MINISTRY OF ENVIRONMENT AND ENERGY
REPUBLIC OF THE MALDIVES

NATIONAL IMPLEMENTATION PLAN

2017

STOCKHOLM CONVENTION ON
PERSISTENT ORGANIC POLLUTANTS

ISBN:

Written by
Fazeela Ahmed Shaheem
Mauman Abdul Rasheed

Contributors
Mareer Mohamed Husny
Mohamed Hamdhoon
Fazeela Ahmed Shaheem
Ahmed Shan
Aishath Huma
Midhath Abdul Rasheed
Ismail Ajmal

Proof read by
Midhath Abdul Rasheed

Critical Review
Hassan Azhar

Layout and Design
Ismail Ajmal

Citation: Ministry of Environment and Energy. 2016. National Implementation Plan to the Stockholm Convention on Persistent Organic Pollutants.

Handhuvaree Hingun
Maaafannu, Male', 20392
Maldives
www.environment.gov.mv

FOREWORD

The Government of Maldives is committed to ensure a safe and healthy environment for its people and future generations.

Given that Persistent Organic Pollutants are harmful chemicals that persist in the environment and have the ability to travel over a great distance affecting human health and environment, it is imperative that we act and take urgent measures to address this very critical issue.

The Ministry of Environment and Energy appreciates the support from the Stockholm Convention and other partners in preparing this National Implementation Plan. I am confident that this process will enhance the institutional, legal and administrative framework required to minimize the adverse effects of Persistent Organic Pollutants and ensure a socially, economically and environmentally stable environment for our people.

It gives me great pleasure on behalf of the Government of Maldives to endorse this National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants.

Thoriq Ibrahim
Minister

ACKNOWLEDGEMENTS

The National Implementation Plan (NIP) for the Stockholm Convention has been prepared by the Ministry of Environment and Energy (MEE), in consultation with key stakeholders at all stages. The Ministry wishes to acknowledge the valuable support, contribution and information provided by all stakeholders for the preparation of this NIP.

MEE appreciates the financial support provided by Global Environment Facility (GEF) and the technical assistance provided by United Nations Industrial Development Organisation (UNIDO) in formulating this NIP.

Furthermore, MEE appreciates the work undertaken by the National Chemicals Management Committee, the SAICM team, technical experts, and the project team for coordinating and facilitating the NIP process.

ABBREVIATIONS AND ACRONYMS

AFFF	Aqueous Film Forming Foam
BTI	Bacillus thuringiensis
DDT	Dichloro-Diphenyl-Trichloro Ethane
DFO	Diesel Fuel Oil
EEE	Electric and Electornic Equipment.
EEZ	Exclusive Economic Zone
FFFP	Film forming Flouroprotein
GDP	Gross Domestic Product
GEF	Global Environment Facility
HDI	Human Development Index
HPA	Health Protection Agency
ILO	International Labour Organisation
LDC	Least Developed Country
LFPR	Labour Force Participation Rate
LGA	Local Government Authority
LPG	Liquefied Petroleum Gas
MCS	Maldives Customs Service
MDNS	Ministry of Defence and National Security
MEE	Ministry of Environment and Energy
MFDA	Maldives Food and Drug Authority
MIC	Medium Income Country

MNDF	Maldives National Defence Force
MoFA	Ministry of Fisheries and Agriculture
MRDC	Maldives Road Development Corporation
NCD	Non-Communicable Diseases
NEAP	National Environment Action Plan
NSSD	Maldives National Strategy for Sustainable Development
ODS	Ozone Depleting Substance
OECD	Organisation for Economic Cooperation and Development
PCA	Principal Component Analysis
PCBs	Polychlorinated biphenyls
PCDD	Polychlorinated dibenzo-dioxins
PCDF	Polychlorinated dibenzo-furans
PDBEs	Polybrominated diphenyl ethers
PFOSF	Perfluorooctane sulfonyl fluoride
PFOS	Perfluorooctane sulphonic acid
PO	President's Office
POPs	Persistent Organic Pollutants
SAICM	Strategic Approach to International Chemicals Management
STELCO	State Electric Company Limited
UNEP	United Nations Environment Programme
UPOPs	Unintentional Persistent Organic Pollutants
WHO	World Health Organisation

CONTENTS

EXECUTIVE SUMMARY

The Stockholm Convention (SC) on Persistent Organic Pollutants (POPs) was adopted in May 2001 with the objective of protecting human health and the environment from POPs. According to Article 7 of the SC, Parties are required to develop National Implementation Plans (NIPs) to demonstrate how the obligations under the SC will be implemented. This NIP covers both the initial POPs and the new POPs added at the fourth and fifth meetings of the Conference of Parties to the Stockholm Convention.

The Republic of Maldives ratified the SC on 17th October 2006. However, to date, there has been no specific action towards the environmentally sound management of POPs at the national level. The Environment Protection and Preservation Act (Law no. 4/93) of the Maldives has particular provisions for the sound management of hazardous waste. However, limited data, capacity, resources and a general lack of under-standing have hampered the substantive realisation and implementation of these specific provisions.

Given that there are no industries manufacturing POPs in the Maldives, their presence in the country could only be accounted for by the direct importation of these chemicals, incidental imports where they are contained in other products, and trans-boundary transfers, including marine and atmospheric. It is also important to note that combustion of solid and chemical waste materials also constitute a significant contributor to the generation of POPs in the Maldives.

The POPs situation of the country was determined by various preliminary inventories conducted from 2013-2015 and through which information was gleaned regarding import, use and management of POPs. This NIP includes an in-depth study of the regulatory and institutional framework of the country concerning POPs and chemicals and the level of information and awareness about POPs among stakeholders and the general population. The NIP presents a policy statement and an implementation strategy, supported by 11 action plans.

This NIP has been developed through wide consultations and assessments of the status of chemicals listed under the Convention. The action plans outlined in this document has been developed following stakeholder consultations and prioritisation following these discussions. A national workshop was conducted to further validate the results and endorse this NIP.

INTRODUCTION

The high risk associated with POPs led the United Nations Environment Programme (UNEP) to recognise the need to develop an international treaty that would protect human health and the environment from the adverse effects from these chemicals. Following inter-governmental negotiations, the text of the Stockholm Convention was adopted and was brought into effect on 17th May 2004. The Republic of Maldives ratified the Convention on 17th October 2006.

To date, 151 countries are signatories and 124 are Parties to the Convention. To comply with the objective of protecting human health and the environment, the Stockholm Convention seeks, in its first stage, to reduce and subsequently eliminate twelve of the most hazardous POPs, nine of which are pesticides (aldrin, dieldrin, endrin, clordane, heptachlor, hexachlorobenzene, mirex, toxaphene and DDT), and three correspond to unintentional emissions (dioxins and furans, PCBs and hexachlorobenzene) of which PCB is an industrially used compound.

As part of obligations under the Stockholm Convention, the Maldives developed its National Implementation Plan (NIP), through the project "Enabling Activities to Facilitate and Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants". This project was funded by the Global Environment Facility (GEF), administered by the United Nations Industrial Development Organisation (UNIDO), and executed by the Ministry of the Environment and Energy (MEE). The NIP was developed by a team of national consultants, with the guidance of international consultants and the implementing agency, through a participatory and consensus-building process. A range of stakeholders including government institutions, regional and local authorities, business associations, non-governmental organisations and academic and research institutions were consulted throughout the NIP process.

1. Country profile

1.1. Geographic and environment

The Republic of Maldives stretches over 860 km long along the Laccadive-Chagos submarine ridge. The chain of coral atolls, varying in width from 80-120 km, are comprised of 26 natural atolls, divided into 20 administrative regions, which along with the Capital City Male', constitute the 21 administrative regions of the country.

A total of 1192 islands make up the country, of which 187 islands are inhabited and a further 1005 islands are recorded as uninhabited. The total Exclusive Economic Zone (EEZ) is approximately 859,000 sq. km. The coral reef system of Maldives is of international significance, being the 7th largest in the world and contributing to 5% of the world's coral reefs. Maldivian coral reef system is rich in biodiversity, with over 250 species of corals and 1090 species of reef and reef associated fish species.

The islands vary in size, from 0.5 sq. km to around two sq. km. The average elevation of the islands is around 1.5 metres, making the country one of the lowest lying in the world. The small size, geographical distribution, extremely low elevation and impacts from climate change also make the country extremely vulnerable to various types of natural and environmental disasters.

1.2. DEMOGRAPHICS

At the 2014 census, the population of the country stood at 338,434 people, of which approximately one third inhabit the capital Male'.[1] The following table shows the population distribution along selected population groups.

TABLE 1 :
POPULATION BY SELECTED AGE GROUPS

Age Groups	Number
Under 19 years	125,807
Adolescent (10-19)	57,741
Youth (20-34)	108,437
Working Age (15-64)	233,180
Reproductive Age (15-49)	200,178
Old Age (65+)	16,419

Source: National Bureau of Statistics/ National Statistical Yearbook, 2016

[1] *National Bureau of Statistics/ National Statistical Yearbook, 2016*

1.3. PROFILE OF ECONOMIC SECTORS

The local population 15 years of age and above is increasing and statistics show that it is likely to continue to do so. Whilst the unemployment rate in Maldives is 5.2 percent, there has also been a significant migrant inflow into the country over the past years. According to Statistical Yearbook 2016, a total number of 62,502 foreigners work in Maldives in over 16 sectors of the economy.

In terms of development, the Maldives ranks amongst middle-income countries, having been graduated from the Least Developed Country (LDC) status in 2011. The 2004 Asian Tsunami caused damages to around two thirds of the country's GDP and destroyed key infrastructure. Subsequently, the United Nations General Assembly granted an exceptional three-year moratorium to the Maldives to enable post-tsunami recovery and reconstruction. Following the end of this moratorium, the country was graduated from the LDC status to Middle Income Country (MIC) status in January 2011.

The particular geographic nature, compounded by a restricted natural resource base, and highly dispersed population presents particular challenges for the economic and developmental agenda of the country. However, the country has made steady progress, as demonstrated by the improvement in the Human Development Index (HDI) from 0.592 in 2000 to 0.688 in 2012,[2] an increase of 15.0% or average annual increase of about 1.6 %.The country ranked 109th out of 187 countries in 2011 HDI ranking.

