, and workers who work in the agriculture sector. It is imperative that these populations be assessed for POPs. The results of such assessments will provide much needed information for how POPs can be better managed to protect human health.

POPs Priorities

The assessment of POPs identified issues of concern, which were then prioritised. There were six groups of priorities, namely General Chemicals Management Priorities, Pesticide Priorities, DDT Priorities, PCBs Priorities, U-POPs Priorities and E-Waste Priorities. The priorities are as follows:

A. General Chemicals Management Priorities

i. Lack of Awareness of Chemicals Management Issues
ii. Lack of Coordinated Approach to Chemicals Management Issues
iii. Poor Legal and Administrative Infrastructure for Chemicals Management
iv. Poor Enforcement of Existing Laws
v. Ineffective Systems for Chemicals Data Management
vi. Lack of Project Sustainability after Project Termination
vii. Insufficient Application of Non-Mandatory Mechanisms for Improved Environmental / Chemicals Management
viii. Lack of Research in Chemicals Management Issues
ix. Inadequate Technical Infrastructure for Chemicals Management

B. Pesticide Priorities

i. Ineffective Legislation for Pesticide Management
ii. Lack of Awareness of Proper Pesticide Management Practices
iii. Lack of Knowledge on Exact Quantities and Locations of Obsolete Pesticides
iv. Poor Management of Obsolete Pesticides and Pesticide Waste
v. Lack of Alternatives of Pesticides, Including DDT

C. DDT Priorities

i. Continued Use of DDT for Malaria Vector Control

D. PCB Priorities

i. Inadequate Knowledge of PCB-status in the country
ii. Lack of Awareness of PCB Management Issues
iii. Poor Management of Decommissioned and Non-Working Transformers
iv. Inadequate Legislation for PCBs Management

E. U-POPs Priorities

i. Need for Improved Medical Waste Management
ii. Poor Management of Hazardous Waste
iii. Poor Management of Contaminated Land
iv. Need for Improved Fire Prevention Measures in Homes
v. Poor Waste Management
vi. Lack of Application of BAT / BEP among industries

F. E-Waste Priorities

i. Lack of Awareness of E-waste management
ii. Unsustainably High Volumes of E-Waste Being Generated
iii. No Legal and Technical Infrastructure for Sound Management of E-Waste
iv. Insufficient Data on E-Waste

Specific Action Plans

Following the prioritisation process, specific action plans were developed for addressing each priority area. These action plans take into account the requirements of the Stockholm Convention and each action plan is basically addressing a specific Article in the Convention. The action plans therefore detail the measures that Namibia will take to meet its obligations under the Convention. The action plans show goals, activities, responsibilities, durations and budget. They are summarized in the following tables (just indicating the goal, the duration and the budget):

Specific Action Plans for General Chemicals Management Issues

Goal	**Duration**	**Budget (US$)**
1. To develop and implement a communications strategy for chemicals management issues	two years	475,000
2. Develop and implement mechanisms for coordinating chemicals management issues	two years	340,000
3. Improve the legal and administrative infrastructure for chemicals management, including establishing a Chemicals Management Unit in the Ministry of Environment and Tourism	one year	570,000
4. Improve enforcement of existing environmental and chemicals-related legislation	one year	200,000
5. To develop a chemicals information management strategy	one year	100,000
6. To develop mechanisms for ensuring project sustainability,	one year	10,000
7. To develop a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management,	two years	290,000
8. To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least one research institution	every two years	2,002,000
9. To capacitate at least 25% of the Namibia analytical laboratories with requisite equipment and skilled manpower	three years	9,030,000
Total		**13,017,000**

Specific Action Plans for Pesticide Priorities

Goal	Duration	Budget (US$)
1. To finalise the proposed new pesticides legislation	one year	10,000
2. To develop and implement an awareness raising programme for proper pesticide management drawing from the Chemicals Communications Strategy mentioned under Category A	two years	500,000
3. To conduct a detailed, national obsolete pesticides inventory	18 months	330,000
4. To implement sound environmental management of obsolete pesticides and pesticide waste through safeguarding and disposal	three years	17,700,000
5. To build national capacity for Integrated Pest Management	three years	765,000
Total		**19,305,000**

Specific Action Plan for DDT Priority

Goal	Duration	Budget (US$)
1. To implement Integrated Vector Management Programmes for malaria control, in order to reduce reliance on DDT	five years	1,800,000
2. To participate in regional project to promote and demonstrate alternatives to DDT in vector management	five years	1,100,000
Total		**2,900,000**

Specific Action Plans for PCB Priorities

Goals	Duration	Budget (US$)
1. To conduct a detailed, national PCB inventory	18 months	430,000
2. To develop and implement an awareness raising programme for PCBs, drawing from the Chemicals Communications Strategy mentioned under Category A	in two years	450,000
3. To implement sound environmental management of decommissioned, non-working and PCB-contaminated transformers	five years	11,300,000
4. To develop PCB-specific legislation	two years	300,000)
Total		**12,480,000**

Specific Action Plans for U-POPs Priorities

Goal	Duration	Budget (US$)
1. To install state-of-the-art incinerators in at least 20% of the hospitals	five years	9,030,000
2. To improve hazardous waste management in at least 10 local authorities	five years	9,080,000
3. To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least three areas	three years	8,330,000
4. To reduce the incidences of fires in homes by at least 20% annually	Over three years	190,000
5. To improve waste management in Namibia	three years	600,000
6. To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions	three years	630,000
Total		**27,860,000**

Specific Action Plans for E-Waste Priorities

Goal	Duration	Budget (US$)
1. To develop and implement awareness-raising programme for E-waste management	Two years	550,000
2. To improve management of E-waste	One year	340,000
3. To revise current appropriate legislation and include provisions for the sound management of E-waste	two years	Included under budget for overall legislative review
4. To establish an E-waste monitoring programme	one year	123,000
Total		**1,013,000**

Implementing the NIP

The implementation of the NIP will be spearheaded by the Ministry of Environment and Tourism. However, there will be maximum stakeholder involved, since the issue of POPs and chemicals management is cross cutting across many sectors. The NIP Committee should be instrumental in providing guidance and direction for the implementation of the NIP.

The action plans identified in the NIP will require funding, some of which will be provided by the Government, and some of which will be sought from external donors. Detailed project proposals will need to be prepared for seeking donor funding. The implementation of the NIP should be embarked upon as soon as possible, possibly in the last quarter of 2014, particularly for those action plans that do not need extra funding. This will help to maintain the momentum that was observed during the preparation of the NIP.

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List of Acronyms

APCS	Air Pollution Control System
BFR	Brominated Flame Retardant
BHC	Benzene Hexachloride
CBNRM	Community Based Natural Resources Management
CBO	Community Based Organisation
CP	Cleaner Production
DANIDA	Danish International Development Agency
DRFN	Desert Research Foundation of Namibia
E-Waste	Electronic Waste
FAO	Food and Agricultural Organisation of the United Nations
GDP	Gross Domestic Product
GHS	Globally Harmonised System of Classification and Labelling
GLP	Good Laboratory Practice
GRN	Government of the Republic of Namibia
GRTI	Gobabeb Research and Training Institute
GTZ	German Technical Corporation
HACCP	Hazard Analysis Critical Control Point
HCB	Hexachlorobenzene
HCH	Hexachlorohexane
HERSS	Health Environment Radiation Safety and Security
ICMM	International Council for Mining and Metals
IEC	Information, Education and Communication
ILO	International Labour Organisation
IPM	Integrated Pest Management
IRS	Indoor Residual Spraying
ISOER	Integrated State of the Environment Report
IVM	Integrated Vector Management
LA	Local Authority
LDC	Least Developed Country
LDPE	Low Density Polyethylene
LLIN	Long Lasting Insecticide-treated Net
MAWF	Ministry of Agriculture, Water and Forestry
MEA	Multilateral Environmental Agreement
MET	Ministry of Environment and Tourism
MHSS	Ministry of Health and Social Services
MME	Ministry of Mines and Energy
MTI	Ministry of Trade and Industry
NCCI	Namibian Chamber of Commerce and Industry
NCRST	National Commission on Research, Science and Technology
NDP	National Development Plan
NGO	Non-Governmental Organisation
NIP	National Implementation Plan
NMA	Namibia Manufacturers' Association
NOA	Namibia Organic Association
NPC	National Planning Commission

NPHL	National Public Health Laboratory
NSA	Namibia Statistics Agency
NSI	Namibia Standards Institution
NUA	Namibia Uranium Association
OAU	Organisation of African Unity
OHS	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzo-p-Dioxins
PCDD	Polychlorinated Dibenzofurans
PIC	Prior Informed Consent
PoN	Polytechnic of Namibia
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PPP	Public Private Partnerships
R&D	Research and Development
REDs	Regional Electricity Distributors
RST	Research, Science and Technology
SABS	South African Bureau of Standards
SAPP	Southern African Power Pool
SEMP	Strategic Environmental Management Plan
TEQ	Toxic Equivalent
TFCA	Transfrontier Conservation Area
ToT	Training of Trainers
UN	United Nations
UNAM	University of Namibia
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
U-POPs	Unintentionally Produced Persistent Organic Pollutants
WEEE	Waste Electronic and Electrical Equipment
WHO	World Health Organisation
ZERI	Zero Emissions Research Institute

Chapter 1 – Introduction

1.1 The Stockholm Convention

The Stockholm Convention is a Multilateral Environmental Agreement (MEA) whose aim is to protect human health and the environment from the effects of Persistent Organic Pollutants (POPs). It was adopted in May 2001, after the world's Governments realised that the issue of POPs could only be solved by a global, legally binding instrument. The Convention came into force in 2004.

1.1.1 General Information on Persistent Organic Pollutants

Persistent Organic Pollutants are a group of highly hazardous chemicals, which all share the following four unique properties:

- Persistence: They persist in the environment for long periods of time before breaking down into less harmful substances.

- Bioaccumulation and bio-magnification: They have the ability to accumulate in fatty tissues of humans and other living organisms. They are also biomagnified on going up the food chain, such that carnivores and omnivores (including humans), which are at the top of the food chain, have the highest concentrations of these chemicals in their bodies.

- Long-range transport: They have the ability to travel long distances (up to thousands of kilometres) from where they were originally produced.

- High toxicity to both humans and wildlife: They are highly toxic, and will cause adverse effects to human health and the environment. These adverse effects include disruption of the reproductive, immune, endocrine and nervous systems. They are also known to cause cancer.

POPs can be classified into pesticides, industrial chemicals, and unintentionally produced POPs (U-POPs). To date, 22 chemicals have been listed as POPs under the Stockholm Convention. When the Convention was first adopted in 2001, 12 chemicals were listed under the Convention (they were referred to as the "Dirty Dozen"). Since that time, 10 more chemicals (new POPs) have been added to the list – nine in 2009, and one in 2011.

The full list of POPs chemicals and some of their common uses are given in Table 1.

Table 1: Full List of POPs Chemicals and Some of Their Uses

POPs Pesticides	Industrial Chemicals	Unintentionally-Produced POPs
Originally Listed POPs ➢ *Aldrin* –was applied to soil to kill termites, grasshoppers, and other insect pests ➢ *Chlordane*–was used to control termites and as a broad-spectrum insecticide on a range of agricultural crops ➢ *DDT*- was sprayed on a variety of agricultural crops, especially cotton, but is currently being used only for malaria vector control in several countries ➢ *Dieldrin*- was used to control termites, textile pests, insect-borne diseases and insects living in agricultural soils ➢ *Endrin*- was sprayed on the leaves of crops such as cotton and grains, and was also used to control rodents such as mice ➢ *Heptachlor*- was used to kill soil insects and termites, and also more widely to kill cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes. ➢ *Hexachlorobenzene*- was used for treating seeds as it kills fungi that affect food crops; it was also used to control wheat bunt. ➢ *Mirex*- was used mainly to combat fire ants, and has also been used against other types of ants and termites, and has also been used as a fire retardant in plastics, rubber, and electrical goods ➢ *Toxaphene*- was used on cotton, cereal grains, fruits, nuts, and vegetables, and also to control ticks and mites in livestock.	Originally Listed POPs ➢ *Polychlorinated Biphenyls (PCBs)* - used as dielectric fluid in electrical transformers, capacitors, voltage regulators, electromagnets and as an additive in paint, carbonless copy paper, and plastics	Originally Listed POPs ➢ *Polychlorinated dibenzo-p-dioxins (PCDD – also referred to simply as dioxins)* - produced unintentionally due to incomplete combustion, as well during the manufacture of pesticides and other chlorinated substances. They are emitted mostly from the burning of hospital waste, municipal waste, and hazardous waste, and also from automobile emissions, peat, coal, and wood ➢ *Polychlorinated dibenzofurans (PCDF– also referred to simply as furans* - produced from processes similar to those giving rise to PCDD ➢ *Hexachlorobenzene (HCB)* - is a by-product of the manufacture of certain industrial chemicals and exists as an impurity in several pesticide formulations ➢ *Polychlorinated biphenyls (PCB)* – is a by-product of certain industrial processes involving chlorinated substances

POPs Pesticides	Industrial Chemicals	Unintentionally-Produced POPs
New POPs ➢ *Alpha hexachlorocyclohexane (alpha HCH*) – constituent of technical HCH which is used as an organochlorine insecticide or chemical intermediate to manufacture enriched HCH (lindane) ➢ *Beta hexachlorocyclohexane (beta HCH)* - constituent of technical HCH which is used as an organochlorine insecticide or chemical intermediate to manufacture enriched HCH (lindane) ➢ *Chordecone* - was used as an insecticide on tobacco, ornamental shrubs, bananas, citrus trees, and in ant and roach traps ➢ *Lindane* - as used as an insecticide on fruit and vegetable crops, for seed treatment and in forestry. It is also used as a therapeutic pesticide in humans and animals ➢ *Endosulfan* - a broad spectrum, non-systemic insecticide which is used to control a number of insects on food crops such as grains, tea, fruits, and vegetables and on non-food crops such as tobacco and cotton. It is also used as a wood preservative.	*New POPs* ➢ *Hexabromobiphenyl* – used as a fire retardant in thermoplastics for constructing machine housings such as radio and television parts; in coatings and lacquers; and in polyurethane foam for upholstery ➢ *Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octa-BDE)* – used as a flame retardant for housings of office equipment, nylon, LDPE, adhesives and coatings ➢ *Pentachlorobenzene*– was used in PCB products, in dyestuff carriers, as a fungicide, in flame retardants, as a chemical intermediate in the production of quintozene, a soil fungicide ➢ *Tetrabromodiphenyl ether and Pentabromodiphenyl ether (commercial penta-BDE)* – used as a flame retardant additive in flexible polyurethane foam for furniture and upholstery and in electronic equipment. ➢ *Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)* – found in products such as electric and electronic parts, fire fighting foam, photo imaging, hydraulic fluids, carpets, leather, upholstery, packaging, industrial and household cleaning products, pesticides	*New POPs* ➢ *Pentachlorobenzene*-produced unintentionally during combustion in thermal and industrial processes; and also appears as an impurity in products such as solvents or pesticides

1.1.1.1 Human Exposure to POPs

For the originally listed POPs (and the new POPs pesticides and unintentional POPs), human exposure to POPs is mostly through diet, occupation and accidents. Exposure can be long term exposure to low concentrations (chronic) or short term exposure to high concentrations (acute). Acute exposure to POPs normally occurs through industrial accidents, chemical fires, burning of waste, ingestion of treated seeds or poor handling processes, while chronic

exposure most commonly occurs through diet. Foods which have the highest concentrations of POPs include edible oils and fatty tissues of animals.

However, with the listing of new industrial POPs (mainly the Brominated Flame Retardants – BFRs), an additional exposure route needs to be taken into account – that of indoor air and house dust. This is because some of these BFRs are physically combined with the materials being treated rather than chemically combined, and so the flame retardant may diffuse out of the treated material into the surrounding environment (usually indoors), and thus contaminate it.

The presence of a wide range of sources of POPs, coupled with the many exposure pathways, underscores the need for taking collective action to protect humanity from these POPs. The importance of implementing the Stockholm Convention in order to protect human health and the environment from POPs can therefore not be overemphasized.

1.1.2 The Requirements of the Stockholm Convention on POPs

The Stockholm Convention has a number of key provisions, the implementation of which should enable it to achieve its goal of protecting human health and the environment from POPs. These include:

a. Prohibiting and / or eliminating the production and use, as well as import and export of certain chemicals (listed in Annex A);
   Annex A chemicals include all intentionally produced POPs (i.e. POPS pesticides and industrial chemicals). DDT is excluded from Annex A.

b. Restricting the production and use, as well as the import and export of certain chemicals (listed in Annex B); Annex B includes DDT.

c. Reducing or eliminating releases from unintentional POPs (listed in Annex C);
   Annex C includes all unintentionally produced POPs, namely dioxins and furans, as well as PCBs, Hexachlorobenzene and Pentachlorobenzene, (in so far as the last three are unintentional products of some other processes).

d. Ensuring that stockpiles and wastes consisting of, containing, or contaminated with POPs, are managed in an environmentally sound manner;

e. Requiring each Party to produce detailed a National Implementation Plan (NIP) which outlines the measures that the Party will take to meet its obligations under the Convention;

f. Providing detailed provisions for the listing of new POPs in Annexes A, B and C;

g. Providing for information exchange; public information, awareness and education; research, development and monitoring; technical assistance; financial resources and mechanisms; reporting; effectiveness evaluation; and non-compliance.

1.2 The National Implementation Plan for Namibia

1.2.1 The Objective for Developing the NIP

The preparation of this National Implementation Plan is in fulfilment of the requirement of the Stockholm Convention under Article 7, as mentioned in paragraph 1.1.2 (e) above. However, the preparation of the NIP is not just about fulfilling the requirement of an International Convention, but it actually presents immense benefit to Namibia. In preparing and implementing the NIP, Namibia will be able to:

i) Strengthen its capacity to manage POPs and similarly hazardous chemicals;
ii) Implement the requirements of the Stockholm Convention, thereby protecting its people and environment from the effects of POPs;
iii) Comply with reporting and related requirements of the Convention

1.2.2 The NIP Development Process for Namibia

The NIP development process for Namibia involved assessing the infrastructure for the management of chemicals (including POPs), compiling inventory reports for POPs in Namibia, identifying POPs priority issues of concern and setting objectives, preparing specific action plans for achieving the objectives, compiling the NIP, and endorsing it. The NIP preparation process was coordinated by the Ministry of Environment and Tourism. There was a lot of stakeholder input mainly from the NIP committee that was set up to advise the process and review the different outputs that were prepared during the NIP development process, as well as from the participants to the Endorsement Workshop who made invaluable contributions to the document. The NIP was endorsed on 26 November 2014 in Windhoek at a workshop that was attended by 40 participants. The full list of participants is attached as Annex 1.

1.2.3 Structure of the NIP

The NIP is structured into three chapters. The first chapter gives a background of the NIP, and why it was developed. The second chapter gives baseline information on the Namibian situation, including an assessment of POPs issues. The third chapter gives the POPs priority issues of concern, and presents specific action plans that need to be implemented in order to address the priority issues of concern. It also outlines mechanisms for implementing the NIP.

Chapter 2 –Country Baseline Information

2.1 Country Profile

2.1.1 Geography

Namibia is a Southern African country lying between latitudes 15^0 and 29^0 south of the equator and between longitudes 11^0 45" and 25^0 15'' east of the Greenwich Meridian. It is bordered by the Atlantic Ocean to the west¸ Angola to the north, Zambia to the north-east, Botswana to the east, and South Africa to the south.

Namibia has a total land area of 825,234 square kilometres, of which much is exposed bedrock with huge deposits of sand in the Namib and Kalahari Deserts (ISOER, 2004). The country has had 13 administrative regions since 1993, until 2013, when a 14^{th} region was added by the division of Kavango into Kavango East and Kavango West. Figure 1 shows the administrative regions of Namibia before the division of Kavango Region (shown on the map as Okavango).

Figure 1 showing the administrative boundaries of Namibia

Namibia has typical desert conditions in that it is dry with rainfall that is extremely variable. Generally, higher rainfall of more than 600 mm per year falls in the North East, while the far south and far west normally receive less than 50 mm per year. The only permanent rivers in Namibia flow mainly along the country's northern and southern borders. These are the Orange River in the South, and the Kunene, Okavango, Zambezi and Chobe Rivers in the North. Rivers arising within the country are normally dry and most flow west or south. River courses that flow eastwards rarely have any water.

Namibia has two Transfrontier Conservation Areas (TFCAs). These are the /Ai-/Ais Richtersveld TFCA, which was declared in 2003 and is jointly run by authorities in Namibia and South Africa, as well as Kavango-Zambezi (KAZA) TFCA, shared between Angola, Botswana, Namibia, Zambia and Zimbabwe. The KAZA TFCA, which is the world's largest conservation area, was officially launched in 2012, and represents a paradigm shift in conservation away from national parks and toward an integrated multiple land used concept.

2.1.2 Population

Since independence in 1990, Namibia has undertaken Population and Housing Censuses every 10 years. In addition to these censuses, the Government also undertakes Demographic and Health Surveys, Labour Force Surveys, and Household Income and Expenditure Surveys. According to the 2011 Population and Household Census, the population of Namibia was 2,113,077 at the time. The population has grown rapidly over the years, especially in the urban areas where the annual population growth rate has been approximately 4% in recent years. Examples include Windhoek, where the population grew by 130% from 1991 to 2011, as well as Walvis Bay, where the population grew by 192% during the same period (NSA, 2013).

In terms of population distribution, 43% of the population lives in the urban areas, with the majority of the rural population being concentrated in the central-north, along the Okavango River and in the Zambezi region where rainfall is highest and staple crops can be grown (NSA, 2013). Elsewhere, rural populations are scattered in low densities on farms and in small villages.

School attendance rates for children aged between 7 and 16 years have been more or less constant from 1991, although there was a slight decrease in attendance from 2001 to 2011. In 1991, the attendance rate was 86.7%, while that for 2001 was 88.7% and that for 2011 decreased to 83.8%.

2.1.3 Political Structure

Namibia is a sovereign, democratic state whose main organs are the Executive, the Legislature and the Judiciary. It is headed by a President who is Head of State and of the Government. The executive power of the country lies in the President and the Cabinet. The President appoints a Prime Minister, who is the leader of Government business in Parliament, and coordinates the work of the Cabinet and advises and assists the President in the execution of the functions of the Government.

Namibia is divided into regional and local units, which consist of regions and Local Authorities. Namibia comprises 14 regions, each with a regional council. The Local Authorities comprise 16 municipalities, 14 town councils 16 village councils and 12 settlement areas[1].

2.1.4 Economy

Namibia is classified as an upper middle income country with an estimated annual GDP per capita of USD 5,293 (NPC, 2012). The Namibian economy is characterised by a non-tradable sector (comprising Government industries), and an export oriented primary industry (NPC, 2012).

2.1.4.1 Gross Domestic Product (GDP)

The tertiary industry is the biggest contributor to GDP (accounting for 57.5% of GDP in 2012), while the primary industry contribution has declined over the last 10 years, falling from 24% in 2002, to about 19% in 2012.

The primary industry is dominated by the mining and quarrying sector, followed by the agriculture and forestry sector, and lastly the fishing and fish processing sector. Figure 2 shows the percentage contributions of the various sectors to GDP in 2012.

