



**BASELINE ASSESSMENT
ON NATIONAL USE OF CHEMICALS AND
ASSOCIATED RISKS 2022**



Ministry of Environment,
Climate Change
and Technology



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Foreword



The Maldives is highly dependent on import-based development pathways. Imports ranging from plastic packaging to electronic products and agricultural as well as industrial chemicals are increasing.

Sound management of chemicals is critical for the protection of our biodiversity and wellbeing of our people. This is especially true given the vulnerability of our nation's ecosystems and most importantly biodiversity resources to the impacts of climate change.

The agriculture, health, energy and transport, tourism, food and fish processing, construction and boat-building sectors are the largest consumers of chemicals in the Maldives. Overall, the total value of chemical imports indicates a steady increase in all sectors from 2017 to 2021 except for 2020, the statistics for which are attributed to the COVID-19 pandemic and its vast economic repercussions.

Despite the progress made in managing chemicals through national and stakeholder action, international treaties and voluntary instruments, our country faces mounting challenges in the sound management of chemicals due to the lack of a legal framework and deficiencies in critical scientific research and data.

The current profile has been prepared through active participation and extensive consultation among relevant stakeholders. I would like to extend my sincere thanks to everyone involved in the undertaking of this assessment and look forward to the successful development of many concrete and substantive actions based on the findings of this profile. My hope is that this

Aminath Shauna,
Minister

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Contents

Contents	07
List of Figures	09
List of Tables	09
Abbreviations	11
Executive Summary	13
1. Introduction	16
1.1. Objectives of the assessment	17
2. Background Information	19
2.1. Economic Sectors	20
3. Study Approach and Method	22
3.1. Inception Meeting	22
3.2. Desk Review	22
3.3. Secondary data	23
3.4. Questionnaire Formulation	25
3.5. Bilateral Stakeholder Meetings	25
3.6. Interviews with industries and end users	26
3.7. Validation Workshop	28
4. Policy Direction and Development	29
4.1. Obligations under International Conventions and Agreements	29
4.2. Legislative and Regulatory Framework	35
4.3. Coverage of chemical lifecycle stages by existing legal instruments	43
5. Institutional Framework and Mechanisms	44
5.1. Responsibilities of Relevant Ministries and Agencies	44
5.2. Mechanism for Import of Chemicals	46
5.3. Responding to chemical related emergencies and incidents	50
6. Core areas of Chemical Management: Imports	53
6.1. Total Chemical Imports Expenditure	53
6.2. Major Countries of Import	55
6.3. Organic and Inorganic Chemical Imports	56

7. Core Areas of Chemical Management: Consumption of Chemicals by Major Sectors and Associated Risks	58
7.1. Agriculture Sector	58
7.2. Health Sector	67
7.2.1. Energy and Transport Sector	69
7.3. Tourism sector	71
7.4. Food and Fish Processing Sector	74
7.5. Construction and Boat Building	76
7.6. Educational sector and laboratory services	78
8. Storage and Transportation of Chemicals	80
9. Management and Disposal of Chemical Waste	82
10. Chemical related Incidents	84
11. Initiatives by Stakeholders on Chemical Management	86
12. Sound Management of Priority Carcinogenic and Highly Toxic Chemicals	87
12.1. Inventory of Carcinogenic Chemicals	88
12.2. Other Highly Toxic Chemicals	94
12.3. Occupational Exposure and Challenges	96
13. Key Challenges in Sound Management of Chemicals	97
14. Recommendations	101
Bibliography	102
Annex A: Guiding Questionnaires used for data collection	106