In terms of the education sector, the Maldives has made immense gains in the area of primary and secondary education, for which the net enrolment stood at 104.5% and 86.6% in 2015 respectively.[3] Similarly, much gain has also been made in the health sector. For instance, in 1977, the life expectancy at birth was 46.5 years. By 2011, this had improved to 74 years. In 1990, infant mortality rate was 76 and this dropped sharply to 9 by 2011.

[2]UNDP, Human Development Report 2013: The Rise of the South. Human Progress in a Diverse World
[3]Net enrolment above 100 is as a result of using estimated population and data duplication in the calculation.
Source: Ministry of Education, 2015

2. Institution, Policy and Regulatory Framework

2.1. Environmental Policy, Sustainable Development Policy and General Legislative Framework

Currently, there is no dedicated institutional body mandated with the overall the management of chemical substances, including POPs, in the Maldives. Furthermore, an analysis of the existing legislation within the scope of chemicals regulation shows a lack of special legislative and normative-methodological base for POPs management.

However, goal 15 and 16 of the Third National Environmental Action Plan (NEAP) aims to develop mechanisms for the appropriate management of hazardous wastes including chemicals, healthcare waste and waste oils by mid-2010, and reduce health risks from chemicals and pesticides by 2011. Goal 6 of the Maldives National Strategy for Sustainable Development states the importance of ensuring that chemicals, including pesticides, are handled and used in ways that do not pose significant threats to human health and the environment.

The responsibilities of management of hazardous chemicals, including POPs are distributed amongst various ministries, agencies and institutions. This has, consequently, lead to fragmentation and a lack of effective coordination, impeding the realisation of government policies towards the protection of the environment and human health from these substances. As such, there is an urgent need to formulate and implement a collective and coherent body of law relating to chemicals management.

2.2. ROLE AND RESPONSIBILITY OF MINISTRIES AND OTHER GOVERNMENTAL INSTITUTIONS

The general structure of the chemical related legislation in the Maldives entails the close collaboration between local authorities (atoll, island and city councils) and relevant ministries for effective implementation of the environmental policies and its related legislative norms. Thus, control and regulation of chemicals are divided between different organisations.

2.2.1. MINISTRY OF DEFENCE AND NATIONAL SECURITY

The Ministry of Defence and National Security (MDNS), is responsible for monitoring the control and flow of chemicals. These responsibilities can be categorized as regulation of chemical weapons, import of chemicals into the country and the disposal of chemicals. The ministry also implements decisions and provides coordination of activities by relevant ministries, departments and institutions dealing with imports, usage and distribution of chemical and chemical compounds. Prior approval from the MDNS is required before importing chemicals into the country.

2.2.2. MALDIVES CUSTOMS SERVICE

The Maldives Customs Service (MCS) maintains a database for the imports of chemicals that shows a broad category of chemicals that are imported into the country. This database is of particular importance as specific databases do not exist, and this is the only form of analysis of chemical usage in the country.

Author's note:
At the time of editing and publishing, MEE and MDNS had launched a national chemical management database "MAKUDI", a harmonised database that shows the most common types of chemicals imported to Maldives which will strengthen monitoring and surveillance of imported chemicals.

2.2.3. MINISTRY OF FISHERIES AND AGRICULTURE

In relation to chemicals management, the role of Ministry of Fisheries and Agriculture (MoFA) extends to the following;

- Implementation of the agricultural policy;
- Storing and treatment of pesticides;
- Determination of alternative methods for control of pests, plant diseases and weeds;
- Elaboration of effective measures on safe use of plant protection chemicals;
- Official control of observation rules on use and treatment of pesticides;
- Regulation of import and distribution of pesticides.

Pesticides are regulated through MoFA, who process the requests of imports of chemicals. The contents of the request include trade name, unit size and number of units. In terms of procedures, following a request for import, the ministry looks up the category of the product requested, and identifies the active ingredient and whether the active ingredient is present on the list of prohibited pesticides. Products (of active ingredients) that are not on the list are approved and send to the MDNS for final approval.

MoFA also provides advice on control of pests and proper treatment to consumers of pesticides. The ministry also provides information to farmers and other consumers on the recommended pesticides and effective use. Information sheets are written in the local language, giving instructions and precautions in handling and application of pesticides.

2.2.4. MINISTRY OF ENVIRONMENT AND ENERGY

The Ministry of Environment and Energy (MEE), is mandated to set appropriate solid waste management mechanisms, and formulate the required laws and regulations to this regard. The ministry also provides assistance to the local councils in establishing a viable solid waste management system at the island level.

Furthermore, the Environmental Protection Agency (EPA) (which acts as the regulatory body affiliated to MEE) is mandated to formulate and implement guidelines and standards for environmentally safe procedures for waste management, and monitor to ensure that those operating waste management systems meet these guidelines and standards. In addition, the ministry also issues quota, and gives approval for the import of Ozone Depleting Substances (ODS) as per obligations under the Montreal Protocol.

2.2.5. MINISTRY OF HEALTH

Ministry of Health is mandated with overseeing the country's health and social protection sectors. The Health Protection Agency and the Maldives Food and Drug Authority are both institutions operating under the umbrella of Ministry of Health.

2.2.5.1. HEALTH PROTECTION AGENCY

Health Protection Agency (HPA) was formed under the Public Health Protection Act (Law no. 7/2012). Mandate of HPA is to undertake the responsibilities mentioned in Public Health Protection Act and take the lead to protect public health, maintain public wellbeing and improve health awareness among Maldivians and all people living in Maldives. The HPA's main responsibilities in relation to chemicals management is to identify hazards or possibility of health hazards, measure extent of possible public health risks and to establish a monitoring system. HPA's mandate extends to identification of health risks and the agency takes action to protect people working or living in surrounding areas from any gas, chemicals, radiation or vibration emanating from a residential or non-residential building. Furthermore, HPA also regulates vector control chemicals that are used for controlling mosquitoes that cause vector borne diseases such as dengue fever and chikungunya.

2.2.5.2. THE MALDIVES FOOD AND DRUG AUTHORITY

Maldives Food and Drug Authority (MFDA) operates the National Health Laboratory which is used for conducting a range of tests including, amongst others, water quality tests, histamine in fish, and alcohol traces in beverages. However, tests for pesticide residues on fruits and vegetables are not conducted.

In approving pesticides for public health issues and in the medical sector, MFDA operates under a similar procedure as practised by MoFA. In this regard, the contents on the request form include brand name, chemical name, quantity, and intended use of the product. However, information on the formulation or the concentration is not included in these requests. The requests are approved based on public health considerations.

At the time of editing and publishing, MEE and MDNS had launched a national chemical management database "MAKUDI", a harmonised database that shows the most common types of chemicals imported to Maldives which will.to strengthen monitoring and surveillance of imported chemicals.

2.3. CONSTITUTIONAL NORMS

Article 22 of the Constitution of the Republic of Maldives states that the State has a fundamental duty to protect and preserve the natural environment, biodiversity, resources and aesthetics of the country for the benefit of present and future generations. Furthermore, it further stipulates that the State shall undertake and promote economic and social goals through ecologically balanced sustainable development and shall take measures necessary to foster conservation, prevent pollution, extinction of any species and ecological degradation.

Article 23 of the Constitution provides every citizen the following rights, and requires the State to undertake the progressive realisation of these rights by reasonable measures within its ability and resources:

a. Adequate and nutritious food and clean water;

b. Clothing and housing;

c. Good standards of health care, physical and mental wellbeing;

d. A healthy and ecologically balanced environment;

e. Equal access to means of communication, the State media, transportation facilities, and the natural resources of the country;

f. The establishment of a sewage system of a reasonably adequate standard on every inhabited island;

g. The establishment of an electricity system of a reasonably adequate standard on every inhabited island.

2.4. CORRESPONDING INTERNATIONAL COMMITMENTS AND OBLIGATIONS

Maldives is party to various multilateral environmental agreements, of which 5 are related to chemicals management. These include Vienna Convention for the Protection of the Ozone Layer, Montreal Protocol on Substances that Deplete the Ozone Layer, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Stockholm Convention on Persistent Organic Pollutants, Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and the Convention on the Prohibition of the Development, Production, Stockpiling and use of Chemical Weapons and on their Destruction. Maldives is also a member to the Strategic Approach to International Chemicals Management (SAICM).

Ratification of international agreements demands legislative assuring of country's commitments. Although the Maldives has existing legislations, the implementation of these, including those related to chemicals management are highly challenging. As the majority of ecological laws are interconnected with each other, and changes in one law demands the insertion of changes to subsequent regulations; this factor stipulates breaking of general system of ecological legislation, causing discrepancies between laws and regulations. In future, the reformation of legislation should be directed not to the increasing of number of legislative acts, but on their systematisation and enhanced effectiveness.

2.5. DESCRIPTION OF EXISTING LEGISLATION CONCERNING POPS

Assurance of ecological safety and use of chemical substances, is ensured and regulated by the Constitution of the Maldives, legislative acts and normative-methodological documents. Analysis of existing legislation on POPs management shows the lack of special normative base for POPs treatment in the Maldives. The following section outlines the existing legislations and regulations related to the sound management of chemicals and hazardous waste.

2.5.1. LEGISLATIVE NORMS

2.5.1.2. LAW ON IMPORTATION OF PROHIBITED ITEMS TO THE MALDIVES (LAW NO. 4/75)

The Law on Importation of Prohibited Items to the Maldives (Law no. 4/75) implemented and enforced by the MDNS, regulates, among others, the import of dangerous chemicals into the country. Article 5 of the Act states that all dangerous chemicals (except for fireworks), acids and other poisonous items produced using these chemicals shall only be imported into the country with the prior written permission and approval from the MDNS. In order for the effective management of chemicals, special permits need to be sought from the relevant government institutions which monitor the respective chemicals related to that sector, while the final approval will be issued from the MDNS.

The ministry has formulated a regulation pursuant to Article 5, however, it is yet to be implemented. The implementation of the said regulation has been delayed due to the unavailability of trained staff and the required equipment to carry out the specific tasks as stipulated in the regulation.

2.5.2.3. ENVIRONMENTAL PROTECTION AND PRESERVATION ACT (LAW NO. 4/93)

The Environmental Protection and Preservation Act (Law no. 4/93) includes provisions for the environmentally sound management of hazardous wastes, chemicals and oils. Article 7 of the Act provides for waste disposal, oil and poisonous substances where:

(a) any type of waste, oil, poisonous gases or any substances that may have harmful effects on the environment shall not be disposed within the territory of the Maldives; and

(b) in cases where the disposal of the substances stated in paragraph (a) of the clause becomes absolutely necessary, these shall be disposed only within the areas designated for the purpose by the government. If such waste is incinerated, appropriate precaution should be taken to avoid any harm to the health of the population.