[1] Available from: http://www.mrlgh.gov.na/

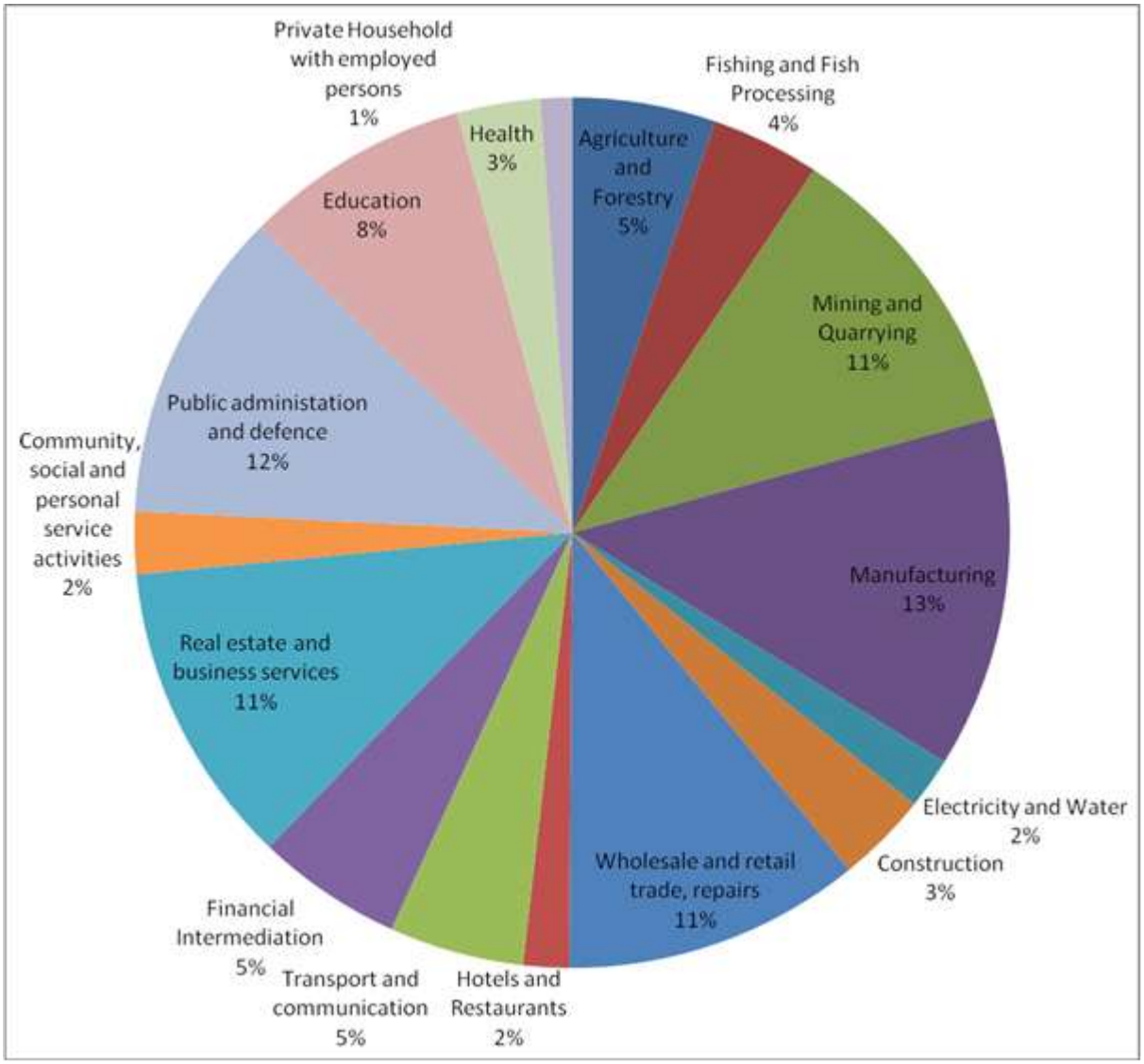

Figure 2 Contribution of various sectors to GDP for 2012
(Source: NSA – Preliminary Annual National Accounts 2013)

The manufacturing sector contributed 13% to GDP in 2012. A further analysis of the manufacturing sector on its own in Figure 3 shows the biggest contributor to GDP to be the beverages sector at 22% of the total manufacturing in 2012, followed by the basic non-ferrous metals at 21 %. Manufacturing of chemicals contributed only 7% of the total manufacturing contribution.

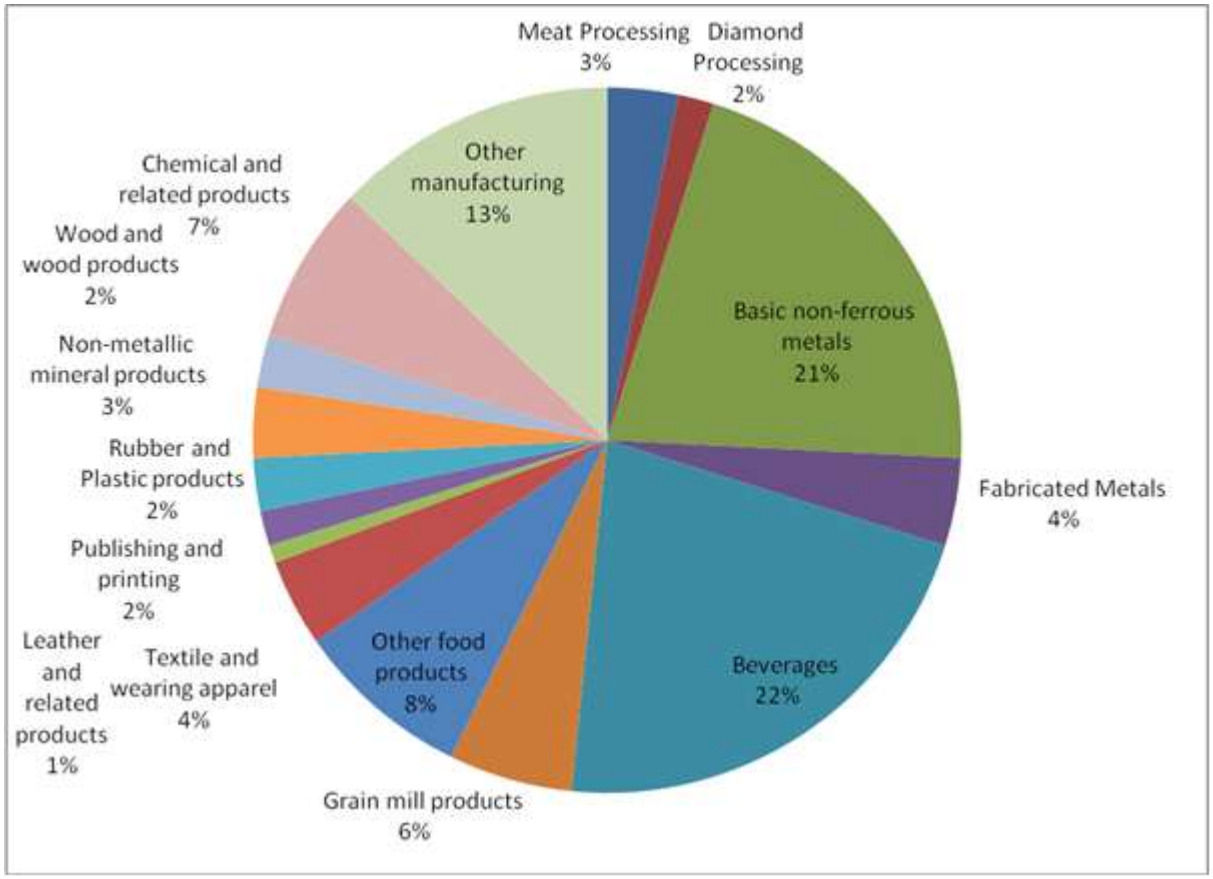

Figure 3: Contribution of various sectors of the manufacturing industry, to GDP in 2012

(Source: NSA – Preliminary Annual National Accounts 2013)

2.1.4.2 Industrial Sector

The industrial sector is fairly active in Namibia, although its contribution to the economy is significantly less than that of the services industry as shown by Figure 2 in which Manufacturing, Mining and Quarrying combined contributed only 24 % to GDP in 2012.

The main industrial activities in Namibia are mining and mineral processing, as well as manufacturing of a wide variety of products. Minerals that are mined include uranium, diamonds and base metals such as zinc, copper and lead. Products that are manufactured include beverages and various foods, fabricated metals, chemicals and related products, textile and wearing apparel, non-metallic mineral products, rubber and plastic products, leather and related products, wood and wood products, as well as publishing and printing. In 2011, the Manufacturing sector had 5,153 registered businesses which employed a total of 26,129 employees (NSA, 2013b).

Although the industrial sector is fairly active, Namibia has nevertheless been a net importer of goods since 1992. Table 2 shows the commodities that were imported and exported in 2012 as well as their value in millions of N$.

Table 2: Value of Imports and Exports for 2012

Commodity Imported	Value of Imports (millions of N$)	Commodity Exported	Value of Exports (millions of N$)
Mineral fuels, oils and waxes; bituminous substances	8,359	Precious or semi-precious stones and metals	12,055
Vehicles and vehicle parts	6,782	Ores, slag and ash	7,766
Industrial mechanical machinery and appliances	5,301	Fish and crustaceans	5,753
Precious or semi-precious stones and metals	3,139	Zinc	2,265
Electrical machinery and equipment	2,940	Vehicles and vehicle parts	2,062
Ores, slag and ash	2,926	Beverages	1,990
Ships and other floating structures	2,454	Copper	1,550
Iron and steel	2,346	Meat and meat products	1,495
Pharmaceutical products	1,301	Industrial mechanical machinery and appliances	1,404
Beverages	1,289	Salt, stone, lime and cement	839
Other products	23,314	Other products	7,729
Total	60,152	Total	44,909

(Source: NSA - Profile of Namibia: Facts, Figures and other Fundamental Information 2013)

2.1.4.3 Agricultural Sector

The agricultural sector is an important sector in the Namibian economy, although on average, its contribution to GDP is fairly small. In 1995, its contribution was 6.9 %, in 2004 it was 5.3%, (MAWF, 2005) while in 2012 it was 5% (NSA, 2013). However, agriculture has been the main source of livelihood for the majority of the rural population, mainly the subsistence rural population (NPC, 2003). It is estimated that more than 70 per cent of the population in the country depend to a greater or lesser extent, upon the agricultural sector.

At the commercial scale, livestock makes a much greater contribution to the agricultural output (MAWF, 2005), with the main activities as at 2004 being cattle rearing (33.9%), sheep and goats (15.2%), pigs (0.6%), dairy (3.1%), hides and skins (5.2%) and karakul wool / pelts (0.6). Cropping on the commercial scale makes a lower contribution, with the main commercial crops as at 2004 being maize (3.9%), grapes (4.6%) and wheat (0.8%). At the

communal scale, crops make a larger contribution (8.2%), with livestock contributing 0.3%. The remaining 23% is accounted for by a wide array of other smaller and less significant activities.

As a way of improving the agricultural sector's contribution to GDP, the Government, through the Ministry of Agriculture, Water and Forestry has embarked on the Green Scheme Initiative. The Green Scheme Initiative aims to encourage the development of irrigation based agronomic production in Namibia[2]. Its mission is to create an enabling, commercially viable environment through effective public-private partnerships. This will be achieved through attracting and enabling large scale commercial farming enterprises to establish commercially viable entities in remote, undeveloped rural areas to act as Service Providers for the successful and sustainable settlement of small scale farmers.

The presence of a viable agricultural sector means that quite a lot of agrochemicals should be in use, although exact quantities used were not readily available during this assessment. The Government's drive to increase agricultural activity in the country using such schemes as the Green Scheme mentioned above, means that the use of agrochemicals is likely to increase in the near future.

2.1.5 Environmental Problems in Namibia

The major environmental concerns in Namibia include land degradation and soil erosion, deforestation, water management, waste and pollution, and climate change (HSF et al, 2011).

Land Degradation

Land degradation is caused mostly by overstocking and overgrazing. Often in rural areas, poverty forces people into these unsustainable environmental management practices in order to ensure food supply. Other activities that contribute to land degradation include unsustainable harvesting of forest resources, wild plants and game, and the clearing of land for farming or housing. Land degradation results in deforestation, soil erosion, bush encroachment, soil salinization, and decreased availability of palatable grasses.

Deforestation

Deforestation in Namibia is caused mainly by expansion of land which is cleared for agriculture and infrastructure development, cutting of wood for fuel and domestic purposes, uncontrolled wildfires, habitat destruction by elephants, selective logging through timber concessions ,and unlicensed curio carving. Between 1990 and 2011, 2% of the forest area in Namibia disappeared as a result of the causes mentioned above (HSF et al, 2011). The deforestation leads to loss of resources used for human activities, and also results in desertification and severe land degradation.

[2]http://www.mawf.gov.na/Programmes/greenscheme.html

Water Supply

Water supply is a major challenge in Namibia, since the country is one of the most arid in Southern Africa. 22 per cent of Namibia can be classified as desert, having a mean annual rainfall of less than 100 mm, 33 per cent classified as arid, with a mean annual rainfall of between 100 and 300 mm, 37 per cent classified as semi-arid, with a mean annual rainfall of between 301 and 500 mm, and 8 per cent as sub-humid, with a mean annual rainfall of between 501 and 700 mm (GRN, 1997). In addition to the rainfall being generally low, it is also extremely variable in both quantity and distribution.

Water is required for sustenance, agriculture, and industrial development. Industrial activities are causing surface and groundwater pollution, which is further decreasing the availability and quality of the scarce water resources. Provision of sustainable water supply is therefore a key issue requiring the Government's attention.

Waste and Pollution

Namibia in general and Windhoek (its capital) in particular, are considered to be clean in comparison with the rest of the African continent. With the increase in industrialisation since the 1990s, there has been an increase in the potential for environmental pollution. Mining is one of the key economic activities, and it is a potential source of pollution. The rise in population has also resulted in an increase in the amount of waste generated in Namibia. While waste management in Windhoek has improved over the years, the same level of improvement still needs to be cascaded to other local authorities, as the waste management industry there is still underdeveloped (HSF, 2011).

Climate Change

The Namibian climate is highly variable, and this makes it more vulnerable to climate change than other countries with more stable climates. Namibia's initial national communication to the United Nations Framework Convention on Climate Change (2002) gave a prediction of some of the impacts of climate change assuming that there is only a modest degree of policy intervention to limit emissions of greenhouse gases. It predicted that mean annual temperature will increase by 2 to 6^0C by 2100 in Namibia. Rainfall is also expected to decrease, especially in the central inland areas.

The combined effect of increased temperature and decreased rainfall is likely to cause a decrease in agricultural productivity. The decrease in agricultural productivity may result in the use of more agricultural chemicals in order to counter this effect. The increase in temperature is also expected to extend the area in which malaria (an important cause of adult mortality) is endemic, from the current northern region, to spread southwards towards the central regions of the country. This trend has become apparent in recent years. Climate change is therefore expected to lead to a significant increase in chemicals usage in Namibia.

2.2 Regulatory, Policy and Institutional Framework for Environmental Management, with Particular Reference to Chemicals Management, Including POPs

2.2.1 Current Legislation and Regulations for Addressing POPs

Namibia has a fairly robust legal framework for environmental management in general, and the management of certain chemicals in particular. The Supreme Law of the land, the Namibian Constitution, says in Article 95 (l) that the State will adopt policies that promote the maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future. This shows that issues of environmental protection are viewed as being important at the highest level.

Besides the Constitution, there are many other Acts that deal with environmental protection and / or chemicals management. There are very few Acts that deal specifically with POPs issues, but there are a number whose provisions give them the potential mandate to deal with POPs, if this potential is exploited. Table 3 lists some of the relevant Acts (which are currently dealing with POPs issues, or have the potential to), their key provisions, as well as the Ministries responsible for enforcing the Acts.

Table 3: Detailed Description of Relevant Acts which can be used for POPs Management

Act	Provisions	Responsible Ministry
Environmental Management Act of 2007	The Act promotes the sustainable management of the environment by establishing principles which include: • Adoption of high benefit and low cost options for reduction of waste generation and pollution at source • Promotion of reduce, reuse and recycle in waste management • Polluter-Pays-Principle • Precautionary Principle	Ministry of Environment and Tourism
Environment Investment Fund of Namibia Act of 2001	The Act establishes the Environmental Investment Fund which is meant to support projects aimed at promoting sustainable use and management of natural resources, maintaining the natural resource base and ecological processes. The Fund can be used for training, education, awareness raising, as well as the development of policies and strategies.	Ministry of Environment and Tourism
Marine Pollution (Prevention of Pollution from Ships) Act of 1986	The Act provides for the protection of the sea from pollution by oil and other harmful substances discharged from ships.	Ministry of Works and Transport
Prevention and Combating of Pollution of the Sea by Oil Act (1981) and the Amendment Act, No.24 of 1991	The Act provides a framework for the prevention and combating of pollution of the sea by oil, and for determining liability for damage caused by the discharge of oil from ships, tankers or offshore installations.	Ministry of Works and Transport
Forest Act of 2001	The Act provides for the management of veld fires, which are a major source of unintentional POPs	Ministry of Agriculture, Water and Forestry
Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979.	It provides for the protection of consumers from the harmful effects of chemicals in consumer products; protection from residual pesticides found in agricultural products and other foodstuffs; setting of standards for acceptable levels of residual concentrations in line with the World Health organization.	Ministry of Health and Social Services

Act	Provisions	Responsible Ministry
Namibia Institute of Pathology Act of 1999	The Act provides for: • The establishment of medical laboratories • The conducting of research into the pathology of diseases and performing medical laboratory services relating to the occurrence, cause, prevention, diagnosis or treatment of any illness, disease • Training of staff for medical laboratories	Ministry of Health and Social Services
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947	The Act provides for the appointment of a Registrar of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies; for the registration of fertilizers, farm feeds, agricultural remedies and stock remedies. It regulates or prohibits the sale, importation, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies.	Ministry of Agriculture, Water and Forestry
Petroleum (Exploration and Production) Act of 1991	The Act prohibits pollution of any water body by the spilling of petroleum, drilling fluid, chemical additive, any gas or any waste product or effluent.	Ministry of Mines and Energy
Petroleum Products and Energy Amendment Act of 2000	The Act requires the National Energy Council to keep abreast of international developments in the field of energy supply. The Act obliges the National Energy Council to ensure that the latest environmentally friendly technologies are applied in energy supply.	Ministry of Mines and Energy
Import and Export Control Act of 1994	The Act provides for control of imports and exports.	Ministry of Trade and Industry

Act	Provisions	Responsible Ministry
Standards Act of 2005	The Act provides for the promotion, regulation and standardisation relating to the quality of commodities. It establishes the Namibia Standards Institution whose functions include preparing, issuing and promoting Namibian standards and other standards, including specifications and codes of practice, in relation to any commodity. The Act provides for the incorporation of standards into national law.	Ministry of Trade and Industry
Customs and Excise Act of 1998	The Act prohibits the importation of goods requiring import certificates / permits, unless such certificate / permit is available.	Ministry of Trade and Industry
Water Resources Management Act of 2013 (Act No.11 of 2013)	Fundamental principles under the Act include the Polluter-Pays-Principle, as well as Duty-of-Care by disposers of waste and effluent, to prevent pollution. The Act provides for the setting of water quality standards, the establishment of laboratories for monitoring water quality, as well as the development of national programmes for testing and monitoring water quality. It also provides for water pollution control.	Ministry of Agriculture, Water and Forestry
Local Authorities Act of 1992	The Act provides for the local authority to provide sewage management and drainage systems, as well as waste management services to its residents, for all types of waste.	Ministry of Regional and Local Government, Housing and Rural Development
Local Authorities Fire Brigade Services Act of 2006	It provides for emergency response to natural disasters, industrial incidences such as fires, and other anthropogenic disasters.	Ministry of Regional and Local Government, Housing and Rural Development
Disaster Risk Management Act of 2012	The Act provides for the establishment of institutions for disaster risk management in Namibia. (The definition of disaster in the Act includes serious disruption of community functioning that may result from major accidents and pollution).	Office of the Prime Minister

Act	Provisions	Responsible Ministry
Namibia Statistics Act of 2011	The Act requires statistics producers who collect statistics under the Act to • produce, disseminate and make the statistics available to users, as a public good, and • formulate an access to information policy which details how the public may access the statistics. Statistics which may be collected include agricultural statistics, industrial statistics, distributive trade statistics, international trade statistics, natural resources and environmental statistics.	Ministry of Trade and Industry through the National Planning Commission
Road Traffic and Transport Regulations of 2001	These regulate the transportation of dangerous goods by aligning it with the standard specifications in the South Africa Bureau of Standards.	Ministry of Works and Transport
Research, Science and Technology Act of 2004	The Act provides for the promotion, co-ordination and development of research, science and technology (RST) in Namibia.	National Commission on Research, Science and Technology
Labour Act of 2007	The Act requires employers to • provide safe and healthy working conditions • provide adequate PPCE • ensure that employees are given the necessary instructions to work safely and without risk to health • report any accident at the workplace • report any prescribed disease that is contracted at the workplace.	Ministry of Labour and Social Welfare
Regulations Relating to the Health and Safety of Employees at Work of 1997, under the Labour Act of 1992	The Regulations require employers to: • provide training and education for employees in safety management • report any accident or dangerous occurrence to the Chief Inspector. The Regulations require all cases of occupational diseases to be reported (by the diagnosing medical practitioner) to the Chief Medical Officer of Occupational Health and Safety. The list of occupational diseases in the Regulations include among others:	Ministry of Health and Social Services, Ministry of Labour and Social Welfare

Act	Provisions	Responsible Ministry
	• Diseases caused by exposure to various types of specified chemicals including toxic halogen derivatives of aliphatic or aromatic hydrocarbons, (in which class POPs are found). • Poisoning caused by any type of pesticide or chemical agent including their mixtures • Cancer caused by physical, chemical or biological agents The Regulations list the requirements for hazardous substances pertaining to: transportation; duties of suppliers, manufacturers and importers; safety data sheets; labelling of containers; storage and handling of hazardous substances; notification of the use of carcinogens; hazardous substances exposure limits; exposure measurements of hazardous substances; and biological monitoring.	

2.2.1.1 Weaknesses with the Current Legal Infrastructure for Chemicals Management

Namibia has so many laws that are meant to promote and achieve sound environmental management. The proper implementation of these should also result in sound chemicals management, thereby protecting human health and the environment from the harmful effects of chemicals. However, it has been noted that this is not being achieved, due to some of the following reasons:

a. Lack of Specific, Defined Chemicals Legislation / Fragmentation of Current Chemicals Legislation

There is no specific legislation on chemicals management for Namibia. Various issues pertaining to chemicals management are dealt with by various pieces of legislation, but there is no one act that oversees all issues to do with chemicals. This has resulted in several important aspects pertaining to chemicals management being overlooked. Examples of aspects of chemicals management which have not received adequate attention include:

- Weak control mechanisms to regulate transboundary movement of chemicals or chemical wastes
- Lack of audit or tracking of chemicals
- Poor air pollution monitoring, both at national and local government level
- No legislative controls for incineration of hazardous waste

- Inadequate legislation on chemical residues in food and exposure limits for food
- Slow and inadequate processes for identifying, banning and de-registration of banned POPs

There is therefore a real need to harmonise the legislation for chemicals management, in order to ensure that all aspects of chemicals management are covered. This could be done through the development of framework legislation for chemicals management.

b. Ineffective Enforcement and Implementation of Legislation

The enforcement and implementation of the current legislation for chemicals management is weak, mainly due to the fragmentation of the legislation. The fragmentation has resulted in overlap between certain pieces of legislation, leading to lack of clarity over who exactly is supposed to do what. This situation is compounded by the lack of coordination between the different implementing Ministries, which makes the enforcement of legislation a real challenge.

The Ministry of Environment and Tourism, which is the leading ministry for chemicals management issues, is also hampered by a severe lack of capacity for chemicals management in terms of human resources, and this fact hinders effective chemicals management in Namibia.

Another factor which has led to the poor enforcement of the legislation is the lack of community education and awareness of legislation (MET, 2012). Sometimes the public break the law simply because they do not know what the law requires.

It has also been observed that fines / penalties are not deterrent enough, in some cases. An example is the Forest Act of 2001, where the penalty for causing a forest fire only involves compensating the party that suffers damage, and there is no other punitive measure.

c. Excessively Lengthy Process for Reviewing / Enacting Legislation

The length of time that is spent on the legislative review process can be unsustainably long. An example of this is the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act of 1947, which has been under revision for the last 17 years. The Act is fundamental for sound pesticides management, and has many shortfalls which have already been identified as constraining pesticide management. The lengthy revision process means that the inadequacies that are identified in the current Act remain unaddressed.

The Pollution Control and Waste Management Bill has also been under development since 1999. Its failure to be enacted means that numerous problems arising from poor waste management and pollution continue unabated. There is need for the Government to prioritise the legislative review and development processes, if legislation is going to achieve the desired results.

d. Lengthy periods before operationalization of Acts

The length of time that is spent before an enacted piece of legislation is operationalized is also too long. An example of such is the Environmental Investment Fund Act. This was promulgated in 2001, but was only operationalized in 2011. It may be necessary to investigate the reasons why operationalization of Acts takes so long. There is also need to ensure that when Acts are being developed, mechanisms are also being put in place to ensure that they are operationalized as quickly as possible after enactment.

2.2.2 Non-Regulatory Mechanisms for Chemicals Management

2.2.2.1 Government Policies Which Can Contribute to Improved Chemicals Management

In addition to the legal instruments for chemicals management, Namibia also has a number of policies which can be applied to achieve improved chemicals management. Although policies are not legally binding, they provide a framework and direction of how an organisation / nation can get to achieve its goals. Some of the more relevant policies whose implementation would lead to improved chemicals management (and ultimately POPs management), are described below:

a. The National Agricultural Policy of 1995

This policy acknowledges the importance of the protecting the environment in the face of increasing agricultural productivity. It encourages the use of Environmental Impact Assessments for agricultural projects. This is to ensure that any environmental impacts arising from the projects are identified and measures for their mitigation are put in place before the onset of the project. Implementation of the policy should result in protection of the environment from excessive use of agrochemicals. The policy also proposes a review of the current legislation pertaining to the use of agrochemicals, a move which is overdue.

b. The Namibia's Industrial Policy of 2012

The Policy is anchored on Namibia's Vision 2030, and is meant to promote industrialisation. According to the Policy, by 2030, Namibia should be characterised as "a prosperous and industrialised country, developed by her human resources, enjoying peace, harmony and political stability". The Policy has ten underlying principles, one of which is that it emphasises sustainable manufacturing and development practices (MTI, 2012). The Policy promotes innovation, research and development (R&D) and proposes an innovation agenda focused on strategic R&D in the areas of environmentally friendly production methods, resource efficiency and energy, among other things.

c. National Policy on Climate Change for Namibia

The main purpose of the national climate change policy of Namibia is to provide the legal framework and national strategy for the development, implementation, monitoring and evaluation of climate change mitigation and adaptation activities. The policy also provides a legal basis for resource mobilisation to address climate change adaptation and mitigation.
Although Namibia does not contribute significant amounts of greenhouse gasses to global emissions, it is highly vulnerable to the effects of climate change. The Namibia Climate Change Policy therefore primarily focuses on Climate Change Adaptation measures while necessary attention is also given to mitigation. The policy promotes the exploration and utilisation of available global mitigation techniques for the country's economic benefit such as benefits from energy efficiency through Clean Development Mechanism of UNFCCC. This is done through the use of cleaner, more energy efficient technologies, and adapting existing renewable technologies to be more economically viable. The use of cleaner technologies will result in a decrease in emissions of Unintentionally Produced POPs arising from industrial processes.

d. Water Supply and Sanitation Policy of 2008

This policy has, as one its guiding principles, the need to pursue environmentally sustainable development and efficient utilisation of the water resources of the country and environmentally sustainable development of sanitation services in addressing the various needs. The policy therefore promotes recycling through safe and hygienic recovery and use of nutrients, organics, trace elements, water and energy.

e. National Waste Management Policy of 2010

This policy is aimed at promoting sound waste management practices in order to prevent and reduce the health risks associated with exposure to healthcare substances, household, radiation and other wastes. Its objectives are to design appropriate means of safe and sustainable waste management; develop capacity and training on waste management for sustainable and sound waste management; create community awareness on safe waste management and minimize unsafe waste practices that could lead to diseases; promote inter-sectoral collaboration on safe waste management; promote continuous research in waste management; and provide a legal framework for development of a waste management legislation.

The policy will promote waste management through the life cycle approach through the following: Integrated Waste Management Plan; general waste collection; waste minimisation; waste treatment; waste information system; supportive tools and IEC (information, education and communication) materials; capacity building; community education and advocacy; inter-sectoral collaboration; advocacy and lobbying for the development of legislation; and monitoring and evaluation.

The policy is very detailed, and even spells out implementation mechanisms. Its implementation should therefore result in improved waste management in Namibia. Poor waste management, particularly where there is burning or poor incineration, is known to be one of the biggest sources of the unintentionally produced POPs (dioxins and furans), hence improved waste management should contribute to a significant reduction of these POPs.

f. National Public Health Laboratory (NPHL) Policy and NPHL Strategic Plan, 2012

The NPHL Policy is aimed at establishing the necessary environment for setting comprehensive standards for public and private laboratories. The policy defines the laboratory governance, coordination and collaboration structures and provides an environment and infrastructure that will assure the delivery of quality laboratory services to all and support the priority health initiatives of the national health plan. The NPHL Strategic Plan is meant to provide a framework for implementing the Policy. Implementing the Policy and Strategic Plan is expected to improve public health surveillance and response, which is a critical component in monitoring impact of chemicals, POPs and other environmental toxins on human health.

2.2.2.2 National Programmes and Plans for Sustainable Development (with Potential for Chemicals Management)

Besides the laws and policies for environmental and chemicals management, Namibia also has other programmes and plans in place to achieve sustainable development. The successful implementation of these programmes and plans will result in sound environmental and chemicals management. The following paragraphs describe some of these programmes and plans:

a. National Development Plans

The Namibian Government, through the National Planning Commission (NPC) regularly prepares National Development Plans (NDPs) which are meant to direct and coordinate development. The development efforts are meant to uplift the standards of living for Namibians. The NDPs, together with Namibia's Vision 2030 (explained in paragraph b. below), serve as the country's integrated planning framework for sustainable development.
Since Independence, there have been four NDPs, which built on a transitional NDP from 1992 – 1995. These are:

- NDP 1 (1995 – 2000), which focused on four areas: stimulating economic growth, creating employment, reducing inequalities in income distribution, and reducing poverty
- NDP 2 (2001 - 2006), whose vision was "sustainable and equitable improvement in the quality of life of all Namibians",
- NDP 3 (2007 - 2012), whose theme was "Accelerated Economic Growth and Deepening Rural Development"

- NDP 4 (2012/2013 – 2016/2017), which has the three goals of high and sustained economic growth, increased income equality and employment creation. During NDP4, four economic sectors, namely Logistics, Tourism, Manufacturing and Agriculture, will enjoy priority status.

b. Vision 2030

Vision 2030 was adopted in 2004 and is a document which clearly spells out the country's development programmes and strategies to achieve its national objectives[3]. Although the five-year NDPs began before the formulation of Vision 2030, they have acted as short-term vehicles for realising the objectives of Vision 2030. The principle of sustainable development is the cornerstone on which the strategies for realizing the objectives of Vision 2030 are centred[4]. Vision 2030 focuses on a number of themes to realise the country's long term vision. The themes are:

- Inequality and Social Welfare
- Human Resources Development and Institutional Capacity Building
- Macroeconomic issues
- Population, Health and Development
- Namibia's Natural Resources Sector
- Knowledge, Information and Technology
- Factors of the External Environment

The driving forces for realising the objectives of Vision 2030 comprise the following:

- Education, Science and Technology
- Health and Development
- Sustainable Agriculture,
- Peace and Social Justice, and
- Gender Equality

The sound management of chemicals is a cross cutting issue which play an important role in the driving forces for realising the objectives of Vision 2030 (namely Health and Development; and Sustainable Agriculture). It thus follows that in order for Vision 2030 to be realised, there should be an improvement in the chemicals management arena for Namibia.

c. Green Economy Transition

This initiative promotes an economy which is seen as one that "improves and balances human well-being for all Namibians through the efficient and sustainable use of all resources". The Green Economy Transition is to be guided by the commitment to "promote environmentally

[3]http://www.gov.na/vision-2030

[4]http://www.met.gov.na/Documents/Vision%202030.pdf

sound investments and production systems with innovative technology improvements offering sustainable ways towards an industrialised country" (MET, 2011). The process is supposed to complement and contribute to key existing strategies (and institutions) in Namibia, particularly the Vision 2030 and the National Development Plan Framework (MET, 2012). Although a green economy policy framework is not yet in place in Namibia, several activities have been carried out towards the development of green economy transition. These include:

i) A rapid trade and environment assessment in 2009 to identify "green" opportunities and to bring together stakeholders from sectors such as international trade, environment, tourism, agriculture, water and energy, among others;
ii) The production, in 2011, of a paper exploring the role of biotrade with the wider green economy transition;
iii) The green economy "kick-off" conference in 2011, which introduced the theme and offered a preliminary chance to identify and explore how a green economy transition could drive sustainable development in Namibia (At the conference, the green economy transition elements specific to Namibia were identified, and cross sectoral working groups were also set up to identify green economy potentials, best practices and challenges);
iv) The synthesis workshop in 2011, at which the findings from the working groups were presented and built upon.

d. Green Scheme Initiative

This initiative was conceptualised and introduced by the Government of Namibia to encourage the development of irrigation based agronomic production in Namibia with the aim of increasing the contribution of agriculture to the country's Gross Domestic Product (GRN, 2013). The objectives of the Green Scheme Programme include:

i) To increase agricultural production and sector contribution to GDP;
ii) To promote research and adaptation of technology to increase productivity;
iii) To promote skills development and transfer of technology;
iv) To promote investment in food production and agro industry;
v) To mobilise private and public capital for investment in agriculture;
vi) To promote food security at national and household level;
vii) To diversify agricultural production and products for the domestic and export market;
viii) To promote value addition and job creation;

The Green Scheme Initiative is an important initiative for improving the livelihoods of Namibians. The second and third objectives provide an apt opportunity for the programme to employ the use of Integrated Pest Management, which should lead to a reduction in the use of agrochemicals.

2.2.2.3 Other Non-Regulatory Mechanisms for Managing Chemicals

a. Cleaner Production

Cleaner production technologies (or environmentally sound technologies, as they are now referred to), include technologies which employ resource use efficiency to reduce waste and recover materials for reuse. The uptake of these technologies by the private sector has been limited (MET, 2012), in spite of the immense benefits to industry that are associated with the use of these technologies. Generally, there is a lack of awareness of environmentally sound technologies, and there is also no policy framework to encourage the adoption of these technologies.

At one time, the Ministry of Environment and Tourism implemented a Cleaner Production (CP) Programme from January 2005 to December 2007, with financial assistance from the Danish International Development Agency (DANIDA)[5]. The objectives of the programme were:

- To raise awareness about CP opportunities (energy, water and raw material savings, waste minimization and occupational health and safety) and options within the Namibian industries and services, including the participatory development of a national CP strategy; accomplishment of relevant study tours, match-making and experience exchanges between factories; and development and dissemination of relevant information on CP.
- To enhance the regulatory functions concerning CP, i.e., to develop relevant regulations and procedures within concerned authorities to be better able to promote and facilitate CP. Emphasis was put on the promotion of self-regulatory mechanisms within industries and services.
- To apply at least ten CP demonstration projects in Namibia within the two and a half year implementation period; and
- To build capacity at all levels (authorities, industries and services, NCCI, and training providers) to implement the national CP strategy.

The programme was implemented in close partnership with other stakeholders such as the Namibian Chamber of Commerce and Industry, the City of Windhoek, the Department of Water Affairs, and the Ministry of Trade and Industry, among others.

A series of workshops held at the start of the initiative in March to May 2005, indicated that a number of businesses had already started applying the basis techniques of cleaner production to some degree. However, most businesses were not keeping track of their savings on raw materials, water, energy and waste disposal (Mwiya, 2005)[6]

[5]http://www.aaltonenconsulting.fi/fi/referenssit/cleaner+production+in+namibia+2005-2007/

[6]http://www.namibian.com.na/indexx.php?archive_id=14586&page_type=archive_story_detail&page=5757

Under the project, best available technology practices were developed for water, energy and waste management in the fish processing, meat processing, and tourism and hospitality industries.

The project failed to continue due to lack of sustainability. The absence of mechanisms to ensure project sustainability after the termination of the project resulted in the intervention failing to achieve much after project termination.

b. Eco-Certification

Eco-certification is a system where labelling is used to certify that products will have been produced using environmentally sustainable processes. This is being used in Namibia for a number of products, namely fish and fish products; meat and meat products; horticulture; and leather (Ndlukula and du Plessis, 2009)[7]. This is a voluntary system which is driven by the need for producers to meet certain export market requirements.

2.2.2.4 Reasons for Ineffectiveness of Non-Regulatory Mechanisms for Chemicals Management

a. Insufficient Application of Non-Mandatory Mechanisms for Improved Environmental/ Chemicals Management

There is not enough uptakes of non-legal mechanisms of improved environmental management, such as cleaner production and ISO 14001 Environmental Management Systems. Given the fact that industrial expansion is taking place at an unprecedented level in Namibia (MET, 2012), it is imperative that such mechanisms be aggressively promoted and utilised, in order to ensure that the Namibia's industrial growth does not negatively affect the environment.

b. Lack of Project Sustainability After Project Termination

There is a general lack of mechanisms to ensure sustainability once projects terminate. An example of this is the cleaner production project that ran from 2005 to 2007. This weakness results in projects failing to achieve the desired impact, even if the immediate project output will have been achieved.

2.2.3 Relevant International Agreements and their Obligations

In addition to the local legislation for chemicals management, a number of international instruments are also in place. Namibia has signed and ratified some of these instruments, and taken on board some of the provisions into local legislation. There are also a number of

[7] Available on: http://ir.polytechnic.edu.na/bitstream/10628/159/1/Ndhlukula.%20Green%20labelling.pdf

important international instruments that Namibia has not signed. These international instruments and Namibia's status regarding each of them, are described below:

a. Vienna Convention for the Protection of the Ozone Layer, 1985

The objectives of the Convention are for Parties to promote cooperation by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer. The Vienna Convention does not require countries to take concrete actions to control ozone depleting substances.

Namibia acceded on 20 September 1993.

b. Montreal Protocol on Substances that Deplete the Ozone Layer, 1987

The objective of this international protocol is to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's ozone layer.

Namibia acceded on 20 September 1993.

- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer,**
  Adopted at the Fourth Meeting of the Parties at Copenhagen on 25 November 1992
  Namibia accepted on 28 July 2003.
- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer,**
  Adopted by the Ninth Meeting of the Parties at Montreal on 17 September 1997
  Namibia accepted on 1 October 2007.
- **Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer,**
  Beijing, 3 December 1999
  (Entered into force internationally on 25 February 2002)
  Namibia accepted on 01 October 2007.

c. United Nations Framework Convention on Climate Change, 1992

The objective of the treaty is to "stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The treaty itself sets no binding limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms.

Namibia signed in June 1992 and ratified in May 1995.

d. Kyoto Protocol to the UN Framework Convention on Climate Change, 1997

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets.

Namibia acceded on 4 September 2003.

e. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal , 1989

The aims and provisions of this Convention are to reduce hazardous waste generation and promote environmentally sound management of hazardous waste, wherever the place of disposal; restrict transboundary movements of hazardous waste except for purposes of environmentally sound management; and provide a regulatory system applying to cases where transboundary movements are permissible.

Namibia acceded on 15 May 1995.

f. Rotterdam Convention on Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998

The objective of this Convention is to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.

Namibia signed on 11 September 1998 ratified on 24 June 2005.

g. Stockholm Convention on Persistent Organic Pollutants (POPs), 2001

The aim of this Convention is to protect human health and the environment from Persistent Organic Pollutants.

Namibia acceded on 24 June 2005.

h. **Bamako Convention on the Ban of the Import Into Africa and the Control of Transboundary Movement and Management of Hazardous Waste in Africa, 1991**

This is a Convention for African nations that prohibits the import into Africa of any hazardous waste (including radioactive waste). It was negotiated by 12 nations of the then OAU and its promulgation came about after the failure of the Basel Convention to prohibit trade of hazardous waste to less developed countries (LDCs), and from the realization that many developed nations were exporting toxic wastes to Africa.

Namibia has not signed this Convention.

i. ILO Convention 170 (Chemicals Convention) on Safety in the use of Chemicals at Work, 1990

This Convention is aimed at protecting workers from the dangers associated with chemicals in the workplace.

Namibia has not ratified this Convention.

j. ILO Convention 174 on Prevention of Major Industrial Accidents, 1993

The aim of this Convention is to prevent major accidents involving hazardous substances and to limit the consequences of such accidents.

Namibia has not ratified this Convention.

k. Globally Harmonised System (GHS) of Classification and Labelling of Chemicals

The GHS is a system which addresses classification of chemicals by types of hazard and proposes harmonized hazard communication elements, including labels and safety data sheets. It aims to ensure that information on physical hazards and toxicity from chemicals is made available in order to enhance the protection of human health and the environment during the handling, transport and use of these chemicals.

SDAC has adopted the GHS, but Namibia has not yet adopted it.

2.2.3.1 Involvement with International and Regional Organisations

Namibia works with several international and regional organisations in order to implement some of its international obligations. The organisations also assist the country in improved management of chemicals. Table 4 shows some of the international and regional organisations that Namibia works closely with.

Table 4: Cooperation and Involvement with International and Regional Organisations

International Organisation/ Programme/Body	National Focal Point (Lead Ministry/Agency	Related National Activities
UNEP	Ministry of Environment and Tourism	Implementation of several MEAs
WHO	Ministry of Health and Child Welfare	Malaria control
FAO	Ministry of Agriculture, Water and Forestry	Promotion of safe use of agrochemicals
UNDP	Ministry of Foreign Affairs	Implementation of several MEAs
Africa Institute	Ministry of Environment and Tourism	Environmentally sound management of hazardous waste
Southern African Power Pool (SAPP)	Ministry of Mines and Energy	Environmentally sustainable regional electricity supply

2.2.3.2 Reasons for Poor Implementation of Chemicals Related MEAs

a. Insufficient Institutional Framework for Implementation of Certain MEAs

While strides have been made to ensure implementation of some MEAs, such as the setting up of the Ozone Office in the Ministry of Trade and Industry, efforts at implementation of other MEAs are sadly lacking. An example is the Rotterdam Convention, which requires that parties circulate Decision Guidance Documents for chemicals listed under the Convention (to the local stakeholders) and prepare import responses for each chemical. The institutional framework for ensuring this is not in place; hence Namibia cannot implement most of its obligations under this Convention.

b. Lack of Participation in International Conventions Pertaining to Safety of Workers in the Chemicals Industry

The chemicals industry is a fairly dangerous place to work in, unless strict health and safety standards for workers are adhered to. Although Namibia has local legislation which deals with issues of workers' safety, its failure to ratify the ILO Conventions relating to the safety of workers in the chemicals industry implies that it does not view this industry as requiring special attention. The Namibian Government has already ratified at least 11of the ILO Conventions, but not the ones that deal with the protection of workers in the chemicals industry. While it may be argued that the chemicals industry is still fairly small, Namibia's current high industrial growth rate would require the Government to urgently put in place measures to ensure that protection of workers in the chemical industry is in line with international standards.

2.2.4 Roles and Responsibilities of Organisations involved in Hazardous Chemicals and POPs management in Namibia

2.2.4.1 Ministries, Agencies, and Other Governmental Institutions Managing Chemicals

As there are so many pieces of legislation for the management of chemicals, there are also many government entities which are involved in one way or another in the management of chemicals. Table 5 summarises the key Government Ministries and departments which are mandated to deal with environmental and / or chemicals management.

Table 5: Government Ministries Involved in Environmental Management and / or Chemicals Management

Government Ministry	**Mandated Role with regards to environmental / chemicals management**
Ministry of Environment and Tourism (MET)	Its mission is to maintain and rehabilitate essential ecological processes and life-support systems to conserve biological diversity and to ensure that the utilization of natural resources is sustainable for the benefit of all Namibians Its objectives include: • To control standards on environmental pollution; • To conduct and promote environmental education, extension and awareness programmes, in partnership with other ministries and organizations.
MET - Department of Environmental Affairs	The mandate of this Department includes: • Promoting sustainable development; • Improving environmental awareness; • Encouraging democratic environmental planning and management; • Involving Namibia in regional and global environmental issues, programmes and treaties. It serves as the focal point to many of the environmental conventions that Namibia is party to, such as the UN Conventions on Biodiversity, Climate Change, Desertification and the Basel and Stockholm Conventions.
MET - Environmental Investment Fund of Namibia Board	The Board is responsible for managing the Environmental Investment Fund of Namibia.
Ministry of Agriculture, Water and Forestry (MAWF) Directorate of Forestry	This Directorate ensures protection of forests from fires through the enforcement of the Forest Act.
MAWF– Directorate of Engineering and Extension Services	The mandate of this Directorate is to • Provide agricultural extension in the form of communication, advisory and training services, • Improve the legal environment in order to improve farming production. This Directorate also houses the Pesticides Registration.
MAWF – Directorate of Resource Management	This Directorate is responsible for protecting water resources from pollution through the enforcement of the Water Resources Management Act.

Government Ministry	Mandated Role with regards to environmental / chemicals management
MAWF - Directorate of Research and Training	This Directorate seeks to: • Support the non-formal training of farmers and farm labourers • Improve the management of research plans, programmes and projects at all levels, and implement research agendas and priorities in line with the needs and demands of farmers; and • Facilitate access to information and appropriate technology for all stakeholders and customers.
MAWF – Directorate of Veterinary Services	The mandate of this Directorate is to maintain and promote animal health, production and reproduction, and to assure safe and orderly marketing of animals and animal products through animal disease control, import control, veterinary surveillance, epidemiology and extension, diagnostic services and veterinary public health services.
Ministry of Health and Social Services	The functions of this Ministry include: • Overseeing the prevention of the pollution of the atmosphere through enforcing the Atmospheric Pollution Prevention Act • Ensuring the prevention of nuisances (nuisances include accumulation of refuse in an environmentally unsafe manner) through enforcement of the Public Health Act • Ensuring protection of consumers from harmful chemicals in food and other consumer products through the enforcement of the Foodstuffs, Cosmetics and Disinfectants Ordinance 18 of 1979 • Ensuring the health and safety of workers through enforcement of the Regulations Relating to the Health and Safety of Employees at Work of 1997
Office of the Prime Minister	This Office is responsible for overseeing the management of national disasters (these include severe pollution incidents), through enforcement of the Disaster Risk Management Act of 2012.
Ministry of Mines and Energy – Directorate of Mines	The functions of this Directorate include: • Proactively developing and implementing environmental policies to minimise the impact of the exploitation of Namibia's mineral resources • Promoting, monitoring and ensuring safe and healthy conditions for mining industry employees and the public. • Promoting and providing assistance to the small scale mining sector.