Moreover, Article 8 of the Act provides for hazardous/toxic or nuclear wastes where such waste that is harmful to human health and the environment shall not be disposed anywhere within the territory of the country. Permission should be obtained from MEE at least 3 months in advance for any transboundary movement of such wastes through the territory of the Maldives.

2.5.2.3. DRAFT PESTICIDES BILL

Currently, MoFA is in the process of drafting a Pesticide Bill which would be the law governing pesticides upon endorsement by the Parliament. The Bill will be the primary legal instrument to regulate the management, use and distribution of pesticides during all stages of their life cycle, including the disposal of pesticide waste, with the objective of protecting human, animal and plant health and the marine and terrestrial environment and promoting sustainable agricultural production in the Maldives.

Upon ratification of the said Bill, the ministry will be mandated to issue permits on the use of pesticides and manage both direct and indirect effects of pesticides.The implementation of this legislation will also allow the country to more effectively meet its international obligations and further collaboration with international partners

3. KEY APPROACHES AND PROCEDURES FOR POPS CHEMICAL AND PESTICIDE MANAGEMENT

Chemicals are not produced in the country. However, recent developments have resulted in an increase in the import and use of chemicals and related components.

The implementation and enforcement of environmentally sound management of hazardous waste and chemicals has been a challenge to the country due to the lack of chemical databases indicating the usage and disposal of these chemicals.

The means to study and analyse the situation is limited given that no system for collection of baseline information has been established.

Detailed statistics pertaining to the chemicals imported into the country is unavailable except for import data. The broad categories of imports of chemicals and related industries are subdivided under the harmonized system into a number of groups and are managed by the MCS.

All chemicals require prior permission from MDNS, before import into the country can take place.

All chemicals restricted under Stockholm Convention are banned in Maldives except for PCBs. However, this ban is not tied to any legislative norm, and has been exercised via public announcement.

Chemicals should be disposed by means of caution and care, and as such, a formal procedure for disposal of chemicals is necessary. To this regard, MDNS is formally responsible for disposal of hazardous chemicals. Previously this was done at the island of Thamburudhoo, which is used for military training.

However, currently there is no designated area for disposing chemicals and consequently no facility that fulfils environmental criteria for disposing such chemicals exist. At the moment, MNDF dilutes the waste chemicals and drains it into the ground or sea, due to lack of neutralising chemicals and proper facilities for disposal.

Household pesticide containers are often disposed off with the daily garbage or dumped at Thilafushi landfill as is the case in greater Male' region.

The HPA carries stockpiles of chemicals used for vector control, to be used in emergency situations. The main stock are stored at Thilafushi island and an emergency stock is kept at Ministry of Health's store. These are distributed accordingly to the entire country at a need basis or in an outbreak situation. The chemicals used for vector control are Deltacide, Malathion and Bacillus thuringiensis israelensis (Bti)

4. Assesment of POPs issue in the country

4.1. Assessment with respect to Annex A, Part I chemicals (POPs pesticides)

The issue of POPs was brought to international attention during the late 1980s and subsequently measures were undertaken to reduce or phase out these damaging chemical pollutants. Maldives had banned POPs pesticides before the international ban. Currently, there are no productions, import or use of POPs pesticides in the country.

There is no specific pesticide legislation, nor are there any specific regulations on the registration, transportation, storage and use of pesticides and the disposal of empty pesticide containers and small quantities of leftover pesticides. However, a draft pesticide act is being developed with assistance from several key stakeholders that will address these issues in a more holistic manner.

In accordance with the mandate provided by the President's Office to all ministries, the legal status of pesticide registry and other governance structures rests with MDNS as custodian of the Law 4/75.

Currently, there is no pesticide registration scheme. Instead, all individual consignments of pesticide importation require approval in writing from MDNS. To request for such approvalimporters first need to obtain a letter of no objection from MoFA for agricultural pesticides. MCS will only release pesticides if an import permit has been obtained from MDNS.

MoFA maintains a 'Negative List' of pesticides prohibited for importation and use in Maldives. It contains pesticides regulated by international conventions and active ingredients that fall in WHO Hazard Class I. The list was drawn up in 2006 and has not been updated since. However, not all pesticide importers and shops shops are aware of the existence of this list.

There is no standard form to request for "no objection" from MoFA and as such, information submitted varies. Requests typically contain the trade name, unit size and number of units. In several cases

the active ingredient and formulation are also provided, but very often this is not the case. In addition, the intended use is not mentioned in most requests.

Following the submission of the request for import, the category of the product (fertilizer, insecticide, fungicide, herbicide, etc) is determined and the active ingredient identified if this has not been provided. These are then checked against the list of prohibited pesticides. Products that are not on the 'Negative List' get a 'no objection to import' permit and are forwarded to the MDNS for approval.

MoFA maintains a file of all requests for permits to import pesticides and its responses to these requests. However, annual overviews of approved products and/or quantities are not compiled.

MDFA uses a 'health significance approved chemical list' for issuance of permits for health purposes. Only chemicals on the list are approved. It has a format for requesting approval, which contains the brand name, chemical name, quantity and intended use. Information about the formulation and concentration is not requested. This system has been in existence since 2006.

4.2. ASSESSMENT WITH RESPECT TO ANNEX A, PART II CHEMICALS (PCBS)

Polychlorinated biphenyls (PCBs) are class of synthetic organic chemicals that are chemically inert. PCBs have been widely used as an additive to oil found in electrical equipment, hydraulic machineries and other appliances where the inertness of PCBs are desired. 'Chemical inertness enables efficiency in operation, durability and safety of the appliances.' Due to these characteristics, PCBs have many benefits for commercial use. However, PCBs are persistent when released to the environment. PCBs are one of the most widely spread environmental pollutant which have been detected in all of the environmental medium. Trace amounts of PCB have been detected in sampled islands of the Maldives during a study conducted in 2014. [4]

PCBs are used for many applications like dielectric fluids in electrical equipment, heat transfer fluid in mechanical operations, plasticizerz, lubricants, inks and surface coatings.

The uses of PCBs can be categorised based on their occurrence in closed, partially closed and open systems. This classification is based on how easily the PCBs could escape into the environment. Currently, the Maldives does not import any category of PCB based equipment. However, it is possible that such equipment may have been imported in the past and in the absence of adequate records, it is challenging to identify the exact numbers of PCB based equipment that may be in the Maldives. Hence, it is very difficult to individually identify the equipment and application, as most of them would have passed their consumer life cycle since PCBs were banned in 1979. [5]

Potentially PCB containing equipment is distributed to five islands, which are among the most populous in Maldives. The records show that there are 18 potentially PCB containing equipment. These equipment consists of 15 electric transformers and 3 oil filled circuit breakers. The total volume of potentially PCB containing oil amounts to 6,100 litres, which comprises of 5,819 litres of transformer oil and 282 litres used in oil filled circuit breakers.

[4]Colombo, A, Bettinetti, R, Strona, G, Cambria, F, Fanelli, R, Zameer, Z & Galli, P 2014, 'Maldives: An archipelago that burns. A first survey of PCDD/Fs and DL-PCBs from human activities', Science of the total environment, vol. 497-498 (2014), pp. 499-507
[5]UNEP 1999, 'Guidelines for identification of PCBs and PCB containing materials', First Issue, August 1999, UNEP Chemicals.

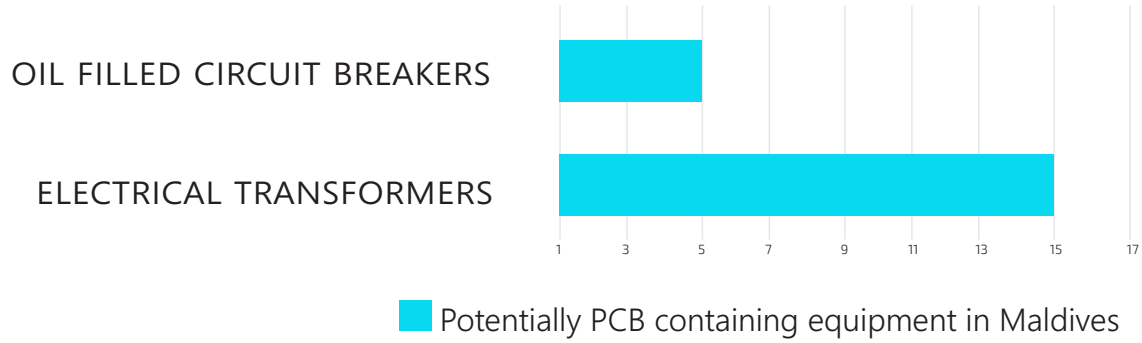

Figure 1 : Types of PCB containing equipment and Volume, in Maldives

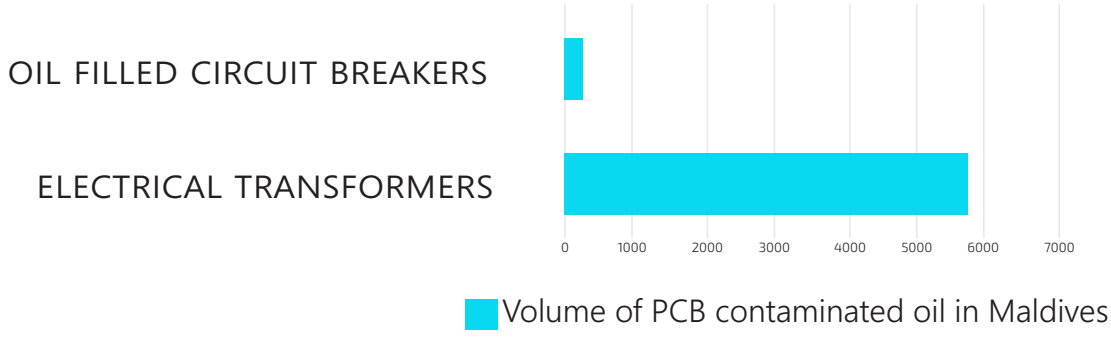

Figure 2 : Volume of PCB contaminated oil in Maldives

4.1.1. PCB CONTAMINATED SITES

The contaminated sites identified are the sites where there were leakage and spilling of oil. Analytical data shows that there are 10 potentially PCB contaminated sites in the Maldives. Table below illustrates the potentially PCB contaminated sites in the Maldives.