Government Ministry	Mandated Role with regards to environmental / chemicals management
Ministry of Mines and Energy – Energy Directorate	The functions of the Energy Directorate are: • To ensure the provision of sufficient, reliable and equitable energy supplies for Namibia • To ensure that Namibia moves towards the sustainable use of natural resources for energy production and consumption as far as economically possible. The Directorate enforces the compliance of legal requirements of energy legislation and regulations and researches new and renewable sources of energy. Its functions include: • Regulating the Petroleum Exploration and Production Industry • Depot fire-fighting and security • Petroleum product import and export control • Rural electrification • The administration of the Solar Electrification Revolving Fund • Bringing electricity to a larger proportion of the population (to more than the 40% of the country's population which currently has electricity) • Promoting the use of new and renewable energy sources such as wind and solar
Ministry of Works and Transport	This Ministry is responsible for • The protection of the sea from pollution by oil and other harmful substances which could be discharged from ships, and also • Ensuring that chemicals and other hazardous substances are transported safely through enforcement of a. The Marine Pollution ((Prevention of Pollution from Ships) Act and associated regulations, b. The Prevention and Combating of Pollution of the Sea by Oil Act c. The Namibia Ports Authority Amendment Act of 2000, and d. The Road Traffic and Transport Regulations of 2001
Ministry of Trade and Industry	This Ministry: • Oversees the control of dumping of substances at sea through the enforcement of the Dumping at Sea Control Act, which prohibits dumping of specified substances at sea • Controls all imports and exports • Is responsible for ensuring that EPZ enterprises do not adversely affect the environment

Government Ministry	Mandated Role with regards to environmental / chemicals management
All Local Authorities (these fall under the Ministry of Regional and Local Government, Housing and Rural Development)	The local authorities are responsible for the management of both solid and liquid waste within the local authority jurisdiction.
Ministry Labour and Social Welfare	This Ministry is responsible for the protection of workers through enforcement of the Labour Act and its associated regulations.
Ministry of Fisheries and Marine Resources	This Ministry is responsible for the protection of the aquatic environment (both sea and inland) where fishing takes place.
Namibia Standards Institution (a parastatal under the Ministry of Trade and Industry)	NSI's functions include: • Promoting the use of standards and quality assurance and control in industry, commerce and public sector • Providing conformity assessment services • Certification of systems, product and personnel systems • Inspecting and testing of products and materials.
National Planning Commission	The function of the NPC are: • To spearhead the identification of Namibia's socio-economic development priorities • To formulate short-term, medium-term and long-term national development plans in consultation with regional councils • To develop monitoring and evaluation mechanisms to ensure effective implementation of the national development plans;
Namibia Statistics Agency	The Agency is mandated to collect, produce, analyse and disseminate official and other statistics in Namibia. Statistics which may be collected include natural resources and environmental statistics.
National Commission on Research, Science and Technology	This is responsible for the promotion, co-ordination and development of research, science and technology (RST) in Namibia.
Namibia institute of Pathology (NIP)	This is a state-owned entity with the objective of providing medical laboratory services to both state and private health facilities.

2.2.4.1.1 Main Reasons for the Failure by Government Departments to implement sound management of chemicals

The presence of many Ministries that are involved (or have potential roles to play) in the management of chemicals, should make chemicals management in Namibia quite successful. However, the lack of a coordinated approach compromises the effectives of the Ministries' mandates in chemicals management. There is often overlap, which results in lack of clarity of

who is actually supposed to do what. It is important that the functions of the Ministries pertaining to chemicals management be harmonised.

While lack of coordination has been identified as a key challenge in hindering effective implementation of legislation and key ministerial mandates, it is imperative that the process of improving this coordination by spearheaded by one ministry. The lead ministry for environmental management, the Ministry of Environment and Tourism, therefore needs to take a leading role in improving coordination with other ministries involved in chemicals management.

2.2.4.1.2 Other Resources (Skills and Physical Infrastructure) Required by Government Ministries for Improved Chemicals Management

Although the various Government Ministries have different mandates to play in environmental / chemicals management, often they are not able to carry out their individual mandates successfully. This is due, in several cases, to lack of resources of one form or another – whether technical or human. An assessment of some of the resources (in terms of skills and physical infrastructure) which prevent the different ministries from achieving their objectives was conducted, and the results are shown in Table 6. The list is not exhaustive, but it captures some of the more glaring gaps in terms of skills and physical infrastructure that have been identified.

Table 6: Resources Needed for Improved Chemicals Management

Ministry Concerned	Resources Needed for Improved Chemicals Management
Ministry of Environment and Tourism	- Dedicated unit on chemicals management (with adequate trained staff) - Training on sound chemicals management
Ministry of Health and Social Services	- Capacity building on: • monitoring for pesticide exposure, • monitoring for workplace exposure to chemicals, and • generally monitoring the impacts of chemicals and POPs on human health - Capacity building on environmentally sound management of health care wastes and DDT waste through • Training • Setting up proper physical infrastructure for health care waste management (proper incinerators)
Ministry of Agriculture, Water and Forestry	- Capacity building on conducting inventories of POPs pesticides - Constructing and operating proper storage facilities for pesticides in all other regions besides Okahandja - Capacitating the laboratories to enable sufficient and appropriate analysis for chemicals management e.g. • conducting pesticide residue analysis, • identifying unknowns chemicals, • monitoring for POPs in the environment
Ministry of Labour and Social Welfare	- Training on appropriate safety and health practices in chemicals management
Ministry of Regional and Local Government, Housing and Rural Development	- Training on hazardous waste management among the local authorities - Construction of proper hazardous waste management facilities in the rest of the local authorities (so far only two out of 28 local authorities have proper hazardous waste management facilities)
Ministry of Industry and Trade	- Training on the importance of utilising voluntary, environmentally sound technologies among commercial and industrial enterprises, in order to ensure that products compete favourably on the international market - Capacity building on sound environmental management of hazardous waste - Training on non-regulatory mechanisms to promote environmentally responsible industries - Training on improved border control for monitoring movement of chemicals
Ministry of Finance	- Advocacy on the importance and mechanisms of providing incentives for sound environmental management
Ministry of Safety and Security	- Training on implications of poor enforcement of chemicals-related legislation
Ministry of Justice	- Training on implications of poor enforcement of chemicals-related legislation
Ministry of Foreign Affairs	- Training on implications of participation (or lack thereof) in MEAs

2.2.4.2 Relevant Activities of Industry, Public Interest Groups, Professional Bodies, and the Research Sector

a. Industrial Sector

The industrial sector in Namibia has a number of umbrella organisations which represent the interests of their members and also promote (or have the potential to promote) sustainable development practices by their members. These include the Namibian Chamber of Mines, Namibia Uranium Association, the Namibian Chamber of Commerce and Industry, the Namibia Manufacturers' Association as well as CropLife.

i) Namibia Chamber of Mines

The Namibian Chamber of Mines is an associate member of the International Council for Mining and Metals (ICMM), which is focused on improving the sustainable development performance of mining companies[8]. ICMM's development framework consists of 10 principles which include integrating sustainable development considerations within corporate decision-making processes, implementing risk management strategies based on valid data and sound science, seeking continual improvement of companies' health and safety performance, seeking continual improvement of companies' environmental performance, and facilitating and encouraging responsible product design, use, re-use, recycling and disposal of members' products. At the World Summit on Sustainable Development in 2002, all countries that were represented committed themselves to the responsible management of chemicals including mining products. The Chamber of Mines aims to, among other things, uphold mining practice in Namibia to the highest standards, observe international conventions and ensure positive development of Namibia's reputation as a mining nation.

The Namibia Chamber of Mines has recorded some major achievements in sustainable environmental management. In 2007, the organisation initiated the development of a Strategic Environmental Assessment on uranium in the Erongo region, which was finalised in 2010 (MET, 2012). A Strategic Environmental Management Plan (SEMP) is currently being implemented to monitor and guide the development of the uranium industry through a dedicated SEMP Office, and a multi-stakeholder steering committee. The SEMP provides guidance for all infrastructure developments, and seeks to among other things, minimise and avoid the adverse impacts of the uranium industry.

[8] http://www.chamberofmines.org.na/index.php?id=238

ii) Namibia Uranium Association (NUA)

Closely related to the Namibia Chamber of Mines is the Namibia Uranium Association which represents the uranium industry exclusively. Its membership includes all the Namibian uranium mining operations and most of Namibia's leading exploration companies and associated contractors. The Association promotes the industry's adherence to strong sustainable development practices. To this end, the NUA has produced the Health, Environment, Radiation Safety and Security (HERSS) Standards, as well as the HERSS Guidelines and Toolkit.

iii) CropLife Namibia

This is membership-based organisation whose members are distributors of pesticides and agrochemicals. The main activities of the association include:

- Representing members in liaison with Government, Registration Authorities and NGOs
- Managing the Safe Use Initiative
- Managing the awareness of illegal and banned products
- Developing training capacity in the country
- Managing the Pest Control training initiative

In recent years, the organisation has conducted several sessions of the Pest Management Practitioners Training Course. The four day course was first held in March 2010 in Walvis Bay and attended by 14 participants, who included Commercial Pest Control Operators, Environmental Health Practitioners, and Quality Controllers of the fishing industry. The course was hosted by Coopers Environmental Science Namibia and Skills for Africa. The subject areas covered included Pest and Pesticide Knowledge Base; Health, Safety and First Aid; Responsible Use of Pesticides; Pest Management Practices; Pesticides and Formulations; Pests and their Control in Namibia; Calculations and Practical Application Practices; Introduction to HACCP; the Law in Namibia; and Pesticide Management Practitioner – Customer Care and Conflict Handling.

The same course was run in November 2010 in Walvis Bay, and attended by eight Pest Control Operators, and it was again run in March 2011 in Windhoek and attended by six Pest Control Operators. All participants have been from the commercial sector.

iv) Namibia Manufacturers Association

The Namibia Manufacturers Association (NMA, holds annual awards for its members. In 2013, the Association held the inaugural awards ceremony, where companies which had excelled were given awards in recognition of their excellence. Of the seven categories that were rewarded, one of the categories was for "The NMA Most Environmentally Friendly

Manufacturer". Such awards act as incentives to industry and will promote environmentally responsible manufacturing practices.

v) Recycle Namibia Forum (RNF)

This is a grouping made up of several companies working together with the City of Windhoek, to promote and facilitate recycling. It was launched in 2011, following informal and small scale recycling activities that had been carried out by several companies, which then decided to come together as a forum (MET, 2012). This forum offers opportunities for knowledge exchange, as well as formalizing and increasing recycling in Namibia. The RNF is working on awareness raising and public education, and also advocating for more corporate organisations to join.

b. The Research Sector

Namibia has a number of research institutes which conduct environmental research. Key among these are the Gobabeb Research and Training Institute (GRTI), and the Etosha Ecological Institute.

i) Ecological Research Organisations

The Gobabeb Research and Training Institute is a joint Venture between the Ministry of Environment and Tourism (MET) and the Desert Research Foundation of Namibia (DRFN). It conducts research in a wide variety of fields including climate, ecology and desert conservation and restoration[9]. Attached to the GRTI is the Namib Ecological Restoration and Monitoring Unit (NERMU), whose objectives include ensuring close monitoring of changing environmental conditions and planning for the eventual restoration of mining impacted ecosystems. The Etosha Ecological Institute manages research within the Etosha National Park.

ii) Tertiary Education Institutions

The two main tertiary institutions are the University of Namibia (UNAM) and the Polytechnic of Namibia (PoN). They have conducted limited scientific and industrial research in the past, but the levels of research have increased in recent years. UNAM now has a Zero Emissions Research Initiative (ZERI) and a Multi-Disciplinary Research Centre which are fully operational, while a Regional Centre of Expertise on Sustainable Development is under consideration. PoN now houses a Renewable Energy and Energy Efficiency Institute (REEEI), as well as an Integrated Land Management Institute (ILMI).

[9]http://www.gobabebtrc.org/index.php/about-us

While these institutions conduct a lot of critical environmental research, the research does not include chemicals management and chemicals in the environment.

iii) National Commission on Research, Science and Technology

This is a Governmental Institution, but it has been mentioned in this section as it is very important in the research sector. While it has been shown that there is very little going on in the area of chemicals research, it is hoped that the National Commission on Research, Science and Technology (NCRST) will be able to promote such research. The NCRST was established by the Research, Science and Technology Act of 2004, with the purpose of coordinating and facilitating the development of research, science and technology. The NCRST has commenced with the process of developing the National Research, Science and Technology Programme (provided for in Section 18 of the Research, Science and Technology Act), which should cover the period 2014/15 to 2017/18. The Programme is meant to set out the national direction for research, science and technology, as well as identify shortcomings and priorities for research, science and technology.

c. Non-Governmental Organisations

There are about 26 NGOs that are involved in environmental management[10]. Most of the NGOs focus on biodiversity, climate change, individual species conservation and research, as well as Community Based Natural Resources Management (CBNRM). The number of NGOs whose activities involve promoting sustainable chemicals management, is much smaller.

One of the more active NGOs which plays an important role in sustainable chemicals management, is the Namibia Organic Association (NOA). This is a membership-based organisation that coordinates and promotes organic agricultural development, networking and marketing in Namibia. The organisation developed and owns the NOA Organic Standard, and the Namibian Organic Mark. The standard provides guidance for growing agricultural produce without the use of many conventional agrochemicals. It only allows the use of a few specified chemicals (NOA, 2010). It also promotes the ecologically sound management of agricultural waste. Since organically grown products are being advocated for in today's society, the presence of such an organisation in the country will contribute to a reduction in the usage of agrochemicals, and promotion of Integrated Pest Management strategies.

[10]http://travelnewsnamibia.com/archives/conservation-magazine/the-importance-of-ngos-in-conservation/#.U7UA10Cl2_I

d. Opportunities for the Industrial, Research and NGO Sector to Play Improved Roles in Chemicals Management

Industry Input

There are a number of industrial associations which are conducting various programmes aimed at improved environmental management. While these should be applauded, greater strides towards sustainable environmental management in general, and improved chemicals management in particular, would be made if industry could come together to form an organisation specifically aimed at promoting sustainable environmental practices by industry. In other countries where such organisations exist and operate, marked improvements in sustainable environmental management by industry have been noted.

The concept of Public Private Partnerships (PPP) needs to be encouraged and further promoted. There are vast opportunities for PPPs, particularly in the sphere of sustainable waste management, which would contribute significantly to improved chemicals management in Namibia. Industry should thus be encouraged to consider these opportunities, including through being offered incentives.

Research Sector Input

The tertiary education institutions have the potential to carry out research on chemicals management. Their capacity however needs to be strengthened through partnerships and technology transfer, since they are still in the early stages of development.

2.3 Assessment of POPs in Namibia

2.3.1 Assessment with respect to Annex A, Part 1 Chemicals (POPs Pesticides)

2.3.1.1 Production of Pesticides

There has never been any manufacture of pesticides (whether POPs or non-POPs pesticides) in Namibia. All pesticides used in Namibia are imported.

2.3.1.2 Uses of Pesticides

a. Agricultural Uses

POPs Pesticides are all banned in Namibia, and are therefore not used. Historically, though, Dieldrin was used for Tsetse fly control through annual ground spraying between 1960 and 1985 (Bishi et al, 2013)[11]. DDT was also used extensively for agriculture from 1946 (UWC, 2001)[12], but this use was discontinued after the realisation of the harmful effects of DDT in the 1960s.

Other non-POPs pesticides are used both by the general public (farmers) and also by the Government. The pesticides are available commercially.

Government Usage

The Government uses pesticides on a fairly large scale for spraying against pests that pose a national hazard, such as outbreaks of locust (Brown Locust, Red Locust and African Migratory Locust) and Army Worm (Shiyelekeni, 2000). The Ministry of Agriculture, Water and Forestry, which is responsible for these control operations that are normally carried out in communal areas, therefore needs to keep emergency stocks of the relevant pesticides.

Storage of Pesticides in Government Stores

The Ministry has a major pesticide store at Okahandja which was built to international standards in order to avoid environmental contamination. Examples of pesticides kept at the store include Deltamethrin, Chlorpyriphos and Trimethrin. Although the Okahandja Store is built to international standards, it faces a challenge in that it has no sorting section, and thus stores a number of obsolete pesticides and contaminated equipment in an environmentally

[11] Available on: http://www.google.com.na/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CCwQFjAC&url=http%3A%2F%2Fwww.au-ibar.org%2Fcomponent%2Fjdownloads%2Ffinish%2F93%2F1702&ei=vAhjVNO_CoqzaY63gJgE&usg=AFQjCNFHTTZ64l0Mbkyw7e119L1wA02JKQ&bvm=bv.79189006,d.d2s

[12] Available on http://www.botany.uwc.ac.za/envfacts/facts/farming.htm

unsound manner. Figure 4 shows the well-kept part of the store, while Figure 5 shows the consequences of having no sorting section.

Figure 4 showing good pesticide storage at Okahandja Pesticide Store

Figure 5 showing the consequences of having no Sorting Section at Okahandja Pesticide Store

There are other much smaller pesticide stores throughout the country where emergency pesticide stocks are stored. These include the one at Bukalo Agricultural Development Centre in Zambezi Region, Tses in Keetmanshop, Salem Agricultural Development Centre in Rundu, Kavango Region, as well as at Gelap-Ost Research Station. These smaller stores are not built to international standards, and in most cases were converted from other uses to become temporary pesticide stores. The store at Gelap-Ost is of particular concern, as there was historically very poor storage of pesticides which resulted in soil contamination. The pesticides that were poorly stored were repackaged and sent to South Africa for destruction, but there have never been any efforts to remediate the contaminated soil.

b. Other Illegal Uses - Indiscriminate Use of Pesticides for Poisoning Animals

Deliberate poisoning of animals using pesticides often occurs in Namibia and throughout other parts of Africa. Farmers misuse pesticides meant to kill plant pests, by using them illegally to kill mammalian predators such as jackals and leopards[13].

More recently, poachers have been using pesticides to delay officers from noting crime scenes, as the pesticides affect the scavenging vultures which would normally have been circling the carcass and thus alerting responsible authorities of the presence of a carcass[14]. Poachers use this method to give them lead time to get away from the poaching crime scene before it is discovered. The relevant authorities need to address this, either by improving law enforcement, or by tightening controls in the sale of the more poisonous pesticides.

2.3.1.3 Procedure for Importation of Pesticides

Ideally, pesticides should only be imported under permit issued by the Ministry responsible for Agriculture. However, in Namibia, the importation of pesticides only requires that the importer produces a certificate showing that the pesticide is registered in Namibia. The Ministry of Agriculture, Water and Forestry (MAWF) provides a manual list of registered pesticides to the Border posts, against which the Border officials check to see if an incoming pesticide is registered. This system does not allow for records to be generated. The current lack of a permit system therefore limits the capturing of important data required for chemicals management, and also leaves room for a lot of loopholes in pesticide importation.

The Ministry of Agriculture, Water and Forestry is currently revising its legislation to include provision for a permit system for pesticides. In the meantime, before enactment of the new legislation which will provide for the use of permits, MAWF is establishing a web-based

[13]http://www.namibian.com.na/indexx.php?archive_id=56842&page_type=archive_story_detail&page=3473

[14]http://www.iucnredlist.org/news/vultures-the-silent-victims-of-africas-wildlife-poaching

electronic system for use at the Border. This interim system will allow the generation of records on quantities of pesticides imported into the country.

2.3.1.3.1 Importation of POPs Pesticides

Although officially POPs are banned in Namibia, data available from the Namibia Statistics Agency on details of chemicals imported into Namibia, indicate that POPs have been imported into Namibia as late as 2013. (This data is generated from Customs ASYCUDA data). Table 7 shows the quantities of POPs that have been legally imported into Namibia in recent years.

Table 7: showing the quantities of POPs that have been imported into Namibia in recent years

HS Code	Pesticide	Quantities Imported (in kg)									
		2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
29035200	Aldrin (ISO), chlordane (ISO) and heptachlor (ISO)	-	-	-	-	112	-	-	-	-	-
29035910	---Mirex	266	-	-	-	-	-	-	-	-	-
29036100	Chlorobenzene, o-dichlorobenzene and p-dichlorobenzene	3,024	6,363	5,923	8,069	1,012	-	9,814	4,654	-	-
29038110	Lindane (ISO, INN)	-	-	-	-	-	-	-	-	-	246
38085002	products containing camphechlor(iso) (toxaphene)	-	-	-	-	-	-	-	-	28	75

(Source: EIC, 2014)

The continued importation of POPs pesticides into the country, despite their ban, is a serious cause for concern.

2.3.1.4 Obsolete Pesticide Stocks and Associated Materials

The Government of Namibia has conducted at least two inventories of obsolete pesticides, the results of which are given below:

2.3.1.4.1 Government of Namibia / GTZ Inventory 1998

In 1998, the Government of Namibia, in collaboration with GTZ, conducted an obsolete pesticides inventory in the southern part of the country. A total of 208 tonnes of BHC, which

had been purchased for locust control, was identified. In a collaborative effort between the Government of Namibia, the Government of South Africa, the German Government (through GTZ), and CropLife South Africa, the BHC was shipped to the UK, where it was destroyed.

2.3.1.4.2 Government of Namibia / DANIDA Inventory 2002 -2003

Between 2002 and 2003, the Government of Namibia participated in a regional project, in which it undertook an inventory of obsolete pesticide stocks in Namibia. The project was supported by the Danish International Development Agency (DANIDA). The inventory only looked at obsolete pesticide stocks held by Government, and excluded the individual farmers and the private sector. This inventory indicated that there were about 50 tonnes of obsolete pesticides (excluding contaminated associated materials). This figure is likely to be a gross underestimation of obsolete pesticide stocks in Namibia, as it excluded the private players (who are expected to hold huge stocks), and it also excluded contaminated associated materials (which should be included in a proper obsolete pesticides inventory, as these materials will also need to be managed appropriately).

No inventories have been carried out since 2003.

2.3.1.4.3 Shortcomings of Namibia's Obsolete Pesticides Inventory Process

Although information on the Government of Namibia inventories was supplied during the development of this NIP through interviews, the documentation pertaining to the inventory results was not available. The main reason for this is a lack of an information management unit (specifically for pesticides) in the Ministry of Agriculture, Water and Forestry (MAWF) or in MET for dealing with the management of chemicals information. The relevant Government authorities should come up with a chemicals information management strategy, which includes identification of data to be collected, how the data will be managed, and how it can be accessed / disseminated.