Table 2 :
PCB contaminated sites in the Maldives

Island	Number of contaminated sites	Volume of PCB contaminated oil that could seep into soil (litres)
S. Hithadhoo	2	1113
S. Feydhoo	1	521
S. Gan	1	521
GN. Fuvahmulah	6	2540

4.1.2. MANAGEMENT OF PCB WASTE IN MALDIVES

There are no existing guidelines from relevant government authorities to deal with the disposal of potentially PCB containing equipment in the Maldives. Decommissioned electrical transformers are sold as scrap metal in the Maldives.

Due to absence of guidelines and legislative measures regarding disposal of PCB contaminated oil in the Maldives, these are then sold by utility companies for other uses. Island communities buy this oil to apply on wooden furniture and transport vessels like boats. In some cases PCB contaminated oil have been mixed and boiled with naphthalene to make a chemical mixture, which make wood termite resistant. These indicate that there are huge gaps in the public perception of health and environmental impacts of PCB contaminated oil.

4.3. ASSESSMENT WITH RESPECT TO ANNEX A, PART II CHEMICALS (PDBES)

Polybrominated Diphenyl Ethers (PDBEs) are chemicals that have been widely used in many industrial sectors like electronics industry for the manufacture of plastic casings for computer equipment and in transport sector for the manufacture of foam cushioning in automobiles. These chemicals possess toxic properties, which resists degradations and are bio-accumulative.

In Maldives, there are no productions of POPs PDBEs and articles containing POPs PDBEs. However, the country imports and uses articles and products that may contain POP PBDEs particularly in Electric and Electronic Equipment (EEE) and in transport vehicles. Due to lack of comprehensive data and lack of specific classification in terms of brands for the EEE and transport sector, it is not possible to estimate the total amount of POPs PDBEs in the country. Hence, estimating the total EEE entering the waste stream is difficult.

Since Maldives does not have a sound waste disposal capacity, all the POPs PBDE containing wastes from 1970 until now have been left at landfills and dumpsites. Therefore, it is expected that waste dumpsites may have POPs PBDEs.

4.4. ASSESSMENT WITH RESPECT TO ANNEX B CHEMICALS (DDT)

The side effects of DDT usage are well documented, particularly in countries where DDT is used for vector control and management in fighting against malaria. Maldives has also used DDT in the past. However, the effects of DDT is poorly understood, thus there is a need for continuous assessment of the chemical toxicology of DDT in order to trace the effects of DDT usage in Maldives. DDT is listed in the registry of banned pesticides in the Maldives, and as such, its' production, import, exports and use is prohibited in the country since the early 1990's.

4.5. ASSESSMENT OF PFOS, ITS SALTS AND PFOSF (ANNEX B, PART III CHEMICALS)

Perfluorooctane sulfonic acid (PFOS), its salts, and perfluorooctane sulfonyl fluoride (PFOSF) were listed in Annex B of the Stockholm Convention in 2009. The majority of PFOS-related substances are polymers of high molecular weights in which PFOS is only a fraction of the polymer and final product.[6] These PFOS carbon chains ($C_8F_{17}SO_2$) containing industrial chemicals are called PFOS-related substances. Although the net contribution of individual PFOS-related substances to the total environmental load of PFOS cannot be readily predicted, there is a potential that any molecule containing the PFOS carbon chain could be a precursor to PFOS. PFOS can be formed by environmental microbial degradation or by metabolism in larger organisms from PFOS-related substances.[7]

There is no manufacture of articles and products using PFOS as a chemical and its related substances in the country.

However, it is possible that consumer articles may contain PFOS, its salts, PFOSF and its related substances. Nevertheless, due to unavailability of data required for the specific sectors of textiles, apparel, home furnishing and upholstery, synthetic carpets, leather, paper and packaging, industrial and household surfactants, toner and printing ink, it is not possible to quantify its prevalence. Assessments undertaken indicated that PFOS, its salts, PFOSF and its related substances are not present in the medical devices, coatings, paint and varnishes used in the country. The hydraulic fluids used in the aircrafts registered in the country do not use PFOS, its salts, PFOSF and its related substances. In addition to this, sulfluramid is not a permitted insecticide in the country, thus no PFOS is present in the insecticides used in the country.

The largest amount of PFOS and related substances in current use in the Maldives are in the form of fire-fighting foams. To this regard, only the required amounts are brought into the country and foam is not dispensed unless required. The facilities in the airports do not have bulk quantities of foam in their storage, but only sufficient quantities for fire vehicles and reserve.

[6] OECD, 2002
[7] UNEP, 2002

The amount of fire-fighting foams with fluorosurfactants in the country is determined by the import data. The consumption of the fire-fighting foams depends on the frequency of fire drills and the rate of fire accidents. The relevant authorities that use fire-fighting foam in the country are the Fire and Rescue Department of the MNDF, airports and private companies that deal with the sale of fire safety and fire-fighting equipment. The different types of fire-fighting foams and agents containing PFOS related substances in the country are Aqueous Film-Forming Foams (AFFF) and Film-Forming Fluoroprotein Foams (FFFP). The main countries where fire-fighting foams are imported into the country are from UK, India, Malaysia, Sri Lanka, UAE and Singapore.

There is no specific legislation in the Maldives in relation to import or use of fire-fighting foams for oil tanks. Furthermore, all islands with an oil tank larger than 3000 litres are known to have fire-fighting foam, which are mostly AFFF foams. The import data on fire-fighting foams are available from the year 2000 and onwards.

However, it is important to note that the Airport Rescue and Fire Fighting Section of Maldives Airports Company Limited was formed in 1966, and foam has been imported since then.

The MNDF Fire and Rescue Services is the state authority that imports and distributes large quantities of AFFF fire-fighting foams. To this regard, 1210 litres of AFFF have been used in cases of fire incidents from 2009 until end of 2013 and 1200 litres of AFFF are present in the stock as of 2013.

The largest amount of PFOS and related substances has been used between 1970 to 2002, and has therefore entered the waste stream. Since the Maldives does not have a sound waste management capacity, all PFOS containing wastes from 1970 until now have been disposed at landfills and dumpsites. These sites can be considered as PFOS reservoirs and potentially PFOS contaminated sites. The total stock in these landfills could not be estimated, as this data has not been recorded. The largest stocks of PFOS and related substances would be most likely be found at these landfills.

The largest landfill site is at Thilafushi island where the waste from Male' City and other islands have been disposed since the 1990s. In addition, other waste disposal sites may also contain PFOS and related chemicals, thus further assessment is needed.

In addition to landfills, all current and former sites where AFFF and FFFP foam have been used in the past can be considered as potentially PFOS contaminated sites. Additionally, all major sites where fire has been extinguished by fire fighting foams can be considered PFOS contaminated. Moreover, all islands with an oil tank larger than 3000 litres are known to have fire-fighting foam, which are mostly AFFF foams. Therefore, PFOS contamination might have taken place where these foams have been applied or disposed.

Foam is not disposed onto the ground during trainings, and no specific training grounds have been determined, hence, making identification of locations and detailed assessments are very difficult. For some airports, the volume of AFFF foam use can only be roughly estimated due to inconsistency in training schedules and inconsistency in amounts used in respective trainings. As an estimate, the current use may be extrapolated to take into account the number of years since the fire-fighting units was established in the specific airport. 1200 litres of fire-fighting form are used in the Emergency Training Exercise which is held once in every two years in Velana International Airport.

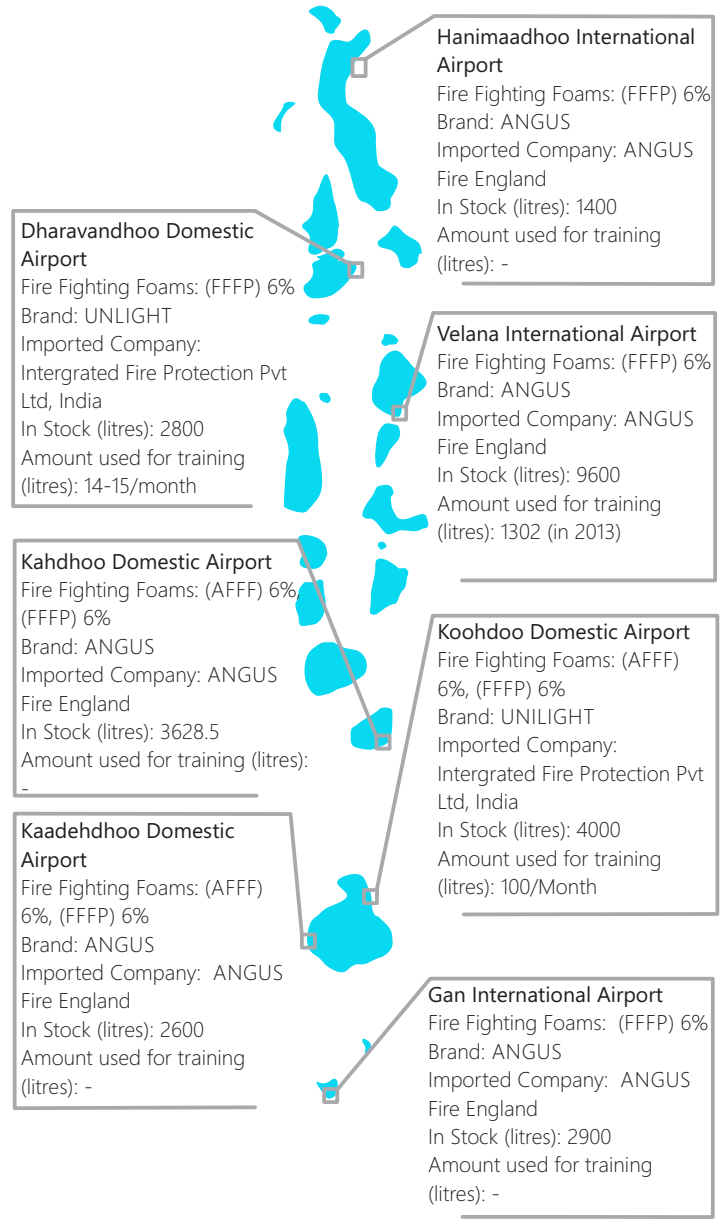

Figure 3 : Distribution of fire-fighting foams in the regional airports.

4.6. ASSESSMENT OF RELEASES OF UNINTENTIONAL PRODUCED CHEMICALS (ANNEX C CHEMICALS)

Polychlorinated dibenzo-dioxins (PCDD or Dioxins), dibenzo-furans (PCDF or Furans) are included under the by-product category of the 12 initial POPs under the Stockholm Convention.

Unlike other pollutants mentioned in Article 5 of the Stockholm Convention, PCDD and PCDF are not deliberately produced for any specific purpose, but always occur as an unintentional by-product of anthropogenic activities, mainly activities such as waste incineration, open burning, power generation, automobile emissions, etc.

4.6.1. WASTE INCINERATION

Waste incinerators are included in Annex C-II of the Convention as a high priority sector for formation and release of PCDD/PCDF. From this source group, only the following three categories were identified to be relevant to Maldives.

4.6.1.1 MUNICIPAL SOLID WASTE INCINERATION

Municipal solid waste is regarded as the waste generated from households, commercial and industrial activities and is generally considered to not include any hazardous waste material.

There has been no nationwide waste audit conducted in the country, although isolated waste audits have been conducted at different regions of the country for various purposes.

At present, general household waste is not appropriately managed at any of the islands in Maldives. Open burning is the most common method of managing municipal waste employed at the country. It is estimated that 0.83 kg of waste is produced per person per day.[8]

Waste incineration is compulsory in the resorts under Section 5 of the Regulation on the Protection and Conservation of Environment in the Tourism Industry. At tourist resorts, an estimated 3.5 kg of waste is produced per bed per day.[9]

The incinerators used at resorts are simple municipal solid waste incinerators that are batch fed on as needed basis, with no air pollution control system incorporated[10] in it, and as such, is classified as Class 1 incinerator for the purposes of this inventory. The residual ash produced by incineration is bagged in plastic bags and sent for disposal.[11]

Data obtained from the Tourism Yearbook 2013 shows that the operational bed capacity for the country in 2012 was 25,062.[12] Using the operational bed capacity and the rate of waste generated per bed per day, it is estimated that 32,016.7 tonnes of waste is being generated by the tourism sector annually.

[8] Feasibility report- North province regional waste management project, 2011
[9] Feasibility report- North province regional waste management project, 2011
[10] Assessment of Solid Waste Management practices and its vulnerabilities to Climate Risks in Maldives Tourism Sector, 2013
[11] Assessment of Solid Waste Management practices and its vulnerabilities to Climate Risks in Maldives Tourism Sector, 2013
[12] Tourism Yearbook, 2013

4.6.1.2 HAZARDOUS WASTE INCINERATION

Hazardous wastes are defined as residues and wastes that are hazardous due to their characteristics or which contain materials that are regarded as hazardous. Hazardous waste may occur in any state of matter and can include commercial products, pesticides, pharmaceuticals, batteries and oils or by products of manufacturing processes.

The current waste management practices in Maldives do not include any waste segregation. Ultimately, it is mixed waste (both hazardous and municipal waste) that is dumped into the waste yards and burned to reduce the waste volume. No specific waste audit has been conducted till date to quantify the volume of hazardous waste produced in the country. Field visits for data collection did not yield any quantifiable data, as all surveyed sample populations did not segregate waste prior to disposal.

Although hazardous waste is being produced, it is not being incinerated, but is being openly burned along with other domestic waste in the waste yard.

4.6.1.3. CLINICAL OR HOSPITAL GENERATED WASTE INCINERATORS

Through key informants and surveys conducted, it was identified that hospitals across the country do not keep data on the amount of waste generated. As such, in the absence of quantifiable data the amount of waste generated at hospitals has been assumed based on the general waste production percentages and quantities as mentioned in the World Health Organization (WHO) Fact Sheet. As per these statistics, of the total waste generated in hospitals daily, 80% of the waste is general waste and the remaining 20% of waste is considered as hazardous waste[13]. It is also estimated that 0.2 kg of hazardous waste will be produced per patient (per bed) per day. The activity rate for this source group has been calculated assuming that bulk of hospital waste would be produced by inpatients.

The types of incinerator being used to dispose hospital and clinical waste in the country are simple, metal incinerators, without a secondary combustion chamber, temperature controls or an air pollution control system. Hence, these incinerators can be classified as a Class 1 incinerator. Since none of these incinerators are currently operational, all the waste collected is being sent to Thilafushi for disposal.

[13] World Health Organization Fact Sheet No. 253.

4.6.2. BRICK PRODUCTION

Brick production is a sector that has recently bloomed in Maldives. Maldives Road Development Corporation is the major actor in this sector, with some other companies and individuals undertaking the process at a comparatively smaller scale. There are four machines allocated for brick production purposes with no air pollution control systems integrated in the system. The machines run on electricity, with uncontaminated diesel being used as a fuel. It is estimated that an average of 30,000 bricks of varying sizes are produced each day. The postproduction residue is collected in burlap sack size sacks, and an estimated 500 bags of residue is transported to Thilafushi for disposal each day. The types of machinery used for brick production are simple machines with no emission abatement technologies and using clean fuel.

4.6.3. ASPHALT MIXING

The only asphalt mixing plant is located in Addu City, and is operational only on demand. During operation, the machine is used for around twelve hours daily.

The machine uses diesel to cook tar and uses electricity to power the plant. It is generally considered as an unsophisticated machine with no filters or dust control systems on the machine. The machine has a smoke residue outlet linked to a water filled depression in the ground. The resultant residue is then collected and buried in the grounds for disposal. Since these projects are small scale projects conducted infrequently, there were no quantifiable data.

4.6.4. TRANSPORT

Contribution to PCDD/PCDF emissions from the transport sector is attributed to incomplete combustion of fuel in vehicles. Numerous factors such as engine maintenance, age, and technologies for emission reduction contribute to incomplete combustion of fuel. This matter is of particular gravity to a small island developing state such as the Maldives, where the capital Male' is one of the most densely populated cities in the world.

The 'Vehicle Registration Regulation' under the Land Transportation Act (Law no. 5/2009) sets standards for the quality and age of vehicles imported into the country. The 'Road Worthiness Examination Regulation' under the same act annually assesses the condition of the vehicle. This acts as a measure to reduce degraded engines which leads to incomplete combustion of fossil fuels releasing PCDD/PCDF. The petrol or gasoline used in Maldives is unleaded.

While vehicle and vessel registration requires it to be registered according to fuel type consumed, there are no information available on whether these vehicles and vessels use 4 stroke or 2 stroke engines. Given these limitations in data, a definite calculation of the PCCD/PCDF in the transport sector is challenging. However, data that is available on diesel engine indicate that the 319,941.83 tonnes of fuel were used in the year 2012. The release estimate for diesel engines is 0.032 g TEQ (unit for toxic equivalent) per year.

4.6.5. OPEN BURNING PROCESSES

Since Maldives does not have significant biomass burning practices, only waste burning and accidental fires are relevant. All municipal and hazardous waste are burned together in a designated dumpsite. Segregation of waste is rare, and mostly steel, metal and construction waste are being dumped separately.

According to the North Province Feasibility Report 2011, an estimated 0.83 kg of waste is produced per person per day[14]. This provides a value of 283, 740.48 tonnes of domestic waste being produced by Maldivians annually. Since mixed waste (domestic waste, agricultural waste and sometimes hazardous waste) are being burnt without any pollution control mechanism, for purposes of reduction of waste volume, the open burning processes has been classified under source class one.

As both hazardous and general wastes generated from the hospitals are also disposed off in the communal waste disposal centre, the 27,379 tonnes of hospital waste is also added to this activity rate. Hence, it can be determined that the most evident source of PCDD/PCDF formation and release would be via uncontrolled and open waste burning practices.

[14] Feasibility Report- North Province regional waste management project, 2011

4.7. DISPOSAL AND LANDFILL

4.7.1. LANDFILLS, WASTE DUMPS AND LANDFILL MINING

Waste management in Maldives mainly consists of openly burning waste at designated dumpsites. Thilafushi is the only landfill site which is located in the greater Male' region. However, at Thilafushi, mixed waste is openly burnt[15] and not buried like conventional landfills.

4.7.2. OPEN WATER DUMPING

Emissions of untreated sewage are expected to have low PCDD/PCDF concentrations as PCDD/PCDF production and release are mainly caused by the procedures and chemicals that go into treatment of sewage.

There are 41 sewerage systems[16] installed in the islands of Maldives. The sewage outfall pipes are located on an average 10 m away from the shoreline, in areas of high wave and current action to facilitate rapid dispersal of nutrients in the sewage.

[15] Environmental and Social Baseline Assessment of Thilafushi Waste Management Facility 2010
[16] As of January 2016

4.7.3. COMPOSTING

Composting in most islands are not being undertaken at a large scale, but individually in household levels to aid in soil enrichment for personal gardening uses. A pilot project funded by the World Bank, the Ari Atoll Solid Waste Management Project,[17] focused on the provision of an integrated solid waste management system to six islands of the Ari Atoll. The project focused on segregation of waste at the household level and reduction in volume of waste that has to be transferred for disposal by facilitating and promoting production of compost.

However, given that data on waste segregation and composting has not been kept, the release of PCDD/PCDF cannot be calculated for the composting sector.

[17] World Bank. 2012. Maldives - Ari Atoll Solid Waste Management Project. Washington DC ; World Bank.

4.7.4. CONTAMINATED SITES AND HOTSPOTS

The contaminated sites and hotspots focus on the past and present actions and activities that might have contributed to the accumulation of PCDD/PCDF, mainly in the soil and sediments of the exposed location. It is of utmost importance that these locations are identified and appropriate management and mitigation measures taken to limit human exposure and subsequent health impacts.

Locations where products and residues identified in the previous source groups are deposited (either previously or currently) can be marked as contaminated sites and potential hotspots. The longevity of the PCDD/PCDF in the environment poses a significant problem, as measures to remediate the contamination sites and hotspots may re-mobilize PCDD/PCDF previously contained in the location.

Open burning dumpsites in all the inhabited islands are potential hotspots for PCDD/PCDF contamination. A study conducted by Colombo et al identified that PCDD/PCDF concentrations in the soil were significantly higher in the areas closer to local waste burning sites. In this regard, all waste burning sites in the inhabited islands of Maldives should be considered as hotspots for contamination.[18]

[18] Colombo, A. et al. 2014.