The inventories mentioned above were ad hoc inventories, and were not really national inventories. They targeted Government pesticide stores, and excluded obsolete pesticides held by individual farmers and by the private sector. There is need for the Government to carry out a comprehensive, detailed obsolete pesticides inventory, which would identify the quantities and locations of obsolete pesticides in Namibia, as well as assess the storage facilities for the pesticides. The inventory should also identify contaminated sites. The results of the inventory should then be used to come up with appropriate programmes for:

- Safeguarding poorly managed pesticide stores
- Environmentally sound disposal of obsolete pesticides
- Clean-up of contaminated sites

Without reliable and comprehensive inventory data, the above cannot be carried out efficiently, and the environment will continue to suffer. Human beings will also remain at high risk of exposure to the pesticides.

2.3.1.5 Issues of Concern Pertaining to Pesticides Management in Namibia

The assessment identified a number of issues which are a cause of concern regarding pesticides management in Namibia. These need to be addressed as a matter of urgency, and include:

a. Failure to Clean Up Contaminated Land

It has been reported that one of the historical storage sites for obsolete pesticides, the Gelap-Ost store, was very poorly managed and the surrounding soil became contaminated. When the obsolete pesticides were removed, the site was left as it was, and was never remediated. It is most likely that if duty of care was not employed in cleaning up this site, then other similar sites would also not have been cleaned up. Such un-remediated contaminated sites result in contamination of the soil, the groundwater, as well as the surrounding surface water. If any of the pesticides that contaminated this area were POPs, which are persistent in the environment, then the effects of this failure to clean up may be felt for generations to come. There have also been insufficient efforts to identify all contaminated sites in Namibia. It is imperative that a comprehensive inventory of Namibia's contaminated sites is conducted, after which, appropriate site clean-up should be carried out.

b. Inappropriate Storage of Pesticides (Both Usable and Obsolete)

MAWF has pesticide stores in most regions in the country. Only one site, the Okahandja store, was constructed and is managed according to internationally acceptable standards. However, this store has no sorting centre in place. There is thus need to ensure that the Okahandja Pesticide Store is upgraded to ensure the establishment of a sorting section.

Elsewhere, storage of pesticides is carried out in an environmentally unsustainable manner, as the other Government pesticide stores throughout the rest of the country are more or less makeshift stores which are not constructed or managed in line with internationally acceptable standards. In these stores, there is generally poor management of the pesticide stocks, there is little or no monitoring, and the stores are manned by untrained staff. These conditions put the surrounding environment and human population at risk of exposure. The Government needs to be proactive in constructing proper pesticide storage sites.

c. Poor Management of Pesticide Waste

The management of pesticide waste, particularly empty containers, poses a huge challenge for Namibia. Companies and individuals are often saddled with empty chemical / pesticide containers and do not know how to properly manage / dispose of them. These empty containers often end up being improperly disposed of, or being re-used (especially by

individual farmers). It is imperative that programmes are put in place for the management of empty containers, such as the introduction of incentives for the return of containers.

d. Continued Importation of POPs Pesticides

The fact that POPs are still being legally imported into Namibia as late as 2013 is extremely worrying. It implies that the registration process for pesticides is deficient, since only registered pesticides are allowed through the Border. It also suggests that there is very poor collaboration between the relevant Ministries which have a role to play in the importation of chemicals into Namibia. Unless this collaboration improves greatly, these banned chemicals will continue to easily find their way into the country.

e. Lack of Alternatives to Pesticides

The agricultural sector continues to rely heavily on pesticides, without concentrating much on seeking to use alternatives. Although some programmes such as the Urban and Peri-Urban Horticulture Initiative promote the use of Integrated Production and Protection Management techniques, these efforts need to be intensified in order to move away from total reliance on pesticides and shift towards Integrated Pest Management (IPM).

2.3.2 Assessment with respect to Annex B Chemicals (DDT)

All Persistent Organic Pollutants have been banned in Namibia, with the exception of DDT, which can only be used for malaria vector control. DDT has been used for malaria control in Namibia since 1965. Spraying was interrupted during the war of independence, which resulted in serious malaria epidemics (UNEP, 2001)[15]. Spraying was resumed after independence, and only the Ministry of Health and Social Services has the sole mandate for using DDT, under strictly controlled conditions.

2.3.2.1 Malaria Occurrence in Namibia

Malaria is a major public health threat in Namibia, with 69.8% of the population living in areas where there is risk of malaria transmission (MHSS, 2014). Of the 14 regions in the country, nine are considered to be malaria endemic (with 23 of out of 34 districts being considered malaria endemic). Malaria endemicity is relatively higher in the north-eastern part of the country, decreasing towards the northwest and the south of the country.

[15] Available on: http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/POPs/FULL%20PROJECTS%20Folder%20-%20POPs/Regional%20-%20DDT%20Africa%20-%20UNEP/3-7-02%20PDF-B%20DDT%20Africa%20UNEP%20Project.doc

2.3.2.2 Methods for Controlling Malaria in Namibia

The Government uses a number of methods for dealing with malaria. The primary vector control intervention is Indoor Residual Spraying (IRS) using DDT 75% WP and Deltamethrin 250 WG. The annual spraying cycle is conducted once a year between September and December. The annual IRS operational coverage has remained above 80% since 2005, except in 2008 where the coverage dropped to 38% due to the insecticide supplier's failure (MHSS, 2014). For quality control, bioassay testing is conducted annually to monitor the correct application rate of IRS.

In addition to IRS, other methods used to fight malaria include the use of long lasting insecticide-treated nets (LLINs) which are distributed widely, targeted winter larviciding, as well as early diagnosis and treatment. The Government has also undergone a re-orientation exercise in 2010, of moving away from malaria control strategies to the malaria elimination strategy approach with the goal of achieving malaria elimination by 2020 (MHSS, 2014).

2.3.2.3 Quantities of DDT Used in Recent Years

As IRS is the major intervention in malaria vector control, quite a lot of DDT has been used for the programme over the years (MHSS, 2014). Over the three years from 2010 to 2013, there was an annual procurement of **175,000 kg** of DDT 75% WP in 670g package sachets made, compared to **65,000 kg** that were procured on an annual basis previously over the years starting from 2006 to 2009. In the financial year 2008/09 no procurement was made at all. The total amount of DDT 75% WP used over the last eight years is **483,358 kg.** The DDT was previously supplied by Katutura Imports and Export CC (1995 – 1998), and then AVIMA Pty Ltd, a South African based company (2000 – 2007). The current supplier (2010-2013) is Hindustan Insecticides Limited (HIL) of India.

2.3.2.4 Management of DDT Waste

The DDT waste consists of cartons and plastic sachets. The plastic sachets are the ones that contain the actual DDT. The plastic sachets are destroyed in hospital incinerators, while the cartons are burned using improvised trench incineration in the field. In addition to DDT waste, obsolete DDT stocks are also present in the country. Namibia does not have the requisite technology to destroy these stocks in an environmentally sound manner. Currently, the obsolete DDT stocks are stored in the regional/district stores temporarily while waiting to be transported to Okahandja collection point (as this is the only central collection point in the country). It is expected that these stocks will remain at Okahandja until they can be transported to other countries which have the appropriate incineration facilities (MHSS, 2014).

2.3.2.5 Issues of Concern Pertaining to DDT Usage

a. Continued Use of DDT

The fact that DDT continues to be used in public health, despite the known adverse effects, is a cause for concern. There is need to implement Integrated Vector Management (IVM) technologies in order to reduce reliance on DDT. There is also need to conduct research into suitable alternatives, in order to ensure that the use of DDT is eventually eliminated.

b. Improper Management of DDT Waste

The methods that are currently used to manage the DDT waste (burning the cartons in open trenches and incinerating the plastic sachets in the hospital incinerators) are not environmentally friendly. Burning of waste in the open or in incinerators which do not reach the required temperatures of above 800 ^{o}C, results in the production of dioxins and furans, which are among the most potent carcinogens known to man. The Ministry of Health and Social Services needs to investigate more environmentally friendly methods of managing the DDT waste.

2.3.3 Assessment with respect to Annex A, Part II Chemicals - Polychlorinated Biphenyls (PCBs)

Polychlorinated Biphenyls (PCBs) are a class of Persistent Organic Pollutants which are used as dielectric fluids in electrical transformers, capacitors and voltage regulators. Considering the fact that they are mostly used in electrical equipment, it therefore follows that the electricity sector holds the majority of PCBs.

2.3.3.1 Electricity Management in Namibia

In Namibia, the electricity industry is dominated by the state-owned NamPower, which owns and operates all of the country's generation and transmission assets as well as some distribution facilities in the rural areas of central and southern Namibia.

a. Electricity Generation

Electricity generation in Namibia occurs at four local power plants, namely Ruacana, Van Eck, Paratus and Anixas (KAS, 2012).

- Ruacana is a hydro-electric power station on the Kunene River, which has a generation capacity of 332 MW.
- Van Eck is a coal-fired power station just north of Windhoek, which has a generation capacity of 120 MW.

- Paratus is a heavy fuel-oil power station in Walvis Bay, with a generation capacity of 24 MW.
- Anixas is a heavy fuel-oil power plant in Walvis Bay, with a generation capacity of 22.5 MW.

Although Namibia generates its own electricity, the quantity is insufficient to meet the needs of the country. The country can import as much as 60% of its electricity requirements from Eskom in South Africa, ZESA in Zimbabwe, EDM in Mozambique and SNEL in DRC (D. Louw, personal communication, May 7, 2014).

b. Electricity Transmission and Distribution

NamPower is responsible for all electricity generation, transmission and some distribution. The bulk of the electricity distribution, however, is undertaken by the regional electricity distribution companies (REDs), the City of Windhoek, and a few small towns such as Keetmanshop, Mariental etc, especially in the southern part of the country. There are three operational REDs, namely the Northern RED (Nored) which covers most of the northern part of the country stretching to the Caprivi Strip, the Erongo RED (Erongored), which covers the central coastal region to the west of the country including Walvis Bay and Swakopmund, as well as the Cenored, covering central-northern Namibia. Ownership of transformers and related electrical equipment is therefore divided between NamPower, these REDs, City of Windhoek, other towns, and some of the older, larger mines, which have their own transformers. The Electricity Control Board (ECB) regulates tariffs and licensing of electricity providers.

c. Manufacture / Repair of Transformers in Namibia

There is no manufacture of transformers in Namibia. NamPower repairs its own transformers in-house, but if the transformers to be repaired are huge, they are sent to South Africa. When selling off any transformers, NamPower first tests the transformers, as this is a written requirement from the Ministry of Environment and Tourism (MET). This requirement was written in 2006 and needs to be updated.

2.3.3.2 PCB and Transformer Management in Namibia

2.3.3.2.1 PCB Inventory for Namibia

In order to ensure sound management of PCBs, it is necessary to first identify PCB-contaminated equipment. This is one of the main driving forces for conducting PCB inventories. A preliminary PCB inventory was embarked upon in Namibia in 2011, but has not yet been completed because of a severe lack of capacity in the country; hence the pace has been very slow. This inventory was initiated by NamPower, which only has one person

dedicated to conducting the inventory, hence the slow pace. Although the Ministry of Environment and Tourism started working with NamPower in 2014 to try and speed up the process, the pace however remains slow because the capacity in terms of manpower and testing equipment is still quite insufficient. However, in spite of the slow pace of the inventory, it has produced quite a lot of valuable information as shown in Table 8.

Table 8 showing the results of the PCB inventory

Description	**Value**
Total number of pieces of electrical equipment (transformers, capacitors, voltage regulators, bushings, etc) in Namibia	11,690
Total number of transformers belonging to NamPower	6,181
Number of transformers tested for PCB-contamination (all belonging to NamPower)	588
Number of PCB-contaminated transformers	72
Contaminated transformers as a percentage of all tested transformers	12.2
Total weight of contaminated transformers (in tonnes)	1833
Total weight of contaminated oil (in tonnes)	513

The results of the transformer inventory show that at least **12.2%** of all tested transformers were found to be PCB-contaminated. If this figure is extrapolated to cover the total number of pieces of electrical equipment in Namibia, it would imply that there are approximately **1,426 PCB-contaminated transformers and other electrical equipment** in Namibia. This figure is very high, and the Government needs to ensure that the environmentally sound management of this contaminated equipment is undertaken as a matter of urgency.

The Government also needs to ensure that the PCB inventory is completed as a matter of urgency. In order to achieve this, there is need to assemble a large, multi-stakeholder PCB inventory task team, train the team, provide the necessary resources for undertaking the inventory, and dispatch the team to undertake the inventory countrywide. All owners of transformers should be targeted in this national inventory, including the local authorities that distribute electricity, the REDs, as well as the large mines that have their own transformers.

2.3.3.3 Challenges Associated With PCB Management in Namibia

The assessment of the PCBs situation in Namibia identified a number of challenges that are faced by transformer owners. Failure to overcome these challenges results in mismanagement of PCBs, leading to environmental contamination. These challenges include the following:

i) Lack of Information on PCB Status of Transformers

There is insufficient knowledge among transformer owners on the PCB-status of their transformers, since inventories have not been carried out. If the PCB-status of a transformer is unknown, that transformer should be treated as possibly PCB-contaminated, in line with the Precautionary Principle. This means that transformers owners are saddled with decommissioned transformers which should be treated as though they were PCB-contaminated. It is imperative that detailed inventories be carried out so that transformer owners can know how to best deal with their decommissioned transformers.

ii) Poor Storage of Decommissioned Transformers

It was noted that some decommissioned transformers are stored under very poor conditions. Examples of these include the scrapped and out-of-use transformers that belong to NamPower and are stored at Brakwater. This equipment was found to be stored outside without any shelter, and was exposed to the elements, as shown on Figure 6. Only 35% of the equipment was stored on impermeable surface (cement), while the remainder was placed on bare soil. This manner of storage greatly increases the risk of environmental contamination, especially given the fact that several transformers were found to be leaking.

Figure 6 showing transformer storage at Brakwater
(Source: NamPower, 2014)

Transformer owners therefore need to improve their storage facilities for decommissioned and non-working transformers, and the Ministry of Environment and Tourism should ensure that this is done.

iii) Management of Transformers without Oil

In many cases, decommissioned transformers will have had the oil removed from them, and will have been kept to be sold to the public as scrap. The Ministry of Environment and Tourism prohibits the sale of these transformers to the public, because of the argument that the drained transformers will always have residual oil in the coils, and this residual oil could be PCB-contaminated. This residual oil cannot be removed for testing hence the owners of such transformers are burdened with this waste which they cannot get rid of.

iv) Management of PCB-contaminated transformers

Although detailed national PCB inventories have not yet been carried out, some transformers have been tested and found to be PCB-contaminated. The owners of these transformers cannot dispose of them, but at the same time, the transformers are taking up valuable space at the companies' premises. The owners of these transformers are thus facing a dilemma of what to do with the transformers. This is a serious problem which the Government needs to look at and solve as a matter of urgency.

v) Lack of Awareness of Dangers of PCBs among Policy Makers

Many of the problems faced by transformer owners arise because there are very few Government policies and programmes for improved PCB management. This is as a result of policy makers being unaware of the dangers associated with PCBs, and therefore failing to put in place appropriate policies and programmes. Raising awareness on the dangers of PCBs among policy makers would be one of the fundamental first steps towards improving the management of PCBs in Namibia.

vi) Lack of PCB Specific Legislation and Policies

Although some legislation exists for hazardous chemicals management, there is no legislation for the management of PCBs, hence there is no legal compulsion for transformer owners to make concerted efforts to manage their PCBs.

The power utility NamPower has no written-down policies on PCB management. It is currently using the Southern African Power Pool (SAPP) Guidelines for PCB management. It has policies for chemicals management, which are not PCB-specific. Such a situation leaves a lot of room for PCB mismanagement.

2.3.4 Assessment of Releases from Unintentional Production of Annex C Chemicals – Unintentionally Produced POPs

Unintentionally Produced POPs (U-POPs) are formed as a result of combustion or certain chemical reactions such as those involved in metallurgical processes. U-POPs include dioxins and furans, which are among most potent carcinogens known to man. (The full names for dioxins and furans are Polychlorinated dibenzo-p-dioxins (PCDD) and Polychlorinated dibenzofurans (PCDF) respectively, therefore the term PCDD/PCDF is often used in place of dioxins and furans).

There are many processes that give rise to U-POPs, and it is necessary to conduct U-POPs inventories in order to quantify the amount of PCDD/PCDF that is released from each process. This will enable the relevant authorities to prioritise and urgently address those sources which produce the highest levels of PCDD/PCDF. In conducting inventories of U-POPs, it is not easy to collect air samples and test these for dioxins and furans, as this is an extremely expensive exercise. UNEP has therefore designed a Toolkit which is used to estimate quantities of PCDD/PCDF that are produced from various sources (UNEP, 2013).

There are 10 defined categories of processes that give rise to dioxins. These are:

1. Waste Incineration
2. Ferrous and Non-ferrous Metal Production
3. Heat and Power Generation
4. Production of Mineral Products
5. Transport
6. Open Burning Processes
7. Production and Use of Chemicals and Consumer Goods
8. Miscellaneous
9. Disposal
10. Identification of Hotspots

The categories are further divided into subcategories e.g. the subcategories for Waste Incineration are Municipal solid waste incineration, Hazardous waste incineration, Medical waste incineration, Light fraction shredder waste incineration, Sewage sludge incineration, Waste wood and waste biomass incineration, and Destruction of animal carcases[16]. In using the Toolkit to estimate releases of dioxins, source data such as amount of raw materials used or amount of product produced, is used, together with established emission factors (which are different for each subcategory). The source data and emission factors are calculated to produce an estimate of the amount of dioxin that is produced by each subcategory.

An inventory of U-POPS was conducted in Namibia in 2014, in order to determine the quantities of dioxins released from the different processes. Although there are a lot of

[16] The full list of subcategories is found in the Toolkit, which is available on: http://toolkit.pops.int/

processes in the Namibia with the potential to give rise to dioxins, releases were only calculated for a few processes, as sufficient data for all the processes was not readily available. Table 9 summarises the dioxin emissions from the processes where data was provided.

Table 9: Summary of Dioxin Emissions for Namibia

Sub Category / Source of Dioxins	Quantity of Dioxins Emitted per annum (in g TEQ)
Medical Waste Incineration	174.03
Destruction of Animal Carcasses	0.00039
Copper Smelting	0.0775
Coal Fired Power Stations	0.16
Power Stations fired by Heavy fuel oil and light fuel oil	0.0002
Cement Production	0.03
Accidental Fires in homes, cars etc	2.00
Sewage Treatment	0.13
Petrol Vehicles	0.0089
Diesel Vehicles	0.013

The results from Table 9 show that medical waste incineration seems to be the biggest source of dioxin emissions in Namibia. This sector needs to be given urgent attention, in order to ensure that the quantities of dioxins emitted from the process are reduced significantly. However, one should keep in mind that the sources of dioxins in Table 9 are not exhaustive, as there are some other potential sources of dioxins where the annual releases were not calculated because of a lack of data.

2.3.4.1 Analysis of Dioxin releases by Sector

Although dioxin releases could not be estimated for all possible U-POPs sources, an analysis of the other potential sources of U-POPs in Namibia was made, even if the actual dioxin release could not be estimated. Since data on these other sources was unavailable, the sources should be considered to be significant until proved otherwise, in keeping with the Precautionary Principle. Detailed analyses of all possible U-POPs sources are given in the ensuing paragraphs.

2.3.4.1.1 Main Category 1 – Waste Incineration

a. Municipal Solid Waste Incineration

Namibian local authorities do not incinerate municipal solid waste, although some individuals often burn waste in the open. This open burning of waste will be discussed further under Main Category 6 – Uncontrolled Combustion / Open Burning Processes.

b. Hazardous Waste Incineration

Hazardous waste in Namibia is not incinerated either. In some local authorities it is dumped together with general municipal solid waste, while Windhoek and Walvis Bay each have separate hazardous waste disposal facilities.

c. Medical Waste Incineration

Medical / clinical waste in Namibia is incinerated. Studies have however shown that many of the hospital incinerators are of an unacceptable standard, lack maintenance and also lack skilled staff, among other things (MHSS, 2010). The incinerators do not operate at the optimum temperature of above 800^0C, (GRN, 2010) hence the chances of dioxin production from the process are extremely high.

Data on the amounts of medical waste incinerated was not readily available during the inventory process. However, some data that had been calculated in 2001 was used to provide an estimate of the amount of medical waste generated in Namibia's health care facilities[17]. During that 2001 study, the amount of medical waste generated in Namibia was determined in terms of the number of patient beds (for hospitals), and the number of people visiting clinics daily. It was assumed that attending each patient generates approximately 600g of waste per day, and this figure was used to calculate the total amount of medical waste generated in Namibia. The calculation gave an estimated total of 4,329 tonnes of medical waste generated in Namibia annually. Considering that medical waste is incinerated in poorly managed hospital incinerators, the emissions of dioxins from medical waste incinerations were calculated to be 174.03 gTEQ, which is very high and implies that people living in the vicinity of hospitals are at risk of exposure to the dioxins.

d. Sewage Sludge Incineration

Of the seven local authorities in Namibia who provided information on their sewage management practices, only one local authority said that it burns the sewage sludge (2-3 tonnes per annum). The others use it for manure or are in the process of setting up drying beds. The information provided by the local authorities on this activity was therefore not sufficient to extrapolate a position for the whole country.

e. Destruction of Animal Carcasses

The Veterinary Department of MAWF have an incinerator where they incinerate animal carcases from the laboratory, as well as any other laboratory waste. On average, about 150 kg

[17]http://africainstitute.info/study_assessment_report_namibia.pdf

of animal and laboratory waste is incinerated weekly, which translates to 7.8 tonnes per annum. The furnace is a modern one, with some Air Pollution Control System (APCS). The emissions from incineration of veterinary waste were calculated to be 0.00039 gTEQ, which is quite low.

2.3.4.1.2 Main Category 2 – Ferrous and Non- Ferrous Metal Production

a. Copper Production

Copper is one of the base metals that is mined and processed in Namibia. Tsumeb Smelter, located 430 km north of the Namibian capital, processes copper concentrate from the Tsumeb Copper Mine and from other mines in the region. The Smelter is one of only five commercial smelters in Africa, and consists of two primary smelting furnaces – the old reverberatory furnace as well as the refurbished Ausmelt furnace. In 2013, the Smelter processed a total of 152,457 tonnes of concentrate[18]. The dioxin emissions from copper smelting were calculated to be 0.0775 g TEQ, which is also fairly low.

2.3.4.1.3 Main Category 3 – Power Generation and Heating

a. Fossil Fuel Power Plants

In Namibia, there is one fossil fuel power plant which generates electricity for the nation. This power station, called Van Eck Power Station is situated just north of Windhoek. It uses bituminous coal and has a generation capacity of 120 MW. The average amount of coal used is 160,000 tonnes per annum, hence the dioxin emission from the power station was calculated to be 0.16g TEQ/annum, which is fairly significant.

b. Heavy Fuel Oil-Fired Power Plants

Namibia has two power plants which use heavy fuel oil to generate electricity. These two plants, namely Paratus and Anaxis are both in Walvis Bay and they have generation capacities of 24 MW and 22.5 MW respectively. The power plants use 1,800 tonnes of oil per year, hence the dioxin release was calculated to be 0.0002 g TEQ / annum, which is quite low.

[18] http://www.dundeeprecious.com/English/operations/processing/tsumeb-smelter/default.aspx

c. Household heating and cooking

The use of wood fuel for cooking is common in Namibia. The Namibia Statistics Agency reported that on average, 61% of all Namibians did not use electricity or gas for cooking as at 2009/2010. This was distributed as 90% of the rural population, and 23% of the urban population[19]. This means that these people used either wood or paraffin for cooking, but wood is more commonly used, since it is cheaper. Data on the estimated total amount of wood fuel burned for this purpose could not be obtained, but it is expected that a very large percentage of the population is exposed to emissions (Polycyclic Aromatic Hydrocarbons (PAHs), fine particles and possibly U-POPs) from this source.