5. CURRENT LEVEL OF INFORMATION, AWARENESS AND EDUCATION

Awareness among the general public or target groups is key in determining the success of strategies and implementation plans towards environmental management, including sound management of chemicals. Given this, the NIP process also examined the current level of awareness with regard to POPs in the country.

Generally, the survey conducted to examine awareness towards POPs revealed that the term is novel to the majority of the general public. To this regard, although, the population is well informed on the broader environmental issues related to global warming and visible aesthetics, knowledge on the toxicological effects of chemicals seem to be minimal.

5.1. PRE-AWARENESS SESSIONS (GENERAL PUBLIC)

Awareness sessions were conducted among the general public. The level of existing knowledge of POPs was assessed prior to the awareness sessions.

.

More than 95% of the interviewed were not aware of the POPs.

Since pesticides shares a large volume of POPs, the participants was asked on the implications of pesticides on the human health.

40% of the participants believed that pesticides can cause harm to human health.

54% of the participants were not sure while 6% of the participants said No.

Participants were asked regarding the biggest environmental threat to the Maldives. The question was asked to analyse the level of concern to issues related to POPs.

33% of the participants stated waste while 8% of the participants stated toxic chemicals as the biggest environment threat to the Maldives.

47% of respondents noted global warming while 11% believed it was air Pollution.

5.2. POST-AWARENESS SESSIONS (GENERAL PUBLIC)

Post awareness session surveys were conducted to assess the level of understandings and its effectiveness.

Participants were asked regarding their biggest concern on POPs.

75% of the participants stated negative effects on human health as their biggest concern regarding POPs, while 16% of the participants stated its threat to the biodiversity. 7% stated the persistent character of POPs as their biggest concern.

Participants were asked whether they were concerned about POPs. 78% of the participants expressed concern on the issue of POPs, while the rest of 22% were not concerned on issues related to POPs

Participants were asked on how eliminate POPs to deduce the level of awareness of the participants on dealing with the issue of POPs.

28% of the participants stated that technological advancements will be the best way to deal with the issue while 37% stated that opting greener technologies will address the issue the best.

31% of the participants noted the role of using less hazardous substances or find better alternatives.

5.3. ASSESSMENT ON THE VULNERABLE GROUPS

Vulnerable groups were surveyed to assess their situation and concerns regarding POPs. It is daunting that the knowledge regarding the health issues associated with the open burning of waste was minute among the vulnerable groups.

Residents who commute along the municipal open burning waste site of Addu City expressed concern of low visibility during burning periods. It was noted that traffic accidents have occurred due to the low visibility.

The following is a summary of the key findings of a survey conducted for workers/occupants/etc. at Thilafushi.

- Protective equipment was provided to the workers with respect to the type of work carried, but masks or respiratory protection was not used or provided.
- The place of stay was less than half a mile from the open burning area for some workers.
- Workers expressed they experienced breathing difficulties in areas nearby the burn site and during the ferry travel (Male' - Thilafushi - Male'). The workers also noted that smoke smell lingers in their clothes.
- The workers surveyed have been working in Thilafushi within the range of 1 - 13 years while the mean is 6.2 years.

6. IDENTIFICATION OF SOCIAL IMPACTS OF POPS

The primary and the most immediate concerns in terms of POPs management in the Maldives are those relating to PDBEs, PCBs and U-POPs. Further investigation is needed in the Maldives to examine the specific impacts that these have on human health and the environment.

In terms of U-POPs, limited availability of data does not allow the identification of the health burden that these presents. However, Colombo et al shows that the range for PCDD/F and DL-PCB soil concentrations was 0.01–49.3 pg WHO2005-TEQ g−1 and 0.01–3.69 pg WHO2005-TEQ g−1 dw respectively. [19] The study also found that the principal component analysis (PCA) of the samples showed that PCDD/Fs had clear link between the pollution levels and the proximity to the local waste management sites, indicating waste combustion to be the primary agent in the release of the contaminants.

The current waste management practice in the islands does not cater for the sound disposal of POPs waste. Although there are 146 waste management centres [20] established, they merely act as waste dumping grounds with little or no waste segregation in place. Most of the biodegradable waste is burnt, as are some of the plastics. This open burning practices present serious and immediate health hazards to those residing in the vicinity of these centres.

However, given the geographic insularity and the small population sizes, and by extension, the limitations in the waste stream, establishing proper waste management in each of the islands is highly challenging.

The current government policy of establishing regional waste management centres present opportunities of scale. The clustering of multiple atolls in the provision of waste management services which includes a halt in open burning and waste segregation, will allow for a more environmentally sound approach to managing waste. However, the planned set up at these regional waste management centres does not have the necessary infrastructure or procedures for the sound management of POPs. The incineration of waste in these sites has the potential to release these chemicals to the environment. As such, further intervention is needed to design and implement procedures to adequately address these issues.

[19] Colombo et al. 2014. Maldives: an archipelago that burns. A first survey of PCDD/Fs and DL-PCBs from Human activities. Sci Total Environ. 497-498(Nov). pp 499-507

[20] As of January 2016

At the moment, waste is not segregated at the household level. However, there is a level of segregation at the hospitals and health facilities across the Maldives. Until 2008, waste generated in the Male' region were separated at the collection area, however, the separated waste were then either buried or burned together at the Thilafushi site. The current practice at Thilafushi is to either collectively disposing the waste in low-lying landfill or open burn. Inefficient combustion process presents risks not only to the marine life in the vicinity but also releases significant amounts of pollutants to the environment causing toxic effects to human health. Toxins may also leach from any ash remaining, which could lead to the contamination of surface water or ground water.

Given the high permeability of the soil in the Maldives, and the absence of protection measures to restrict seepage into the ground, leakage of the chemicals into the groundwater and into the sea is highly likely. Initial assessments indicate that PCBs and concentrations of other chemical are expected to be found in the surrounding and underground areas in the vicinity of waste management centers and sites.

6.1. VULNERABLE GROUPS

The following groups have been identified as requiring specific considerations and focused interventions to reduce their vulnerability to the impacts of POPs.

6.1.1. PERSONNEL WORKING OR LIVING IN THE VICINITY OF DUMPSITES

Initial assessments reveal that waste collection sites and other waste management centres should be treated as potentially contaminated sites, and as such, special consideration need to be accorded to those either living or working within the vicinity of such sites. In this regard, particular attention need to be paid to the expatriate workers involved in waste management activities. These workers are largely unskilled and have a low literacy rate and as such, there may be issues in terms of disseminating information, including safety and risk information. Focused efforts will need to be undertaken to ensure that any policies that seek to address POPs in the Maldives also take into account the case of expatriate workers and design and formulate communication strategies that are effective in reaching these groups. This may require ensuring such communication messages are translated, as need be, to specific languages. Currently, safety and risk information dissemination programmes are not targeted at expatriate workers.

6.1.2. PERSONNEL WORKING IN POWER UTILITIES THAT HAVE CONTAMINATED TRANSFORMERS

Assessments conducted for the purposes of this NIP indicate that currently 18 equipment containing POPs and 6,100 litres of contaminated oil is to be found within the power generation sector. The assessments also reveal that such sites do not have proper safety standards or procedures and personnel working in these sites lack the understanding of the health and safety risks in the matter. As such, it is necessary to ensure such personnel are aware of the risks involved and institutionalise policies and practices that take into account the safety procedures required for handling contaminated equipment and oils.

Given the age of the transformers in question, it has been noted that the company is in the process of phasing out and replacing these with new equipment. Since the replacement of these equipment are factored into the companies are in the costs and plans, additional action will not be required in terms of replacing these equipment. However, the concerns that remain are the disposal of these equipment and the associated contaminated oil. Currently, no facility exists in the country that can handle the proper disposal of such contaminated equipment or oils. It is then likely that these will enter the existing waste stream and further contaminate existing dumpsites.

replacing these equipment. However, the concerns that remain are the disposal of these equipment and the associated contaminated oil. Currently, no facility exists in the country that can handle the proper disposal of such contaminated equipment or oils. It is then likely that these will enter the existing waste stream and further contaminate existing dumpsites.

6.2. GENDER CONSIDERATIONS

As highlighted previously, given that POPs as an issue in the Maldives is largely in the form of unintended by-products, the elimination or restriction of these chemicals would not have significant impact on the livelihoods of the communities. However, it is important to note that even in the case of unintended by products, gendered discourses are an important issue to be examined.

In this regard, it has been noted that it is generally women who are primarily involved in the waste management in the islands. It is women who generally transfer household waste to the dumpsites or waste management centres in these islands. This may then disproportionately expose them to the effects from such contaminated sites. As POPs have the potential to bio-accumulate and be transferred to unborn children, the case of women and their exposure levels to such chemicals need to be given further attention. To date, no detailed studies have been conducted on the health impact of POPs on women and children in the Maldives. However, although such detailed studies do not exist, studies elsewhere have noted the impacts of exposure to such chemicals.

7. STRATEGY, ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

With regard to the assessments and inventories conducted to formulate this NIP, the NIP presents a policy, an implementation strategy, along with the activities and timelines to implement these activities.

7.1. POLICY STATEMENT

To protect human health and environment from Persistent Organic Pollutants through:

- Strengthening the national legislative framework on POPs within the chemicals and environmental law and enhancing the national institutional capacity and coordination mechanism;
- Establishing measures for environmentally sound management of POPs; and,
- Strengthening of public awareness and information regarding chemicals and their sound management.

7.2. IMPLEMENTATION STRATEGY

The implementation strategy will be guided by the following:

- Designating the National Chemicals Management Committee as the body with overall responsibility for coordinating POPs management activities and for reviewing and assessing progress;
- Clearly defining all POPs related roles and responsibilities of agencies and institutions;
- Ensuring that the public and all other stakeholders are made aware of and are adequately trained to undertake their respective roles and functions; and,
- Researching on short and long term effects of POPs.

The specific activities needed to implement the policy will be assigned to various government agencies or ministries based on their mandates. The coordination of the implementation activities across various government ministries and agencies will be vital and it is proposed that the National Chemicals Management Committee established by the Ministry of Environment and Energy will have overall responsibility for coordinating the implementation of POPs management policy.

The policy will be supported by a framework in which there are appropriate institutional arrangements, adequate human and physical resources, effective participation by stakeholders and mechanisms for on-going assessment, evaluation and adaptation to maintain and satisfy obligations under the Stockholm Convention.