2.3.4.1.4 Main Category 4 – Mineral Production

a. Cement Production

There is only one cement manufacturer in Namibia, called Ohorongo Cement. The Ohorongo Cement Plant is a modern plant, with all the necessary pollution abatement systems. It produces 600,000 tonnes of cement per annum[20]. Since it has a modern plant, an emission factor of 0.05 was used to calculate emissions of dioxins from cement manufacture. The dioxin emissions from this process were calculated to be 0.03 gTEQ, which is quite low.

2.3.4.1.5 Main Category 5 – Transport

This category has four subcategories which are 4-stroke engines, 2-stroke engines, diesel engines, and heavy oil fired engines. Data that was availed showed that 127,800 tonnes of diesel, and 178,400 tonnes of petrol are used annually in the transport sector. The dioxin emission from diesel vehicles was calculated to be 0.013 g TEQ/annum. For petrol vehicles, it was assumed that half the petrol vehicles use unleaded fuel with a catalyst (which has an Emission Factor of 0), while the other half use unleaded fuel without a catalyst (with an Emission Factor of 0.1). The dioxin release from petrol was therefore calculated to be 0.0089 g TEQ / annum. The values of dioxin emissions from both petrol and diesel vehicles were thus quite low.

[19] http://www.nsa.org.na/

[20] http://www.dw.de/biofuel-boost-for-namibias-cement-maker/a-17768075

2.3.4.1.6 Main Category 6 – Uncontrolled Combustion / Open Burning Processes

a. Biomass Burning

Although forest fires occur in Namibia, data on the total area burned could not be obtained, hence emissions from this source could not be ascertained. However, the emissions are expected to be significant, considering that deforestation is one of the major environmental problems in Namibia, and uncontrolled wildfires are one of the causes of deforestation.

b. Waste Burning

Poor waste management has been found to be one of the most significant sources of U-POPs in many countries (UNEP, 2009)[21]. However, the Namibian capital Windhoek, which has 12.4 % of the country's population, has very good waste management facilities, and there is insignificant burning of waste. The same was also found to be true for a number of the larger municipalities.

On the other hand, some of the smaller towns were found to have very poor waste management facilities, with as much as 90% of the domestic waste being burned. This points to very high levels of dioxin emissions from the waste management sector in these small towns. These small towns did not provide data on the quantities of waste that are produced (as they do not measure the quantities), hence the total amount of dioxin produced could not be ascertained. The levels are expected to be significant though, given that most of the waste that is generated, is burned.

c. Accidental Fires

Statistics on accidental fires in houses, factories and cars were provided by six local authorities. Table 10 shows the statistics on accidental fires in the local authorities.

[21] Available on: http://www.chem.unep.ch/pops/pcdd_activities/projects/Open%20burn%20ProDoc_internalized.pdf

Table 10: Accidental Fires in Namibia (in Houses, Shacks, Factories and Cars)

Name of Local Authority	Population of LA (2011)	Population of LA as a % of national population	Number of accidental fires in houses and shacks annually	Number of accidental fires in factories annually	Number of accidental fires in cars annually
Swakopmund	44,725	2.1%	44.8	0.8	2.2
Karibib	5,132	0.24%	10	0	1
Henties Bay	4,720	0.22%	4	0	0
Luderitz	12,537	0.59%	17	0	0
Rehoboth	28,843	1.36%	20	0	3
Mariental	12,478	0.59%	30	0	0
Total	**108,435**	**5.1%**	**125.8**	**0.8**	**6.2**

The population of the six local authorities combined represents 5.1 % of the population of the entire country, hence the statistics for accidental fires from these local authorities were extrapolated to provide approximate statistics for the whole country. The dioxin emissions from accidental burning were therefore calculated to be 2.0 gTEQ, which figure is significantly high.

The dioxin emissions from accidental fires are quite high at 2.0 gTEQ / annum. This high figure could be attributed to the fact that there had to be an extrapolation to come up with a national figure. One of the towns, Swakopmund, had a very high number of houses burnt annually (44.8 houses). Of this figure, 2.8 were solid houses, while 42 were shacks. Shacks are usually made of wood, paper and / or plastics, and are therefore highly flammable. This fact most likely caused the dioxin emissions from burning of houses to be so magnified.

In view of the high flammability of shacks, and given the fact that shack dwellings are significant in several countries, it may be worthwhile for the developers of the UNEP Toolkit to revise and give different emission factors for shacks, as compared to houses. According to the 2011 Census Report, Namibia has 16 % of its population living in shacks, distributed as 27% of all urban dwellings, and 5 % of rural dwellings (NSA, 2011). These figures are quite significant, hence it would be appropriate to analyse the shacks separately.

2.3.4.1.7 Main Category 7 – Production and Use of Chemicals and Consumer Goods

a. Leather Plants

The leather industry in Namibia is quite active, but statistics on its performance were not available at the time of writing this report.

2.3.4.1.8 Main Category 8 – Miscellaneous

a. Dry cleaning

In Namibia, the majority of dry cleaners handle normal and not heavy duty textiles (99.99% normal). However, no data on dry cleaning could be collected during inventory process.

2.3.4.1.9 Main Category 9 – Disposal / Landfill

a. Landfill Leachate

In Namibia, most of the municipal landfills are unlined, hence there is bound be leachate flowing from the landfill, to join the groundwater stream. Statistics on estimated volumes of leachate that are produced from the landfills were not available.

b. Sewage / Sewage treatment

Seven local authorities, namely Windhoek, Swakopmund, Karibib, Henties Bay, Mariental, Rehoboth and Luderitz provided data on their sewage management practices. The sewage operations for the local authorities are shown in Table 11.

Table 11: Local Authorities Sewage Management Facilities

Local Authority	Type of Sewage Treatment Plant	Type of sewage that is treated	Amount of effluent treated annually	Any sludge removal	What happens to removed sludge
Windhoek	Biological treatment and settling	Residential effluent only or modern effluent plant[22]	Gammams : 14,235 ML Otjomuise : 3,650 ML Ujams: 1,277 ML	Sludge is removed at the Domestic WCW but quantities are not recorded	Stockpiled at treatment plant sites currently and available for use by public, however very little is used by public due to sludge not being properly stabilised. Projects underway at Gammams for sludge to be reworked into fertiliser with private contractor.
Swakopmund	Biological treatment and settling	Residential effluent only or modern effluent plant	2,400 ML	859 tons	Digested in digesters and then dried in dry beds. Dried sludge is milled to use as garden fertiliser.
Karibib	No treatment	Residential effluent only or modern effluent plant	No treatment	2 – 3 tonnes	Burned
Henties Bay	Biological treatment and settling	Residential effluent only or modern effluent plant	unknown	None	Process has started to build dry beds
Mariental	No treatment – just using evaporation ponds	-	Unknown	40 m^3 is removed every 3 years	Dumped in a fenced area close to the ponds.
Rehoboth	No treatment	Mixed industrial and domestic effluent with sludge removal	Unknown	N/A	N/A
Luderitz	Biological treatment and settling	Modern effluent treatment	438 ML	6.57 ML	Removed sludge is dried and kept at the premises. Plans are underway to treat the sludge with ammonia gas.

Emissions from sewage treatment were calculated to be 0.13 gTEQ / annum, which is a fairly significant figure.

The total dioxin emissions from sewage treatment for Namibia were calculated by extrapolating the total for the three cities (which provided data on volumes of sewage treated)

[22]Treatment happens at three Wastewater Treatment plants – two are for domestic and light industry effluents where activated sludge plants are operated (Gammams and Otjomuise WCW) while the third is industrial waste water which goes to oxidations ponds (Ujams WWTW) currently but in the near future will be treated with membrane bioreactor.

to the whole country (using the fact that the total population for Windhoek, Swakopmund and Luderitz together accounts for 18.13 % of the total Namibian population). This method for estimating the dioxin emission for the whole country, using data from just three local authorities is not the best, considering that all other local authorities may be employing different sewage treatment mechanisms which would need to be subjected to different types of calculations. However, it provides a rough estimation, which gives one something to work on.

c. Open water dumping

It would appear that this activity does not take place in Namibia, since all local authorities which supplied data, said that this did not occur in their jurisdictions.

d. Composting

This activity is carried out on a very small scale in Namibia, hence its contribution to dioxin emissions can be assumed to be negligible.

e. Waste Oil Disposal

The waste oil that is generated in Namibia is either used or recycled (EMS, 2013). Most of the oil is cleaned and filtered, then used as a substitute fuel for burners and industrial boilers. A small portion of the oil is also used for treatment of wood poles against termites. There are a few other inappropriate uses which the waste oil is subjected to, and these include polishing of new floors, skin treatment against ticks, used as a herbicide to kill weeds, and suppression of dust on floors and roads.

Most of the waste oil produced in Namibia is generated by the automotive industry. The automotive sector is widespread in Namibia, and the players include Do-It-Yourself (DIY) oil changers, public transport operators, formal and informal vehicle maintenance workshops, car dealerships, mines and other industries with their own fleets, as well as the Government fleet. Other sources of waste oil besides the automotive sector include the fishing and shipping sector, industry, TransNamib (provider of railway services), as well as NamPower (from their power plants).

Volumes of total waste oil generated are unknown, as there are no reliable statistics on this. However, the annual volume of waste motor oil that is generated is estimated at 7.4 million litres (EMS, 2013).

The waste oil that is generated is collected by a small number of waste oil collection companies. These collection companies place a large number of collection tanks at strategic locations throughout the country, and this enables them to collect as much as possible. It is estimated that about 80% of all the waste oil that is generated is collected, leaving about 20%

that is unaccounted for and is most likely disposed of directly into the environment - either onto the ground or into storm water drains (EMS, 2013).

Since the total volume of waste oil generated in Namibia could not be ascertained, the contribution made by waste oil disposal to dioxin formation could not be calculated. However, it is expected that this sector should be contributing significantly to dioxin formation, especially given the fact that not all the waste oil can be collected, therefore some will definitely find its way into the environment.

2.3.4.1.10 Main Category 10 – Hot Spots

a. Production Sites of Chlorinated Organics, Production Sites of Chlorine, Formulation Sites of Chlorinated Phenols, Application Sites of Chlorinated Phenols

There was no data available on these activities. It is assumed, however, that these activities do not take place in Namibia, considering that the chemicals manufacturing sector in Namibia is not very big.

b. Timber manufacture and treatment sites

Commercial timber manufacture and treatment is not a significant activity in Namibia. One of the main reasons is that Namibia has an arid climate, therefore commercial timber manufacture is not a viable activity. A lot of the activities involving timber in Namibia involve indigenous timber.

c. PCB containing equipment

Detailed PCB inventories have not been carried out in Namibia, hence data on the extent of PCB contamination is not available. However, the preliminary inventory exercise that has been carried out has shown that decommissioned and non-working transformers are often poorly stored, hence it is likely that transformer storage areas could be contamination hotspots.

d. Dumps of waste/residues from categories 1 – 9

In Namibia, 26 of the 28 municipalities dump industrial and domestic waste together at municipal dumpsites. It is thus safe to conclude that ordinary municipal dumpsites are potential hotspots for dioxin emissions.

2.3.5 Assessment with respect to E-waste (source of certain Brominated Flame Retardants)

Electronic waste (E-Waste), also referred to as Waste Electrical and Electronic Equipment (WEEE), is currently the fastest growing waste stream globally, and is already posing a serious challenge to many Governments. E-waste includes discarded computers, office electronic equipment, entertainment devices, electronics, mobile phones, television sets and refrigerators (UNEP, 2013).

E-waste is highly hazardous as it contains high levels of lead, mercury, arsenic, cadmium, selenium, hexavalent chromium and brominated flame retardants (BFRs). BFRs are among the new POPs that have been listed in the Stockholm Convention, hence the inclusion of E-Waste in this report. Burning of e-waste also results in the formation of Unintentionally-Produced POPs, which are known to be carcinogenic.

In order to determine the nature and extent of the E-waste problem it is necessary to conduct E-waste inventories. According to the UNEP E-Waste Inventory Assessment Manual there are at least five methods for conducting E-waste inventories. These include the Time Step Method, the Market Supply Method, the Carnegie Mellon Method, and the Approximation 1 Formula (also known as the Consumption and Use), as well as the Approximation 2 Formula (UNEP, 2007).

Namibia, like many other African countries, faces huge challenges in the management of E-waste. An E-waste inventory was recently conducted in Namibia in order to find out the magnitude of the E-waste problem, with a view to coming up with solutions to the problem. The Namibia E-waste inventory process employed at least two methods for estimating the volumes of E-waste generated. This report will only focus on the Market Supply Method, in which data were collected from selected suppliers on annual sales of e-items. The data were used to estimate annual generation of e-waste. (The estimated amount of e-waste generated was calculated using data on the average mass and lifespan of different e-items, obtained from literature). Table 12 shows the annual sales of e-items and the estimated quantities of e-waste generated in Windhoek, which has 767 furniture / appliance suppliers (MET, undated).

Table 12: Sales of E-Items and Estimated Quantities of E-Waste Generated in Windhoek

Equipment	**Annual sales / numbers of each item sold in Windhoek**	**Estimate annual mass of e-waste generated**
Computers	64,428	214.8
Printers	27,612	71.8
Televisions	156,468	528.0
Refrigerators	349,752	1,154.0
Radios	55,224	11.0
DVD players	294,528	294.5
Washing machines	138,060	338.9
Cellphones	331,344	16.6
Total		**2,629.6**

2.3.5.1 Challenges to E-Waste Management in Namibia

The inventory gave an estimate of the total amount of E-Waste generated in Namibia annually. In conducting the inventory, however, certain challenges which hinder the sound management of E-Waste were also identified. These include:

a. Unsustainably High Volumes of E-Waste Being Generated

The volumes of E-Waste being generated in Namibia are unsustainably high. Current consumption patterns, coupled with the constantly shortening life spans of most electrical gadgets, have resulted in the generation of high volumes of E-waste. Organisations and individuals are now saddled with huge quantities of E-waste which they usually do not know how to manage sustainably, and end up managing them in ways which ultimately pollute the environment and endanger human health. There is need for the Government to put in place mechanisms that will lead to the ultimate reduction in the generation of E-Waste in Namibia.

b. Lack of Capacity to Manage E-Waste in Institutions and Among Individuals

There is a serious lack of capacity to manage E-Waste, both among those who generate it, as well as those who are supposed to be ensuring that it is properly managed (the Government agencies). The lack of capacity means that the E-Waste is improperly managed, leading to environmental contamination and adverse effects on human health. Currently, there are no programmes in place to raise awareness of how E-Waste should be managed. There is need for Government to put in place awareness raising programmes on the dangers of E-waste, and also on how it should be managed. Guidelines for the management of E-Waste need to be developed and disseminated widely.

c. Insufficient Data on E-Waste

Although it is generally agreed that there are unsustainably high volumes of E-Waste that are being generated, the actual statistics are not available to fully support this. Data collection and management for E-Waste is very low. The E-Waste Inventory process that was carried out for Namibia used a lot of estimations, as there was no actual monitoring data on the exact quantities that are being produced. This lack of accurate information on the real extent of the E-waste problem means that it will be impossible to come up with the correct and appropriate interventions to solve the problem. There is thus need to put in place an E-Waste information strategy which details, among other things, how E-waste generation will be monitored, and how the information gathered will be disseminated. This strategy should include the development of an E-Waste database.

d. No Infrastructure (Legal and Technical) for Sound Management of E-Waste (Focusing on Storage, Reuse / Recycling and Disposal)

There are no mechanisms for the sound management of E-Waste in Namibia. Management aspects such as storage, reuse/ recycling and disposal of E-Waste, are all carried out in environmentally unsustainable ways.

Storage

There are no specialised storage facilities for E-Waste, hence generators often keep it in storerooms. Such facilities are not able to prevent contamination of the environment by some of the components of E-waste.

Recycling / Reusing Mechanisms

Proper mechanisms for recycling and reusing E-Waste are not being applied. As a result, people often use crude means to remove valuable components from E-Waste, resulting in exposure to harmful chemicals, as well as contamination of the environment.

Disposal Mechanisms

There are no disposal mechanisms for disposing of E-Waste. It is normally just dumped together with ordinary municipal waste. This results in environmental contamination.

There is thus a critical need for the Government to put in place mechanisms for the sound management of E-Waste. This will include promulgation and enforcement of an enabling legislative environment.

2.3.6 Current Level of Awareness Among Members of the Public and Workers

Awareness and understanding of chemicals management issues among members of the public is very low in Namibia, just like in a lot a lot of other countries. Awareness of POPs issues is much worse, almost non-existent.

2.3.6.1 Public Awareness

Among the public, lack of awareness is often observed when it comes to pesticide management. It is common practice to find empty pesticide containers being rinsed out and used for water storage in the home.

Awareness of chemicals management issues therefore needs to be greatly improved. The lack of knowledge on chemicals management and the dangers associated with chemicals means that the public cannot take the necessary measures to protect themselves and prevent exposure. This makes the Namibian population very vulnerable, as they are at a very high risk of risk of exposure.

Although the MAWF conducts awareness raising for farmers through its Directorate for Extension, these efforts need to be intensified. The Government should also ensure it utilises all available opportunities to raise awareness on pesticides and chemicals management by incorporating these into programmes such as the Green Scheme Initiative and the Urban and Peri-Urban Horticulture Initiative.

It is unfortunate that there is no deliberate legislation aimed at raising awareness for the public on chemicals management. The principal act for environmental management, the Environmental Management Act does not specifically talk about the need for raising awareness or educating the public on environmental management. The only awareness raising that it refers to is the provision for the Minister to introduce legislation or make regulations for education, training, awareness raising and capacity building under MEAs.

2.3.6.2 Worker Awareness

2.3.6.2.1 Legislative Requirements for Worker Awareness and Training

Awareness of chemicals management among workers is much better than among the public, as there is a legislative requirement for the workers to be educated in chemical safety. The Regulations Relating to the Health and Safety of Employees at Work, require employers to regularly prepare and review written policies and programmes on the protection of the health and safety of workers. The programmes to be prepared should include issues of health and safety awareness and training.

The Regulations also mention the need to ensure that workers dealing with asbestos and lead are well informed about the dangers of the substances and are trained in the handling of the substances prior to commencement of employment and periodically thereafter. The training should include, *inter alia*, the contents of the regulations, the potential dangers to health of exposure, the risks associated with exposure, the proper use, maintenance and limitations of safety equipment, and precautions to be taken to protect oneself including use of PPCE.

2.3.6.2.2 Training and Awareness Raising for Workers

There are several organisations that provide training, education and awareness-raising for workers in chemical safety. These include:

- Division of Occupational Health and Safety of the Ministry of Labour and Social Welfare which provides technical support for all parties concerned in OHS, educational materials for campaigns and promotions, as well as provides information regarding the OHS regulations.
- NOSA Namibia – this is an accredited training provider which provides training on, among other things, SHE implementation, Hazard Identification and Response, Continuous Risk Assessment, Safety Management Training Course (SAMTRAC), Workplace Risk Assessment Course, OHS Act and Regulations.
- Namibia Employers Federation (NEF) offers targeted awareness training in issues including Chemical Safety and Correct Use of PPE, as well as external training on Hazard Identification and Risk Assessment and Introduction to Occupational Health and Safety, among other courses.
- CropLife offers workers in the pesticide industry, training on sound pesticide management.

The list is certainly not exhaustive, but simply mentions a few of the organisations providing training on chemical safety for workers.

2.3.6.3 Issues of Concern Pertaining to Levels of Awareness

The lack of awareness among members of the public is a huge cause for concern. The level of awareness regarding chemicals management is so low, and there do not seem to be any programmes aimed at raising awareness among the public. Failure to educate the public and raise their levels of awareness on chemicals management could render other chemicals management programmes ineffective. The general public have an important role to play in other initiatives such as improved enforcement of legislation, integrated waste management, and removal of illegal and banned pesticides from the public domain. They can however only participate if they are educated in these issues. It is therefore crucial that the Government should prioritise public awareness-raising in order to ensure the success of other programmes aimed at improved chemicals management.

2.3.7 Overview of Technical Infrastructure for POPs Assessment

An assessment of Namibia's laboratory infrastructure for chemicals management was carried out. The laboratories were divided into two categories – the environmental / analytical laboratories, as well as the public health laboratories.

2.3.7.1 Environmental / Analytical Laboratories

Namibia has a number of laboratories which conduct analyses for various environmental parameters. These include both Governmental and private laboratories.

During the assessment of infrastructure, four laboratories were assessed for a number of parameters, in order to get an idea of the technical capacity of the Namibian laboratory system to undertake the various types of analyses for chemicals management. These were the Analytical Services Agricultural Laboratory under MAWF, the Materials Testing Institute of the Polytechnic of Namibia, the Analytical Laboratory at the University of Namibia, as well as the Geochemistry Laboratory of the Ministry of Mines and Energy. The parameters that were assessed included:

- The scope of analyses carried out by the laboratory;
- The clientele serviced;
- The status of ISO 17025 Certification;
- The presence of good laboratory practices (GLP);
- The use of internationally recognised protocols; and
- The availability of programmes for cooperation with other laboratories.

The findings are shown below:

Scope of Analyses

Two of the laboratories carry out analyses to determine quality of chemicals, conduct residue analysis, identify unknown chemicals, monitor chemical contamination in water, monitor chemical contamination in the soil, monitor for workplace exposure to chemicals, and monitor for POPs in the environment. The other two do not conduct such a wide range of analyses – one specialises in analysing geological materials, while the other specialises in other chemical, biological and physical analysis services, detecting GMO presence in food and feed and developing appropriate technologies for new products.

Clientele

Three of laboratories conduct analyses for their own needs, as well as for external clients. This means that they can be utilised to conduct analyses. The fourth one is currently only conducting analyses for its own programmes, but expects to start offering services to external clients in 2015.

ISO 17025 Certification
None of the laboratories are certified to the ISO 17025 Standard, but two are at various stages in the process of getting certification. The other two are not yet in the process of seeking certification.

Good Laboratory Practices (GLP)
Only one of the laboratories has certified GLP. The other three do not have.

Use of Internationally Recognised Protocols
Three of the laboratories use a variety of internationally recognised protocols, including SANS, ASTM, BS, and the use of Certified Reference Materials. The fourth one does not.

Programmes for Cooperation
Three of the laboratories have some form of cooperation with either local or international laboratories, e.g. training of industrial personnel or other laboratory personnel, and rendering assistance to other laboratories for any disputes or quality control. The other one does not.

2.3.7.1.1 Weaknesses in the Analytical Laboratory Infrastructure

Although only four laboratories responded to the assessment, it was revealed during consultations with other stakeholders (who often need to get their samples analysed for different parameters, and thus act as clients for the local environmental laboratories), that some of the laboratories in Namibia had often produced inaccurate results for certain analyses. These clients had therefore stopped sending samples for analysis to local laboratories, and were now using South African laboratories. This implies that the capacity of Namibian laboratories to conduct environmental and chemical analysis is inadequate. There is thus need to build capacity in the Namibian laboratory system, both in terms of equipment and skills

2.3.7.2 Public Health Laboratories

The public health laboratories have an extremely important role to play in chemicals management, as they will be able to test for pesticide exposure, test for workplace exposure to other chemicals, and also test for presence of POPs in humans. If these analyses can be carried out, and the results be made available to policy makers, this would provide the most effective impetus for compelling policy makers to come up with policies and legislation that would adequately protect human health and the environment from POPs and other harmful chemicals.

Namibia has 58 clinical laboratories spread throughout the country, 38 of which are operated by the Namibia Institute of Pathology. The Namibia Institute of Pathology is an autonomous government agency which is mandated with providing laboratory services for the private and public sector on a commercial basis. The remaining 20 clinical laboratories are shared by six main laboratory chains, namely Path Care, Clinpath, CPC, Oshana, High Care, and Maxi Med.

The public health laboratory sector suffers from a lack of skilled laboratory staff (MHSS, 2012b). The distribution of skilled personnel is skewed towards the urban areas. In order to overcome this shortage, programmes have been embarked upon to train laboratory personnel in-country at The Polytechnic of Namibia for Medical Laboratory Technologists and the National Health Training Centre for the laboratory technicians.

2.3.8 Assessment of Impacted Populations

Identification and assessment of populations who may have been affected by POPs has not taken place in Namibia. There are several populations that have been exposed to POPs, and are likely to have been impacted by POPs. These include:

- Workers who work with transformer oil
- Populations living in areas where DDT continues to be sprayed
- Populations living in the vicinity of areas where dieldrin was sprayed for tsetse control
- Populations living in the vicinity of facilities whose operations may give rise to dioxins, such as hospitals and metal processing industries
- Workers who work in facilities whose operations may give rise to dioxins, such as hospitals incinerators and metal processing industries
- Workers who work in the agriculture sector

It is imperative that these populations be assessed for POPs. The results of such assessments will provide much needed information for how POPs can be better managed to protect human health.

Chapter 3 - Strategies and Action Plans of the NIP

3.1 Policy Statement

The Government of Namibia is committed to protecting its citizens from the effects of POPs and other hazardous chemicals. The Government's ratification of the major chemicals Conventions bears testimony to this commitment. The fact that the Government has undertaken to prepare this NIP further reiterates the commitment. The Government views this NIP as an extremely important document, and will therefore take necessary steps to ensure that this NIP is implemented successfully.

3.2 POPs Priorities and Objectives

During the process of preparing this NIP, the assessment of POPs identified issues of concern, which were then prioritised. The issues of concern were grouped into six categories, namely General Issues (pertaining to all chemicals management issues), Pesticide-Specific Issues, DDT-Specific Issues, PCB-Specific Issues, U-POPs Specific Issues, and also E-Waste Specific Issues. After the prioritization process, objectives for addressing the priorities were set.

The objectives which were set, all respond to relevant Articles of the Stockholm Convention. The specific relevant Articles are detailed in Box 1.

Box 1: Specific Articles of the Stockholm Convention

Article 3 deals with measures to reduce or eliminate releases from intentional production and use of POPs. It requires Parties to:

- prohibit and/or take the legal and administrative measures necessary to eliminate the production, use, import and export of Annex A chemicals and
- Restrict the production and use of Annex B chemicals.

Article 5 deals with measures to reduce or eliminate releases from unintentional production. It requires each Party to take measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination. The measures to be taken include

- Developing and implementing an action plan designed to identify, characterize and address the release of the chemicals listed in Annex C;
- Promoting the application of available, feasible and practical measures that can expeditiously achieve a realistic and meaningful level of release reduction or source elimination;
- Promoting the development and use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals listed in Annex C, and

- Promoting, in accordance with its action plan, the use of best available techniques and best environmental practices for both existing sources, and new sources.

Article 6 deals with measures to reduce or eliminate releases from stockpiles and wastes. It requires Parties to:

- Develop appropriate strategies for identifying stockpiles consisting of or containing chemicals listed either in Annex A or Annex B, as well as products and articles in use and wastes consisting of, containing or contaminated with a chemical listed in Annex A, B or C;
- Identify, to the extent practicable, stockpiles consisting of or containing chemicals listed either in Annex A or Annex B on the basis of the strategies referred to above;
- Manage stockpiles, as appropriate, in a safe, efficient and environmentally sound manner;
- Take appropriate measures so that such wastes, including products and articles upon becoming wastes, are handled, collected, transported and stored in an environmentally sound manner, and also disposed of in the most appropriate manner.

Article 10 on public awareness, information and education, requires parties to promote and facilitate awareness among policy and decision makers with regard to POPs. Parties should ensure that all available information on POPs is made available to the public and the information is kept up to date. In pursuance of this article, parties should ensure that appropriate education programmes are put in place for groups such as women, children and the least educated, as well as for workers, scientists, educators and technical and managerial personnel.

Article 11 on Research, development and monitoring, requires Parties to undertake appropriate research, development, monitoring and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives and to candidate persistent organic pollutants, including on their:

- Sources and releases into the environment;
- Presence, levels and trends in humans and the environment;
- Environmental transport, fate and transformation;
- Effects on human health and the environment;
- Socio-economic and cultural impacts;
- Release reduction and/or elimination;

The results of such research, development and monitoring activities should be made available to the public.

The different priorities for each category, as well as the objective for addressing each priority, are shown in Tables 13 - 18. Along with each objective, is also the specific Article of the Stockholm Convention, which the objective is addressing.

Table 13: Priorities and Objectives for General Chemicals Management Issues

Ranking (in order of highest priority	**Prioritised Issue of Concern**	**Objective to Address the Issue**
1.	Lack of Awareness of Chemicals Management Issues	To develop and implement a communications strategy for chemicals management issues in two years (***Article 10)***
2.	Lack of Coordinated Approach to Chemicals Management Issues	To develop and implement mechanisms for coordinating chemicals management issues in two years (***Article 3)***
3.	Poor Legal and Administrative Infrastructure for Chemicals Management	To improve the legal and administrative infrastructure for chemicals management, including establishing a Chemicals Management Unit in the Ministry of Environment and Tourism, in one year***(Article 3)***
4.	Poor Enforcement of Existing Laws	To improve enforcement of existing environmental and chemicals-related legislation in one year ***(Article 3)***
5.	Ineffective Systems for Chemicals Data Management	To develop a chemicals information management strategy in one year***(Article 10)***
6.	Lack of Project Sustainability after Project Termination	To develop mechanisms for ensuring project sustainability in one year***(Article 3)***
7.	Insufficient Application of Non-Mandatory Mechanisms for Improved Environmental / Chemicals Management	To develop a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management in two years ***(Article 3)***
8.	Lack of Research in Chemicals Management Issues	To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least one research institution every two years***(Article 11)***
9.	Inadequate Technical Infrastructure for Chemicals Management	To capacitate at least 25 per cent of the Namibia analytical laboratories with requisite equipment and skilled manpower in three years***(Article 11)***

Table 14: Priorities and Objectives for Pesticide Issues

Ranking	Prioritised Issue of Concern	Objective to Address the Issue
1.	Ineffective Legislation for Pesticide Management	To finalise the proposed new pesticides legislation in one year ***(Article 3)***
2.	Lack of Awareness of Proper Pesticide Management Practices	To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned under Category A***(Article 10)***
3.	Lack of Knowledge on Exact Quantities and Locations of Obsolete Pesticides	To conduct a detailed, national obsolete pesticides inventory in 18 months***(Article 6)***
4.	Poor Management of Obsolete Pesticides and Pesticide Waste	To implement environmentally sound management of obsolete pesticides and pesticide waste in three years ***(Article 6)***
5.	Lack of Alternatives of Pesticides, Including DDT	To build national capacity for Integrated Pest Management in three years***(Article 3)***

Table 15: Priority and Objectives for DDT

Ranking	Prioritised Issue of Concern	Objective to Address the Issue
1.	Continued Use of DDT for Malaria Vector Control	To implement Integrated Vector Management programmes for malaria control in order to reduce reliance on DDT in five years***(Article 3)***
		To participate in regional project to promote and demonstrate alternatives to DDT in vector management in five years***(Article 3)***

Table 16: Priorities and Objectives for PCB Issues

Ranking	Prioritised Issue of Concern	Objective to Address the Issue
1.	Inadequate Knowledge of PCB-status in the country	To conduct a detailed, national PCB inventory in 18 months***(Article 6)***
2.	Lack of Awareness of PCB Management Issues	To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned under Category A***(Article 10)***
3.	Poor Management of Decommissioned and Non-Working Transformers	To implement environmentally sound management of decommissioned, non-working and PCB-contaminated transformers in five years***(Article 6)***
4.	Inadequate Legislation for PCBs Management	To develop PCB-specific legislation in two years***(Article 3)***

Table 17: Priorities and Objectives for Unintentionally Produced POPs (U-POPs)

Ranking (in order of highest priority	Prioritised Issue of Concern	Objective to Address the Issue
1.	Need for Improved Medical Waste Management	To install state-of-the-art incinerators in at least 20% of the hospitals in five years***(Article 5)***
2.	Poor Management of Hazardous Waste	To improve hazardous waste management in at least 10 local authorities in five years***(Article 5)***
3.	Poor Management of Contaminated Land	To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least two areas in three years***(Article 5)***
4.	Need for Improved Fire Prevention Measures in Homes	To reduce the incidences of fires in homes by at least 20% annually over a three-year period ***(Article 5)***
5.	Poor Waste Management	To improve waste management in Namibia in three years***(Article 5)***
6.	Lack of Application of for Best Available Techniques / Best Environmental Practices (BAT / BEP) among industries	To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions in three years***(Article 5)***

Table 18: Priorities and Objectives for E-Waste

Ranking (in order of highest priority	Prioritised Issue of Concern	Objective to Address the Issue
1.	Lack of awareness of e-waste management	To develop and implement awareness raising programme on E-waste management in two years***(Article 10)***
2.	Poor management of E-waste	To improve management of E-waste in one year ***(Article 6)***
3.	No Legal and Technical Infrastructure for Sound Management of E-Waste	To revise current appropriate legislation and include provisions for the sound management of E-waste in two years***(Article 3)***
4.	Insufficient Data on E-Waste	To establish an E-waste monitoring programme in one year***(Article 6)***

3.3 Specific Action Plans

For each of the objectives described in 3.2 above, a specific action plan for achieving the objective was prepared. These action plans respond to the requirements of the Stockholm Convention, and are basically detailing the measures that Namibia will take to meet its obligations under the Convention. The action plans show goals (including the specific Article of the Stockholm Convention that is being addressed by the goal), activities, main implementing agencies, durations and proposed budget.

These action plans make up the mainstay of the NIP, and implementation of the NIP entails implementing the action plans. The detailed action plans are shown in Tables 19 – 24.

Table 19: Specific Action Plans for General Chemicals Management Priorities

Activities	Success indicators	Responsible Authorities		Duration	Budget (USD)
		Lead	Supporting		
Goal 1: To develop and implement a communications strategy for chemicals management issues in two years (Article 10)					
1. Conduct detailed, nationwide baseline study on POPs awareness levels	Baseline report	Ministry of Environment and Tourism	• Ministry of Health and Social Services • Ministry of Agriculture, Water and Forestry • Ministry of Trade and Industry • Ministry of Labour and Social Welfare • Ministry of Information and Communication Technology • Ministry of Education • Ministry of Finance • Ministry of Mines and Energy	Three months	50,000
2. Define communication strategy objectives	Communication Strategy objectives in place			One month	
3. Identify target groups	List of target groups			One month	
4. Prepare key messages for the groups	Number of messages			Three months	20,000
5. Select appropriate methods and tools for raising awareness, looking at the areas of Communication, Public participation, Information exchange, Training, and Education	List of appropriate communication tools / methods for the different messages			One month	5,000
6. Identify possible partnerships for implementing the strategy	Relevant partners identified			One month	
7. Identify funding sources for implementing the strategy	Funding sources identified			One month	
8. Develop Monitoring and Evaluation (M&E) mechanisms for the strategy	Documented M&E mechanisms			One month	
9. Prepare a work plan for implementing the strategy	Workplan in place			One month	
10. Prepare the awareness raising materials.	Awareness raising materials prepared			Three months	100,000
11. Implement the communication strategy. Strategy to be linked with awareness programmes for PCBs and Pesticides	Progress reports			Ongoing	300,000

Activities	Success indicators	Responsible Authorities Lead	 Supporting	Duration	Budget (USD)
Goal 2: Develop and implement mechanisms for coordinating chemicals management issues in two years (Article 3)					
1. Identify key stakeholders in chemicals management issues and their mandated roles	List of stakeholders and their mandated roles	Ministry of Environment and Tourism	• Ministry of Health and Social Services • Ministry of Agriculture, Water and Forestry • Ministry of Transport and Works • Ministry of Trade and Industry	One month	
2. Identify issues for chemicals management which have been overlooked administratively through stakeholder meetings (to feed into the legislative review and amendment process)	Minutes of meetings, Detailed issues report			Two months	10,000
3. Develop a mechanism to ensure that chemicals management issues are well coordinated – will involve stakeholder workshops	Documented mechanism			Three months	20,000
4. Implement mechanism for coordinating chemicals management	Successful coordination of chemicals management, with no overlaps, gaps or grey areas			One year	
5. Establish a forum where stakeholders in chemicals management regularly meet to discuss pertinent and topical issues	Report of initial workshop / minutes of subsequent meetings			Three months	10,000
6. Implement the Globally Harmonised System of Labelling and Classification of Chemicals (GHS)	GHS being implemented			24 months	300,000

Activities	Success indicators	Responsible Authorities Lead	 Supporting	Duration	Budget (USD)
Goal 3: Improve the legal and administrative infrastructure for chemicals management, including establishing a Chemicals Management Unit in the Ministry of Environment and Tourism, in one year(Article 3)					
1. Establish a Chemicals Management Unit in the Ministry of Environment and Tourism, which will be responsible for implementing the Chemicals-related MEAs.	Functional, well-staffed Chemicals Management Unit in place	Ministry of Environment and Tourism		Six months	30,000
2. Develop a framework legislation for chemicals management which will address the management of chemicals and hazardous substances and wastes, as well as contaminated sites.	Draft framework legislation in place	Ministry of Environment and Tourism	Ministry of Justice	18 months	200,000
3. Revise existing legislation to, *inter alia*: • make penalties for environmental crimes more deterrent • address inadequately covered issues such as for air pollution, PCBs, e-waste, etc	Draft amendments in place	Ministry of Environment and Tourism	• Ministry of Justice, • Ministry of Agriculture, Water and Forestry	Two years	300,000
4. Initiate dialogue between the Ministries of Environment and Tourism; Agriculture, Water and Forestry; as well as Justice; to highlight the implications of failing to enact relevant legislation (namely the proposed legislation for pesticides management and for pollution control and waste management).	Minutes of meetings, copies of presentations made at the meetings	Ministry of Environment and Tourism	• Ministry of Justice, • Ministry of Agriculture, Water and Forestry	Two months	10,000
5. Ensure the inclusion of mechanisms (during the legislative development process) for ensuring prompt operationalization of each Act	Documented mechanisms for ensuring prompt operationalization of	Ministry of Justice	All Ministries	Six months	20,000
6. Advocate for the signing and ratification of ILO Conventions pertaining to safety of workers in the chemicals industry	Minutes of meetings with relevant Ministries	Ministry of Environment and Tourism	• Ministry of Justice, • Ministry of Labour and Social Welfare • Ministry of Foreign Affairs	Six months	10,000

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (USD)
Goal 4: Improve enforcement of existing environmental and chemicals-related legislation in one year(Article 3)					
1. Conduct awareness raising campaigns for the law enforcement agents to educate them on the importance and requirements of environmental and chemicals-related legislation	Number of awareness raising / training sessions held for the law enforcement agents	Ministry of Environment and Tourism	• Ministry of Agriculture, Water and Forestry • Ministry of Health and Social Services • Ministry of Mines and Energy • Ministry Transport and Works	Three months	50,000
2. Build capacity of the relevant Ministries to enforce their mandated Acts, through provision of sufficient human resources (in terms of numbers and requisite skills and knowledge) and technological resources.	Presence of adequate staff and technological resources to ensure successful enforcement of the requisite legislation			Nine months	150,000
Goal 5: To develop a chemicals information management strategy in one year(Article 10)					
1. Develop a chemicals information management strategy which details: a. Identification of different user needs b. The different types of chemicals data to be collected c. The data collection tools to be used for collecting the different types of data d. The frequency of data collection e. Management of the data, including the databases to be developed and where they will be housed f. Mechanisms for disseminating the information, and ensuring its accessibility to different user groups	• Chemicals Information management strategy in place • Requisite Chemicals databases in place	Ministry of Environment and Tourism	• Ministry of Trade and Industry • Ministry of Health and Child Welfare • Ministry of Agriculture, Water and Forestry • Ministry of Information and Communication Technology	One year	100,000

Activities	Success indicators	Responsible Authorities Lead	 Supporting	Duration	Budget (USD)
Goal 6: To develop mechanisms for ensuring project sustainability, in one year(Article 3)					
1. Ensure that every environmental project has a sustainability component written into the project at each stage of the project cycle.	Project planning / development guideline, indicating the sustainability component as part of the project development process	Ministry of Environment and Tourism		12 months	10,000
Goal 7: To develop a policy which will promote the utilisation of non-mandatory mechanisms for improved environmental / chemicals management, in two years (Article 3)					
1. Conduct a baseline survey of the extent of the use of non-mandatory mechanisms for sound chemicals/environmental management	Report on the statistics of the use of voluntary mechanisms	Ministry of Environment and Tourism	Ministry of Trade and Industry	Three months	30,000
2. Define policy objectives	Policy objectives in place			One month	
3. Conduct policy development process	Progress reports during the policy development process			Eight months	200,000
4. Adopt the policy	Report of meeting / workshop held to adopt the policy			Two months	10,000
5. Disseminate and communicate the policy	• Copy of policy • Copies of materials to raise awareness on the policy e.g. pamphlets, etc) • Reports of campaigns conducted			Four months	50,000
6. Implement the policy	Increase in the uptake of voluntary mechanisms			Six months and ongoing	

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (USD)
Goal 8: To ensure the inclusion of at least one research project on chemicals management, in the research agenda of at least one research institution every two years (Article 11)					
1. Identify all possible research areas in chemicals management, including hazard and risk assessment.	List of all possible research projects	Ministry of Environment and Tourism	• National Commission on Research, Science and Technology • Ministry of Health and Child Welfare – National Institute of Pathology • Ministry of Education – University of Namibia and Polytechnic of Namibia • Ministry of Finance	One month	
2. Hold discussions with each research institution, to discuss areas which the institution can research on, depending on the institution's research interests / strengths.	Minutes of meetings held with each research institution			Three months	2,000
3. Avail funding for the research.	Research projects underway			Ongoing	2,000,000
Goal 9: To capacitate at least 25% of the Namibia analytical laboratories with requisite equipment and skilled manpower in three years (Article 11)					
1. Conduct a detailed assessment of Namibia's analytical laboratories, focussing on mandate of scope of analyses carried out, available equipment and skills	Detailed assessment report of laboratories	Ministry of Environment and Tourism	• National Commission on Research, Science and Technology • Ministry of Trade and Industry • Ministry of Agriculture, Water and Forestry • Ministry of Health and Social Services	Three months	30,000
2. Prioritise the laboratories in terms of those having the most critical role to play in the POPs and chemicals management (looking at hazard and risk assessment for chemicals, residue analysis, determining unknowns, determining chemical quality, analysing for chemical contamination).	List of priorities, with defined prioritisation criteria			One month	
3. Capacitate the top 25% (based on the prioritisation exercise mentioned above), in terms of required equipment and skills.	Percentage of laboratories capacitated		Ministry of Finance	30 months	9,000,000 (Estimate)[23]

[23] This is an estimate, and the actual cost can only be available after a full detailed assessment of the laboratories

Table 20: Specific Action Plans for Pesticide-Specific Priorities

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 1: To finalise the proposed new pesticides legislation in one year (Article 3)					
1. Initiate dialogue between the Ministries of Agriculture, Water and Forestry; Environment and Tourism; and Justice to highlight the implications of failing to enact the legislation	Minutes of meetings held	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Justice • Ministry of Trade and Industry	Three months	5,000
2. Advocate for the signing of the new pesticides legislation through holding constant dialogue	New pesticides bill enacted into law			Nine months	5,000
Goal 2: To develop and implement an awareness raising programme for proper pesticide management in two years, drawing from the Chemicals Communications Strategy mentioned under Category A on General Chemicals Management Priorities / Action Plans (Article 10)					
1. Identify target groups for pesticide awareness raising	List of target groups	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Health and Social Services • Ministry of Trade and Industry • Agro Marketing and Trade Association (AMTA) • SWACHEM • CropLife Namibia • Importers / Retailers • Relevant NGOs, CBOs, OAs • Agribusdev	One month	
2. Conduct baseline survey to establish current state of awareness, for monitoring purposes	Baseline survey report			Three months	20,000
3. Prepare messages for the different target groups. Key issues to be covered include: a. Proper purchase / use of pesticides b. Management of obsolete pesticides and pesticide wastes, including empty containers	• List of different messages for different target groups,			Three months	30,000
4. Identify key communication methods for each target group, including developing a website with up-to-date information on pesticides in Namibia	• List of communication methods / tools for different target groups / messages • Website for pesticide information in place			Two months	10,000

Activities	**Success indicators**	**Responsible Authorities** **Lead**	**Supporting**	**Duration**	**Budget (US$)**
5. Develop awareness material and training manuals	• Number of awareness raising materials • Relevant training manuals prepared			Three months	50,000
6. Develop training capacity	• Number of trainers / organisations trained under Training of Trainers (ToT) • Number of ToT courses held			Three months	60,000
7. Disseminate the information / conduct training	• Number of awareness campaigns held • Number of training sessions conducted for different target groups			9 months	300,000
8. Conduct monitoring and evaluation to determine effectiveness of awareness raising	• Monitoring and evaluation reports			Ongoing	30,000
Goal 3: To conduct a detailed, national obsolete pesticides inventory in 18 months (Article 6)					
1. Set up multi-stakeholder inventory task teams	List of inventory task team members	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Trade and Industry • Ministry of Education (tertiary institutions) • MRLGHRD • Ministry of Health • Agro Marketing and Trade Association (AMTA) • SWACHEM • CropLife Namibia • Agribusdev	One month	

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
2. Purchase the necessary requirements for conducting the inventory, namely the PPE	Appropriate PPE in place	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Finance • Ministry of Trade and Industry	Three months	40,000
3. Train the teams on how to conduct obsolete pesticides inventory	Training Workshop reports		• Ministry of Trade and Industry • Ministry of Education	One month	60,000
4. Conduct awareness raising to inform the public about the process and the purpose of the obsolete pesticides inventory.	Number and type of awareness raising sessions conducted		• Ministry of Information and Communication Technology	Three months	50,000
5. Conduct a detailed national obsolete pesticides inventory.	Report of detailed obsolete pesticides inventory, reflecting quantities of obsolete pesticides and associated materials		• Same as for Activity 1, Goal 3	Six months	150,000
6. Prepare site clean-up / safeguarding plans for the obsolete pesticide stores as necessary.	Site clean-up / safeguarding plans developed			Four months	30,000
Goal 4: To implement environmentally sound management of obsolete pesticides and associated materials through proper storage, safeguarding, clean up and appropriate disposal, in three years (Article 6)					
1. Prioritise obsolete pesticide storage areas to be safeguarded and / or cleaned up, based on inventory findings.	List of prioritised areas, reflecting defined prioritisation criteria	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry		Two months	
2. Conduct safeguarding and / or clean-up of the prioritised obsolete pesticide storage areas	• Number of stores safeguarded • Number of sites cleaned up			12 months	2,000,000 -estimate[24]

[24] This is an estimate – the actual cost can only be determined after the preparation of accurate safeguarding / site clean-up plans.