7.3. STRATEGIES, ACTIVITIES AND ACTION PLANS

7.3.1. INSTITUTIONAL AND REGULATORY STRENGTHENING MEASURES

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Develop a legislation for chemicals management	Set mechanism to address POPs within the chemicals legislation or regulation	New legislation to address chemicals	MEE* MDNS AG	2018	Legal and technical expertise	5000
	Revise and harmonise existing mandates of all relevant institutions to incorporate and identify their responsibility in chemicals management	Revised mandates with no conflicts and overlaps	PO* MEE* MDNS MOH MoFA	2018		-
Strengthen institutional capacity	Capacity building of custom officers on inspection and identification procedures	Number of staff trained	MCS* MEE* MNDF	2017 - onwards	Instruction manuals, trainers,	20,000
	Capacity building of staff handling chemicals for use, storage and disposal	Number of staff trained	MEE* MDNS MOH MoFA	2017 - onwards	Instruction manuals, trainers,	20,000
	Provide POPs chemical testing equipment for relevant authorities	Number of test kits provided	MEE* MOH MNDF MPS MoFA MCS	2017 - onwards		20,000
	Formulate a chemicals unit within the relevant institution	Number of staff at chemicals unit	MEE	2017		20,000

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Improve data collection and management systems	Establish and update database of POPs in the country	Updated database of POPs in the country	MEE	2017		50,000
	Establish HS codes for all POPs and POPs containing equipment	Number of HS codes established.	MEE* MCS	2017 onwards		10,000
Research on effects of POPS on health	Conduct research on short and long term effects of POPs on exposed population	Number of research conducted	MEE* MOH MoFA MNU	2018		50,000

7.3.2. USE, IDENTIFICATION, LABELLING, REMOVAL, STORAGE AND DISPOSAL OF PCBS AND EQUIPMENT CONTAINING PCBS (ANNEX A, PART II CHEMICALS)

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Develop an action plan to eliminate PCB-containing equipment and its wastes by 2025	Label PCBs and equipment containing PCBs are located in the country	Data base containing on PCBs containing equipment	MEE	2017	Technical expertise	5000
	Labelling mechanism for all PCB containing equipment in place	Number of labelled equipment	MEE* STELCO FENAKA	2018	Technical expertise	5000
	Establish adequate storage facilities for the replaced equipment containing PCBs	Number of storage facilities established	MEE* STELCO FENAKA	2017		150,000
	Formulate guidelines for disposal of equipment containing PCBs	Guideline for disposal of equipment containing PCBs	MEE	2018 onwards		5000
	Safe disposal of equipment containing PCBs	Disposal of PCB containing equipment	MEE* STELCO FENAKA	2018 onwards		350,000

7.3.3. PRODUCTION, IMPORT AND EXPORT, USE STOCKPILE AND WASTES OF HEXABDE (ANNEX A, PART IV CHEMICALS) AND TETRABDE AND PENTABDE ANNEX A, PART V CHEMICALS) AND HBB, WHERE APPLICABLE (ANNEX A, PART I CHEMICALS))

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Develop an information sharing platform	Detailed inventory of the e-waste stream	EEE database developed	MEE* NCIT	2018		5000
Improve awareness on EEE and WEEE	Measures, including a monitoring system, to reduce the environmentally unsound disposal of e-waste	Established monitoring framework	MEE	2017		2000
	Enhance awareness on the hazardous substances contained in e-waste	Number of awareness programs conducted	MEE* LGA	2017 onwards		5000

7.3.4. PRODUCTION, IMPORT, AND EXPORT, USE STOCKPILES AND WASTES OF PFOS, ITS SALTS AND PFOSF (ANNEX B, PART III CHEMICALS)

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Action plan for safe disposal and monitoring of PFOS containing fire-fighting foam	Assessment and location of sites potentially contaminated with PFOS	Assessment Report	MNDF MEE*	2017		7000
	Safe disposal of the fire-fighting foam potentially containing PFOS	Incorporate a guideline for safe disposal of the fire-fighting foam to companies standard operation procedures	MEE	2017	Legal expertise	2000
	Monitoring and data system for PFOS containing articles	Established data monitoring system	MEE* MNDF MCS	2017	Technical expertise	2000

7.3.5. ACTION PLAN TO REDUCE RELEASES FROM UNINTENTIONAL PRODUCTION (ARTICLE 5)

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Develop an action plan to reduce releases from UPOPS	Conduct baseline study to identify hotspots, especially for open burning of waste	Number of open burning sites identified Baseline Assessment	MEE	2017	Technical expertise	10,000
	Set up segregation and recycling mechanism	Number of segregation and recycling facilities established	MEE	2017 onwards		660,000 (regional facility)
	Establish incinerating facilities	Number of incinerating facilities established	MEE* LGA	2017 onwards		100,000 (per island)
	Establish monitoring system for UPOPs emissions and releases	Number of site visits conducted	MEE	2017 onwards		150,000

7.3.6. .MEASURES TO REDUCE RELEASES FROM STOCKPILES, ARTICLES AND WASTES (ARTICLE 6))

Strategy	Activity	Indicator	Responsible Agency	Time ine	Resource Requirements	Budget (USD)
Develop an action plan to identify, manage and reduce releases from stockpiles, articles and wastes	Conduct baseline study to identify stockpiles and contaminated sites	Baseline studies and risk assessment conducted	MEE* EPA	2017-2018	Technical expertise	20,000
	Set up segregation and recycling mechanism	Number of segregation and recycling facilities established	MEE* EPA	2018-2019		660,000 (regional facility)
	Transfer stockpiles to source points	Number of reduced stockpiles	MEE* EPA	2018-2019		7,200,000
	Identification and data system for POPs contaminated sites	Environment-al Management Plan for the remediation and avoidance of POPs contaminate d sites developed	MEE	2017-2019		50,000

7.3.7. FACILITATING OR UNDERTAKING INFORMATION EXCHANGE AND STAKEHOLDER INVOLVEMENT AND PUBLIC AWARENESS, INFORMATION AND EDUCATION (ARTICLE 10)

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Establish mechanism for information exchange between Parties to Convention	Design and establish an online portal on POPs information, accessible to public	Updated webpage	MEE	2017	Technical expertise	1000
Enhance awareness mechanisms	Develop material for information dissemination	Number of information leaflets distributed	MEE	2017 onwards		1000
	Involve stakeholders actively in the management and decision making		MEE	2017 onwards		
	Awareness raising campaigns with special focus to gender issues	Number of awareness campaigns conducted	MEE	2017 onwards		5000

7.3.8. EFFECTIVE EVALUATION

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Ensure effective compliance mechanism	Facilitate information between the Party and the Secretariat		MEE	2014	-	-
	Biennium update of NIP	Updated NIP	MEE	2017	Technical expertise	250,000

7.3.9. REPORTING

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Establish a data sharing electronic mechanism	Develop electronic platform for data sharing with key stakeholders	Electronic platform for data sharing established	MEE* MCS MNDF MoFA NCIT	2018	Technical expertise	50,000

7.3.10. RESEARCH, DEVELOPMENT AND MONITORING

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Improving sampling and analysis of POPs in Labs	Provide facilities and equipment for Labs	Laboratory with adequate facilities and equipment established	MEE* EPA MFDA MOH	2017-2021	Technical expertise	100,000
	Monitoring reports, research studies	Number of reports and studies conducted	MEE* MNU	2017 onwards	Technical expertise	50,000

7.3.11. TECHNICAL AND FINANCIAL ASSISTANCE

Strategy	Activity	Indicator	Responsible Agency	Timeline	Resource Requirements	Budget (USD)
Strengthen financial and technical capacity	Conduct capacity building programmes	Number of capacity building programmes conducted per year	MEE	2017 onwards	Technical expertise	200,000

8. DEVELOPMENT AND CAPACITY-BUILDING PROPOSALS AND PRIORITIES

8.1.PRIORITY AREAS

Given the dispersed population and the location of waste management centres near residential areas, open burning is a topical issue in the country. Currently, open burning is the primary course of waste management in the country.

UPOPs produced through vehicle emissions should be given a high priority as well, since the nation does not enforce a rigid vehicle emission standard. The situation is exacerbated as one third of the nation's population resides in the capital Male' where traffic congestions are inevitable and observed daily. It should be noted that the most common mean of transport is by motorcycles.

The public needs to be educated through the education curriculum and targeted awareness campaigns should be conducted. It is recommended to carry out studies on the impacts to human health from UPOPs. It is also important to establish a standard chemicals labelling system which directs the users in both local, English and common expatriate languages.

8.1.1 RECOMMENDATIONS FOR THE ISSUE OF WASTE

It is important to address the issue of waste through the legislative framework. Formulation of a waste management law or guideline that is in accordance with best practices is required. Furthermore, it is recommended to make proper incineration mandatory as an alternative to open burning and make open burning of hazardous or potentially hazardous waste a punishable offense to safeguard the environment and human wellbeing. It is further recommended to formulate waste management guidelines that cover the entire process of waste management. In addition, these efforts should also be complemented with nationwide awareness campaigns.

Furthermore, waste management infrastructure should be established which includes hazardous waste management facilities.

Moreover, as the nation at present lacks a proper mechanism to assess the usage and end-life of chemicals used in the nation it is important to establish waste data management and auditing mechanism.

8.1.2 RECOMMENDATIONS FOR THE ISSUE OF VEHICLE EMISSIONS

With regard to the current laws and regulation of the nation, it is challenging to assess the emission values quantitatively. Therefore, amendments need to be made to the current vehicle regulations. The suggested amendments are setting of vehicle emission standards and development of a mechanism which supports low emission vehicles. Furthermore, with regard to the high population density (in the capital Male') and limited land area, it is recommended to set engine capacity standards per passenger for vehicles.

9. CONCLUSION

As required by the Stockholm Convention, the NIP requires to be updated biannually. The review and update of the NIP would require Parties to assess whether it is affected by an external or internal factors, such as national priorities or the scope of the problem to be addressed. The review and update of the NIP also requires stakeholder involvement and most importantly funds, which is the most challenging issue of all.