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
3. Develop and implement empty container management programmes, building upon already existing programmes in the MAWF	Number of empty container management programmes running			12 months	200,000
4. Conduct environmentally sound disposal of obsolete pesticides and associated materials through a. Participating in regional obsolete pesticides disposal programmes b. Initiating and implementing national programmes for disposing of obsolete pesticides and associated materials by sourcing the requisite funding from various sources	• Progress reports of Namibia's participation in regional obsolete pesticides disposal programmes • Progress reports of national pesticide disposal programmes • Quantities of obsolete pesticides disposed of (or shipped out of the country for disposal)	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Foreign Affairs • Ministry of Health and Social Services • Ministry of Finance	Three years	10,000,000 -estimate[25]
5. Construct proper Government pesticide storage areas throughout the country, in line with FAO guidelines, by: a. Assessing the maximum quantities of pesticides that need to be stored in each region b. Using the FAO guidelines to develop plans for constructing the appropriate pesticide stores in the different regions c. Identifying suitable companies for constructing the stores, through tender d. Constructing the pesticide stores	• Plans for constructing pesticide stores for each province / district as required in place, according to FAO specifications • Number of proper pesticide stores constructed in the areas where they are needed	Ministry of Environment and Tourism, Ministry of Agriculture, Water and Forestry	• Ministry of Health and Social Services • Ministry of Local Government • Ministry of Finance	Three years	5,000,000 -estimate[26]

[25] This is an estimate, and the actual cost can only be determined once the total amount of obsolete pesticides to be disposed of, is known

[26] This is again an estimate, and the actual cost can only be determined based on assessment of maximum quantities that need to be stored

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
6. Upgrade the Okahandja National Pesticide Storage Facility to ensure the establishment of a sorting section	Sorting section available at the Okahandja Pesticide Store			Six months	500,000 -Estimate[27]
Goal 5: To build national capacity for Integrated Pest Management in three years (Article 3)					
1. Set up a multi-stakeholder IPM Steering Committee	IPM Steering Committee in place	Ministry of Environment and Tourism / Ministry of Agriculture, Water and Forestry	• Ministry of Education (tertiary institutions) • National Commission on Research, Science and Technology • Ministry of Health and Social Services • Agro Marketing and Trade Association (AMTA) • CropLife Namibia • Agribusdev	One month	5,000
2. Conduct analyses of pesticide residues for different products from different parts of the country, to determine the products which have the highest levels of pesticide residues.	• Reports with statistics of products with highest pesticide residues • Reports showing areas which have the highest pesticide residues			Three months	70,000
3. Carry out an assessment of areas which have the highest levels of environmental contamination by pesticides.	• Reports with data on the levels of pesticide environmental contamination in different areas			Two months	80,000
4. Identify the most frequently recurring pests and diseases which require constant pesticide use.	• Reports showing the pests and diseases requiring the most frequent pesticide use	Ministry of Agriculture, Water and Forestry		One month	

[27] This is an estimate value, and the actual cost can only be determined after a professional assessment of what needs to be done, and the preparation of proper plans for constructing the sorting section

Activities	Success indicators	Responsible Authorities		Duration	Budget (US$)
		Lead	Supporting		
5. Use the results from 2, 3 and 4 to prioritise areas for IPM inventions.	List of prioritised areas for IP intervention, showing methodology used for prioritisation	Ministry of Environment and Tourism, Ministry of Agriculture, Water and Forestry		Two months	10,000
6. Conduct pilot IPM projects in the prioritised areas, with the buy-in of local farmers and other stakeholders, and use these as training opportunities for training the farmers.	• Progress reports on the implementation of pilot IPM projects • Number of farmers benefitting from the training	Ministry of Agriculture, Water and Forestry		18 months	200,000
7. Replicate the pilot projects nationwide.	• Reduction in the levels of pesticide residues (in previously high pesticide residue areas) • Reduction in the extent of environmental contamination from pesticides	Ministry of Environment and Tourism, Ministry of Agriculture, Water and Forestry		Ongoing, after the successful implementation of the pilot projects	400,000

Table 21: Specific Action Plan for DDT Priority Issues

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 1: To implement Integrated Vector Management (IVM) programmes for malaria control in order to reduce reliance on DDT in five years (Article 3)					
1. Develop an IVM programme for malaria vector control, taking into account the following elements of IVM: • Advocacy, social mobilization and legislation • Collaboration within the health sector and with other sectors • Integrated approach • Evidence-based decision making • Capacity building	Documented IVM programme in place	Ministry of Environment and Tourism / Ministry of Health and Social Services	• Ministry of Labour and Social Welfare • Ministry of Agriculture, Water and Forestry • Ministry of Finance • Ministry of Education (Tertiary education institutions)	12 months	300,000
2. Implement the programme for a pilot area.	Progress reports for pilot project			2 years	500,000
3. Replicate the programme throughout the malaria endemic regions in the country.	• Progress reports for national programmes • Reduction in annual quantities of DDT used			2 years	1,000,000
Goal 2: To participate in regional project to promote and demonstrate alternatives to DDT in vector management in five years (Article 3)					
1. Fulfil the conditions for taking part in the project	Conditions for participation fulfilled	Ministry of Environment and Tourism / Ministry of Health and Social Services	Ministry of Foreign Affairs	One year	100,000
2. Set up implementing mechanisms for participating in the project	Implementing mechanisms in place			Six months	
3. Participate in the regional project	Progress reports of participation in regional project			3½ years	1,000,000

Table 22: Specific Action Plans for PCB-Specific Priorities

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 1: To conduct a detailed, national PCB inventory in 18 months(Article 6)					
1. Identify and set up multi-stakeholder inventory task teams	List of inventory teams in place	Ministry of Environment and Tourism	• Ministry of Mines and Energy • Ministry of Local Government • Ministry of Trade and Industry • Ministry of Education (tertiary institutions)	One month	
2. Purchase the necessary requirements for conducting the inventory, namely the PPE, the PCB analyser(s) and the reagents (this process should be initiated this early, as the equipment and reagents are only available from foreign suppliers, and the purchasing process and logistics take a long time).	• Appropriate PPE in place • PCB Analyser and reagents for 10,000 tests in place			Three months	130,000
3. Conduct awareness raising to inform stakeholders about the process and the purpose of the PCB inventory	• Number and types of awareness raising campaigns			Two months	30,000
4. Train the Inventory task teams on how to conduct PCBs inventories	Training workshop reports			One month	60,000
5. Prepare a statistically robust sampling methodology for collecting oil samples	Sampling methodology in place			Two months	10,000
6. Conduct a detailed national PCBs inventory, which includes a. Desk studies to get an approximation of the numbers of transformers in Namibia b. Field inventory exercise to collect transformer oil samples c. Analysis of oil samples for PCB contamination d. Proper analysis and management of the inventory data.	PCB inventory report showing: • total number of transformers in Namibia • quantity and details of contaminated transformers and other equipment in Namibia			Six months	200,000

Activities	**Success indicators**	**Responsible Authorities**		**Duration**	**Budget (US$)**
		Lead	**Supporting**		
Goal 2: To develop and implement an awareness raising programme for PCBs in two years, drawing from the Chemicals Communications Strategy mentioned under Category A (Article 10)					
1. Conduct baseline survey to establish current state of awareness, for monitoring purposes	Baseline survey report	Ministry of Environment and Tourism	• Ministry of Mines and Energy • Ministry of Local Government • Ministry of Trade and Industry	Three months	20,000
2. Identify target groups for PCB awareness raising	List of target groups			One month	
3. Prepare messages for the different target groups.	List of different messages for different groups			Three months	20,000
4. Identify key communication methods for each target group	List of communication methods/tools for different target groups / messages			Two months	10,000
5. Develop awareness material and training manuals	• Number and type of awareness raising materials • Relevant training manuals prepared			Three months	40,000
6. Develop training capacity	• Number of trainers trained under Training of Trainers • Number of ToT courses held			Three months	60,000
7. Disseminate the information / conduct training	• Number of awareness campaigns held • Number of training sessions conducted for different groups			9 months	300,000
8. Conduct monitoring and evaluation to determine effectiveness of awareness raising	Monitoring and evaluation reports			Ongoing	

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 3: To implement environmentally sound management of decommissioned, non-working and PCB-contaminated transformers and other electrical equipment (capacitors, voltage regulators, switches, reclosers, bushings and electromagnets) in five years(Article 6)					
1. Establish and utilise proper, regional, Government-managed storage areas for storing all decommissioned, non-working and PCB-contaminated transformers, capacitors, voltage regulators, switches, reclosers, bushings and electromagnets. The storage areas should be constructed and managed in line with internationally recognised standards.	Number of storage areas constructed	Ministry of Environment and Tourism	• Ministry of Mines and Energy • Ministry of Local Government • Ministry of Trade and Industry • Ministry of Finance	2 years	2,000,000
2. Participate in regional PCB-destruction programmes.	• Quantities of PCBs destroyed • Progress reports for Namibia's participation in such programmes		• Ministry of Mines and Energy • Ministry of Local Government • Ministry of Trade and Industry	Five years	9,000,000
3. Explore the feasibility of utilising a regional (Southern African) facility for destruction of PCBs	Feasibility report for utilization of a regional facility to destroy PCBs		• Ministry of Foreign Affairs	One year	300,000
Goal 4: To develop PCB-specific legislation in two years (Article 3)					
1. Draft PCB specific legislation (either an Act, or regulations as part of an already existing Act), drawing from the SAPP guidelines and customising them for Namibia.	Draft PCB legislation	Ministry of Environment and Tourism	• Ministry of Justice • Ministry of Mines and Energy • Ministry of Local Government • Ministry of Trade and Industry • Ministry of Labour and Social Welfare	2 years	300,000

Table 23: Specific Action Plans for Unintentionally-Produced POPs (U0POPs) Priorities

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 1: To install state-of-the-art incinerators in at least 20% of the hospitals in five years (Article 5)					
1. Conduct a detailed assessment of hospital and private incinerators, focussing on: a. State of the incinerator and how it is operated b. Quantities of waste that are burned c. Proximity of incinerator to settlement	Assessment report of hospital and private incinerators in place	Ministry of Environment and Tourism / Ministry of Health and Social Services	Ministry of Local Government	Three months	30,000
2. Prioritize incinerators to be upgraded taking into account the criteria in 1. above	List of prioritised incinerators for upgrading, showing the prioritisation criteria			Two months	
3. Upgrade the top 25% of the hospital incinerators to become state-of-the-art, however ensuring that the whole country is more or less covered	25% of hospital incinerators upgraded		Ministry of Finance Ministry of Local Government	4 ½ years	9,000,000 -estimate[28]
Goal 2: To improve hazardous waste management in at least 10 local authorities in five years(Article 5)					
1. Prepare hazardous waste management training materials for local authorities.	Hazardous waste management training materials in place	Ministry of Environment and Tourism / Ministry of Local Government	Ministry of Education (tertiary institutions	Three months	20,000
2. Conduct hazardous waste management training for the local authorities	Training workshop reports, number of participants trained			Six months	60,000
3. Construct hazardous waste management facilities (landfills) in at least 10 local authorities	Hazardous waste management facilities in at least 10 local authorities		Ministry of Trade and Industry (Namibia Standards Institute)	4 ¼ years	9,000,000 -estimate[29]

[28] This figure is an estimate, and the actual cost can only be known once the assessment process is done.

[29] This figure is also very much an estimate, and the actual cost can only be known once the assessment has been carried out.

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 3: To conduct a detailed inventory of contaminated land in Namibia, and initiate site clean-up on at least three areas in three years (Article 5)					
1. Set up multi-stakeholder inventory task teams.	List of inventory task team members	Ministry of Environment and Tourism	• Ministry of Mines and Energy • Ministry of Agriculture, Water and Forestry • Ministry of Education (tertiary institutions) • Ministry of Information and Communication Technology • Ministry of Trade and Industry • Ministry of Finance	One month	
2. Purchase the necessary requirements for conducting the inventory, namely the PPE.	PPE in place			Three months	40,000
3. Train the teams on how to conduct contaminated land inventories.	Training workshop reports			One month	60,000
4. Conduct awareness-raising to inform stakeholders about the process and the purpose of the contaminated land inventory.	Number and types of awareness raising campaigns			Three months	30,000
5. Conduct a detailed national inventory of contaminated land in Namibia.	Inventory report of contaminated land in Namibia			Six months	200,000
6. Prioritise site clean-up based on risk assessment of the contaminated sites	Prioritised list of contaminated sites to be cleaned up			One month	
7. Conduct site clean-up on at least three sites	At least three contaminated sites cleaned up			18 months	8,000,000 -estimate[30]
Goal 4: To reduce the incidences of fires in homes by at least 20% annually over a three year period (Article 5)					
1. Develop training material for fire prevention in homes	Training materials in place	MET, MRLGHRD	Ministry of Education (Tertiary institutions)	Two months	10,000
2. Train communities whose homes are at highest risk of fire, on fire prevention strategies	Reduction in the incidences of fires in the home			6 months per year (for three years)	180,000

[30] This figure is an estimate, and the actual cost can only be known once the assessment process is done.

Activities	Success indicators	Responsible Authorities Lead	Supporting	Duration	Budget (US$)
Goal 5: To improve waste management in Namibia in three years (Article 5)					
1. Revise legislation to include, among others • The three Rs of waste management – reduce, reuse, recycle, • The concept of waste elimination • Offering of rewards and incentives for improved waste management	Draft legislation /amendments	Ministry of Environment and Tourism	Ministry of Justice	Two years	Included in overall legislative review
2. Identify different groups that produce / handle waste, and the different types of waste they produce / handle	List of different groups and the types of waste produced		Ministry of Trade and Industry Ministry of Local Government	One month	
3. Prepare awareness raising and training materials for educating the different groups on improved waste management.	Number and types of awareness raising materials		• Ministry of Trade and Industry • Ministry of Education • Ministry of Local Government	Three months	50,000
4. Conduct awareness raising and training among the different groups on improved waste management.	• No of training workshops held • Number of participants trained			12 months	150,000
5. Conduct pilot community projects to demonstrate sustainable community based waste management.	• Number of community based organisations involved in waste management		• Ministry of Local Government	12 months	200,000
6. Enforce and ensure compliance with good waste management practices	• Reduction in volumes of waste generated		• Ministry of Local Government • Ministry of Safety and Security	12 months	200,000

Activities	**Success indicators**	**Responsible Authorities** **Lead**	**Supporting**	**Duration**	**Budget (US$)**
Goal 6: To implement programmes for Best Available Techniques / Best Environmental Practices (BAT / BEP) application among relevant industries which are potential sources of dioxin / furan emissions in three years(Article 5)					
1. Design training materials for training on BAT / BEP applications	Training materials available	Ministry of Environment and Tourism	Ministry of Trade and Industry	Four months	50,000
2. Conduct training on BAT / BEP for those industries which are potential sources of dioxin / furan emission	• Number of training sessions held • Number of organisations trained		• Ministry of Trade and Industry • Ministry of Mines and Energy	Six months	80,000
3. Monitor the uptake / implementation of BAT / BEP by companies	Number of organisations adopting BAT / BEP			12 months	
4. Introduce incentives for companies applying BAT / BEP	Types and numbers of incentives awarded		Ministry of Finance Ministry of Trade and Industry	12 months	500,000

Table 24: Specific Action Plans for E-Waste Priorities

Activities	Success indicators	Responsible Authorities		Duration	Budget (US$)
		Lead	**Supporting**		
Goal 1: To develop and implement an awareness raising programme for E-waste management in two years, drawing from the Chemicals Communications Strategy mentioned under Category A on General Chemicals Management Priorities / Action Plans (Article 10)					
1. Identify target groups for E-waste management awareness raising	List of target groups	Ministry of Environment and Tourism	• Ministry of Trade and Industry • Ministry of Education (Tertiary Institutions) • MRLGHRD • Private companies (electronic retailers)	One month	
2. Conduct baseline survey to establish current state of awareness, for monitoring purposes	Baseline survey report			Three months	20,000
3. Prepare messages for the different target groups. Key issues to be covered include: a. What is E-waste b. How to reduce the generation of E-waste c. How to manage E-waste	• List of different messages for different target groups			Three months	30,000
4. Identify key communication methods for each target group	• List of communication methods / tools for different target groups / messages			Two months	10,000
5. Develop awareness material, training manuals and sector-specific guidelines	• Number of awareness raising materials • Relevant training manuals prepared • Relevant guidelines developed			Six months	100,000
6. Develop training capacity	• Number of trainers / organisations trained under Training of Trainers (ToT) • Number of ToT courses held			Three months	60,000
7. Disseminate the information through training and conducting awareness raising campaigns	• Number of awareness campaigns held • Number of training sessions conducted for different target groups			9 months	300,000
8. Conduct monitoring and evaluation to determine effectiveness of awareness raising	• Monitoring and evaluation reports			Ongoing	30,000

Activities	Success indicators	Responsible Authorities Lead	 Supporting	Duration	Budget (US$)
Goal 2: To improve management of E-waste in 12 months (Article 6)					
1. Incorporate the development of an e-waste management plan as part of the requirements for licensing of businesses by local authorities.	Revised business licensing requirements, to include the development of e-waste management plan	Ministry of Environment and Tourism	MRLGHRD- Regional Councils (constituencies etc. for clear coordination and guidelines for destination of e waste products)	Six months	40,000
2. Establish e-waste collection centres and maintain these in an environmentally sound manner	• Number of e-waste collection centres in the country • Quantities of e-waste collected in centres		• MRLGHRD • Ministry of Trade and Industry	Six months	300,000
Goal 3: To revise current appropriate legislation (Pollution Control and Waste Management Bill)and include provisions for the sound management of E-waste in two years (Article 3					
1. Conduct legislative review for e-waste management	Report of legislative review	Ministry of Environment and Tourism	• Ministry of Justice • Ministry of Trade and Industry	12 months	Included in budget for overall legislative review
2. Draft relevant regulations / amendments to incorporate e-waste management	Draft regulations on e-waste in place			24 months	
Goal 4: To establish an E-waste monitoring programme in two years(Article 6)					
1. Set up a committee for monitoring e-waste quantities in the country. The committee should include: a. Ministry of Environment and Tourism b. Ministry of Trade and Industry c. Namibia Statistics Agency d. Local Authorities e. Ministry of Mines and Energy f. MICT g. National Planning Commission	Committee in place	Ministry of Environment and Tourism	• Office of the Prime Minister • Ministry of Trade and Industry • Namibia Statistics Agency • MRLGHRD • MME • MICT • NPC	Four months	3,000

Activities	Success indicators	Responsible Authorities		Duration	Budget (US$)
		Lead	Supporting		
2. Develop an e-waste monitoring plan	Monitoring plan in place			Eight months	20,000
3. Conduct a comprehensive e-waste inventory for the country, and implement the monitoring plan	Inventory report for e-waste, detailing the quantities of e-waste in Namibia, and the accumulation rates			12 months	100,000

3.4 Implementing the NIP

The implementation of the NIP will be spearheaded by the Ministry of Environment and Tourism. However, there will be maximum stakeholder involved, since the issue of POPs and chemicals management is cross cutting across many sectors. The NIP Committee should be instrumental in providing guidance and direction for the implementation of the NIP.

The action plans identified in the NIP will require funding, some of which will be provided by the Government, and some of which will be sought from external donors. Detailed project proposals will need to be prepared for seeking donor funding.

3.5 Timetable for Implementing the NIP

The action plans show the time proposed for each activity / project. It is imperative that the implementation of the NIP be embarked upon as soon as possible, possibly in the last quarter of 2014, particularly for those action plans that do not need extra funding. This will help to keep the momentum that was observed during the preparation of the NIP. Some of the projects can run concurrently, while others will need to be follow-ons to other projects.

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Annex 1: List of Participants to the NIP Endorsement Workshop

	NAME	DESIGNATION	INSTITUTION
1	Dr. Fredrick Sikabongo	Deputy Environmental Commissioner	Ministry of Environment and Tourism
2	Mr. Bryn Canniffe	Technical Assistant	Ministry of Environment and Tourism
3	Ms. Farirai Magadzire	Consultant	Independent consultant
4	Mr. Kazombiri I Kamuingona	Environmental Health Practitioner	Okahandja Municipality
5	Mr. Harald Marggraff	Manager of Commodities	Agronomic Producers Association
6	Mr. Tim Eimann	Coordinator of EMS and QMS	Namport
7	Mr. Mario Mberira	Technical Services Manager	Arandis Town Council
8	Mr. Nicolaas du Plessis	Senior Environmentalist: Water Quality and Environmental Services	Namwater
9	Ms. Justina Endjala		Namwater
10	Mr. Ehren Kaambo		Namwater
11	Dr. Renate Hans	Senior Lecturer in Chemistry and Biochemistry	University of Namibia (UNAM)
12	Dr. Stefan Louw	Senior Lecturer Chemistry and Biochemistry	UNAM
13	Mr. Jakes Mbandi	Manager of Health and Safety	Transnamib Holdings
14	Mr. Danie Louw	Manager of Safety, Health, Environment and Wellness	NamPower Pty Ltd.
15	Mr. S. Tsanigab	Food Safety and Diagnostics Division	Agricultural Marketing and Trade Agency (AMTA)
16	Ms. Suama Kashima	Food Safety and Diagnostics Division	AMTA

	NAME	DESIGNATION	INSTITUTION
17	Ms. Angela Kanduvarisa	Researcher: Agriculture	Agra
18	SJD Labuschagne	Strategic Executive Officer	Outjo Municipality
19	Tom Alweendo	Analytical Services Agricultural Laboratory	Ministry of Agriculture, Water and Forestry (MAWF)
20	Fred Koujo	Manager: Environmental Management	City of Windhoek
21	Kauta Kaakunga		Ministry of Health and Social Services
22	Miriam Hirongua	Agricultural Technician	MAWF
23	Theo Uvanga	Environmental Manager	Dundee Precious Metals Tsumeb
24	Louis Nel	Senior Manager Health Safety and Environment	Dundee Precious Metals Tsumeb
25	Rosalia Neshuku	Environmental Health Practitioner	Luderitz Town Council
26	Jason Iyambo	Engineer	Erongo RED
27	Veikko Uahengo	Lecturer	UNAM
28	HHL Abraham	Police Officer	Nampol
29	Nickey //Gaseb	National Coordinator	GEF/Small Grants Programme
30	KM Aribeb		Environment Investment Fund
31	BA De Klerk	Nampol	
32	C. Gontes	Nampol	
33	Richard Horaeb	Fisheries Biologist	Ministry of Fisheries and Marine Resources
34	Justice Ncube	Senior Engineer	Ministry of Works, Transport and Communication (MWTC)
35	Ludwig Araeb		Namibia Agronomic Board
36	Victor Likando	MWTC PS office	
37	Selma Nghinamundara	Chief Foreign Relations Officer	Ministry of Foreign Affairs
38	Nico Willemse	Head of Energy and Environment	United Nations Development Programme
39	G.E. Nasima	Licencing and Compliance Officer	Electricity Control Board
40	Martin Elago	CEO	Ondangwa Town Council