ANNEX 1

LIST OF BANNED PESTICIDES IN MALDIVES

NO	COMMON NAME	TRADE NAME
1	1,1,2,2-tetra chloroethane	Acetylene tetrachloride (fumigant)
2	aldrin	Octalene, Aldrex
3	azinophosmethyl	AZN
4	azinphos-methyl	Gusathion
5	benfuracarb	Oncol, Furacon
6	camphechlor	Toxaphene
7	chlordane	Octachlor
8	chlordecone	Kepone
9	chlorethoxyfos	Fortress
10	chlormephos	Dotan
11	coumaphos	Asuntol
12	DDT	Anofex, Neocide, Chlorophenthoate
13	dieldrin	Octalox, dieldrex, dieldrite
14	endosulfan	Thiodan (very highly toxic to fish)
15	endothion	Endocide
16	endrinethylene	Hexadrin, Endrix, Mendrin
17	dichloride	Bualta, Busan 77
18	ethylene oxide	Oxirane (fumigant)

NO	COMMON NAME	TRADE NAME
19	flucythrinate	Cybolt , Cythrin, Pay-off
20	fonofos	Dyfonate
21	furathiocarb	Deltanet, Promet
22	gamma-HCH (hexachlorocyclohexane)	Gamma-Col , Lindane
23	heptachlor	Heptamul, Heptox, Hepta
24	heptenophos	Hostaquick, Ragadan
25	isophenphos	Oftanol,
26	isoxathion	Karphos,
27	lumbda-cyhalothrin	Karate (very highly toxic to fish)
28	methylene chloride	Dichloromethane (fumigant)
29	mirex	Mirex
30	nicotine	Nico Soap
31	oxydemeton-methyl	Metasystox R,
32	parathion-methyl	Folidol, Metacide, Fostox
33	pirimiphos-ethyl	Primicid
34	RU 15525	Kadethrin
35	sodium selenate	Selenic acid, Disodium salt
36	tebupirimifos	Phostebupirim
37	azinphos-ethyl	Gusathion A
38	butoxycarboxim	Plant Pin

NO	COMMON NAME	TRADE NAME
39	chlorfenvinphos	Birlane, Sapona, Apachlor
40	demeton-S-methyl	Metasystox
41	dichlorves	Dedevap, Nogos, Vapona
42	dicrotophos	Bidrin
43	disulfoton	Disyston, Frumin AL, Solvirex
44	EPN	EPN
45	formetanate	Carzol, Dicarzol
46	formothion	Anthio
47	mecarbam	Murfotox
48	mephosfolan	Cytrolane
49	methamidophos	Monitor, Tamaron, Patrole
50	methidathion	Supracide, Suprathion
51	methomyl	Lannate
52	mevinphos	Phosdrin, Duraphos
53	monocrotophos	Azodrin, Nuvacron, Crotos, Monocron
54	naled	Dibrom, Bromex
55	omethoate	Folimat
56	parathion	Fostox E, E605
57	phosphamidon	Dimecron
58	polychloroterpenes	Strobane

NO	COMMON NAME	TRADE NAME
59	propetamphos	Safrotin
60	sulfotep	Bladafum
61	thiofanox	Dacamox
62	thiometon	Ekatin
63	vamidothion	Kilval
64	ethylene dibromide	Dibrome
65	ethoprophos	Mocap
66	isazofos	Miral
67	terbufos	Contraven, Counter, Cyanater
68	carbofuran	Furadan, Curatter , Carbodan
69	azobenzene	Azofume, Diazene
70	chlordimeform	Fundal, Galecron
71	cyhexatin	Acarstin , Aracnol F, Mitacid
72	cyhexatin	Acarstin , ArancolF
73	dienochlor	Pentac
74	propargite	Omite
75	aldicarb	Temik
76	aldoxycarb	Standak
77	fensulfothion	Dasanit, Terracur P
78	oxamyl	vydate

NO	COMMON NAME	TRADE NAME
79	phorate	Agromet
80	triazophos	Hostathion
81	DNOC	Ibertox, Trifocide, Trifrina
82	pentachlorophenol	Dowcide, Penta, Penchlorol
83	tar oil	Cade Oil
84	methiocarb	Mesurol
85	calcium arsenate	Chip-Cal, Pancal, MMA
86	1,2-dibromo-3-chloropropane (DBCP)	Nemagon, Fumazone, Nemafume
87	fenamiphos	Nemacur
88	methyl isocyanate	MIC
89	methyl isothiocyanate	Trapex
90	2-phenylphenol	Torsite, Ortho phenylphenol
91	benomyl	Benlate
92	blasticidin-S	Bla-S
93	cadmium chloride	Caddy
94	captafol	Difolaten, Difosan, Crisfolaten
95	dodine	Cyprex , Melprex, Venturol
96	edifenphos	Hinosan
97	ethyl mercury chloride	Ceresan, Hexasan
98	hexachlorobenzene	Anticarie, Co-op-hexa, Sanocide

NO	COMMON NAME	TRADE NAME
99	mercuric chloride	Corrosive sublimate, Fungchex
100	mercuric oxide	Mecuric Oxide Red
101	methyl mercury hydroxide	Methylmercury hydroxide
102	oxine-copper	Quinolate
103	phenylmercury acetate	Agrosan, Unisan
104	phenylmercury salicylate	Phenylmercury Salicylate
105	mercurous chloride	Calomel, Turf fungicide
106	phenylmercury acetate	Unisan
107	calcium polysulfide	Lime Sulfur

ANNEX 2

LIST OF STAKEHOLDERS CONSULTED

Ministry of Tourism
Maldives Police Services
Health Protection Agency
Ministry of Defence
Marine Research Centre
State Electric Company Limited (STELCO)
Male' Water and Sewerage Company (MWSC)
Energy Department/MEE
Water and Sanitation Department/MEE
Local Government Authority
PESTEX Maldives
Maldives Energy Authority
Laamu Atoll Council
Maldives Customs Services
Maldives Food and Drug Authority
Ministry of Fisheries and Agriculture
Maldives National Defence Force
Maldives National University
Thilafushi Cooperation
Environmental Protection Agency
Waste and Pollution Control Department/MEE
Attorney General's Office
Transport Authority
Ministry of Health
FENAKA Cooperation
Addu City Council
Southern Maldives, Addu City
Hulhumeedhoo Hospital
Maldives Road Development Cooperation
ADK Hospital
Indira Gandhi Memorial Hospital
Kulhudhuffushi Regional Hospital
Kulhudhuffushi Island Council
Fuvahmulah Regional Hospital
Fuvahmulah island Council

ANNEX 3

CLASS	SOURCE CATEGORIES	POTENTIAL RELEASE ROUTE (MG TEQ/T)					PRODUCTION	ANNUAL RELEASE G TEQ/A				
		AIR	WATER	LAND	PROD-UCT	RESI-DUE	t/a	AIR	WATER	LAND	PROD-UCT	RESI-DUE
	Open burning processes											
	Biomass burning						0	0.000	0	0.000	0	0
1	Agricultural residue burning in the field of cereal and other crops stubble, impacted, poor burning conditions	30	ND	10	NA	NA		0.000		0.000		
2	Agricultural residue burning in the field of cereal and other crops stubble, not impacted	0.5	ND	0.05	NA	NA		0.000		0.000		
3	Sugarcane burning	4	ND	0.05	NA	NA		0.000		0.000		
4	Forest fires	1	ND	0.15	NA	NA		0.000		0.000		
5	Grassland and savannah fires	0.5	ND	0.15	NA	NA		0.000		0.000		

CLASS	SOURCE CATEGORIES	POTENTIAL RELEASE ROUTE (MG TEQ/T)					PRODUCTION	ANNUAL RELEASE G TEQ/A				
		AIR	WATER	LAND	PROD-UCT	RESI-DUE	t/a	AIR	WATER	LAND	PROD-UCT	RESI-DUE
	Waste burning and accidental fires						130,971	39.291	0	1.310	0	0
1	Fires at waste dumps (compacted, wet, high Corg content)	300	ND	10	NA	NA	130,971	39.291		1.310		
2	Accidental fires in houses, factories	400	ND	400	NA	NA		0.000		0.000		
3	Open burning of domestic waste	40	ND	1	NA	NA	0	0.000		0.000		
4	Accidental fires in vehicles (per vehicle)	100	ND	18	NA	NA		0.000		0.000		
5	Open burning of wood (construction/ demolition)	60	ND	10	NA	NA		0.000		0.000		
	Open Burning Processes							39.291	0	1.31	0	0.000

BIBLIOGRAPHY

CDE, 2011. Environmental and Social Baseline Assessment of Thilafushi Waste Management Facility

Colombo, A, Bettinetti, R, Strona, G, Cambria, F, Fanelli, R, Zameer, Z & Galli, P 2014, 'Maldives: An archipelago that burns. A first survey of PCDD/Fs and DL-PCBs from human activities', Science of the total environment, vol. 497-498 (2014), pp. 499-507.

Guidance for Developing, Reviewing, and Updating a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants, UNEP, 2012

Maldives Energy Authority 2014, 'Maldives Energy Supply and Demand Survey 2010 - 2012', Male', Maldives.

Maldives Energy Authority 2014, 'Maldives Energy Supply and Demand Survey 2010 - 2012', Male', Maldives.

Ministry of Tourism 2014, 'Tourism Yearbook 2014', Male', Maldives.

National Bureau of Statistics 2016, Statistical Yearbook, Male' Maldives.

National Strategy for Sustainable Development, MHTE, 2009

Peterson, C. 2013. Assessment of Solid Waste Management Practices and Its Vulnerability to Climate Risks in Maldivian Tourism Sector. http://tourism.gov.mv/downloads/tap/2014/Solid_Waste.pdf.

The Maldives Health Statistics, 2013.
http://health.gov.mv/publications/25_The_Maldives_Health_Statistics_2013_FINAL_18th_December_2014.pdf

Third National Environmental Action Plan, MHTE, 2009

United Nations Environment Programme 1999, 'Guidelines for identification of PCBs and PCB containing materials', First Issue, August 1999, UNEP Chemicals.

United Nations Environment Programme 2003, 'PCB Transformers and Capacitors from Management to Reclassification and Disposal', First Issue, UNEP Chemicals.

World Bank. 2012. Maldives - Ari Atoll Solid Waste Management Project. Washington DC; World Bank. [Available at: http://documents.worldbank.org/curated/en/2012/11/18190609/maldives-ari-atoll-solid-waste-management-project]

Waste from Health care activities, WHO Media center, www.who.int/ediacetre/factsheets/fs253/en