List of Figures

Figure 1	Nominal GDP percentage share of Maldives for 2021	21
Figure 2	Greenhouse gas (GHG) emissions by sector, Maldives, 2019	21
Figure 3	Maldives permit approval procedure for chemicals imports	48
Figure 4	Quantity of organic and inorganic fertilisers imported to the Maldives from 2017 to 2021	58
Figure 5	Pesticides imported to the Maldives from 2017 to 2021	61
Figure 6	Pharmaceuticals imported to the Maldives from 2017 to 2021	68
Figure 7	Major categories of petroleum and petroleum products imported to Maldives in 2021	70
Figure 8	Petroleum and petroleum products imported to the Maldives from 2017 to 2021	70
Figure 9	Categories of chemicals imported to the Maldives from 2017 to 2021 by the tourism sector	74

List of Tables

Table 01	Description of HS codes from chapters 27 to 38	24
Table 02	List of government and public stakeholders consulted	26
Table 03	List of key economic sectors in the Maldives	27
Table 04	List of industries and end users consulted	28
Table 05	Key international conventions related to hazardous chemicals and waste ratified or to be ratified by the Maldives	29
Table 06	Summary of SDG goals and targets related to chemicals management	34
Table 07	Overview of current legal instruments related to chemical management and use in the Maldives	36
Table 08	Scope of legal instruments applicable to chemical management	43
Table 09	Key institutions directly or indirectly involved in the management of chemicals	44
Table 10	Value of chemical imported in to the Maldives from 2017 to 2021	54

Table 11	Top ten countries of chemicals imports to the Maldives in 2021	55
Table 12	Major imports of organic and inorganic chemical to the Maldives in 2021	56
Table 13	Types of chemical fertiliser groups imported to the Maldives in 2021	59
Table 14	Pesticides imported to the Maldives from 2017 to 2021, in weight or volume	60
Table 15	Agricultural pesticides distributed to farmers by AgroNAT from January to October 2022	61
Table 16	Summary of information from interviews with businesses and end-users in agriculture sector	64
Table 17	Quantity of pharmaceuticals imported to the Maldives from 2017 to 2021	68
Table 18	Approvals or licences granted in 2019 and 2020 for pharmaceutical products and veterinary medicine	69
Table 19	Total quantity and value of chemicals imported by the tourism sector from 2019 to 2021	72
Table 20	Summary of Information from interviews with large scale fish processing businesses	75
Table 21	Categories of chemical products imported by the boat building sector in 2021	76
Table 22	Summary of Information from interviews with the boat building sector	77
Table 23	Chemical related incidents and accidents reported from 2016 to 2021	84
Table 24	Amounts of potentially carcinogenic pesticides issued imported permits to the Maldives in 2021	90
Table 25	Amounts and value of asbestos products imported in to the Maldives from 2017 to 2021	92
Table 26	Sheets of asbestos-cement and corrugated sheets of asbestos-cement imported to the country Maldives from 2017 to 2021	93

Abbreviations

CFL	Compact Fluorescent Lights
EPA	Environmental Protection Agency
ETL	Economic Threshold Level
FAO	Food and Agriculture Organization
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEF	Global Environment Facility
HPA	Health Protection Agency
IARC	International Agency for Research on Cancer
IGMH	Indhira Gandhi Memorial Hospital
MCAA	Maldives Civil Aviation Authority
MCS	Maldives Customs Service
MED	Ministry of Economic Development
MFDA	Maldives Food and Drug Authority
MIA	Minamata Initial Assessment
MIFCO	Maldives Industrial Fisheries Company
MNDF	Maldives National Defence Force
MoD	Ministry of Defence
MoECCT	Ministry of Environment, Climate Change and Technology
MoFMRA	Ministry of Fisheries, Marine Resources and Agriculture
MoH	Ministry of Health
MoT	Ministry of Tourism
MoTCA	Ministry of Transport and Civil Aviation
MPL	Maldives Ports Limited
MPS	Maldives Police Service
MVR	Maldivian Rufiyaa
MWSC	Malé Water and Sewerage Company
NDA	National Drug Agency
NDMA	National Disaster Management Authority
NIP	National Implementation Plan

OC	Organochlorine pesticides
OEL	Occupational Exposure Limit
OPCW	Organization of Prohibition of Chemical Weapons
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzodioxins
PIC	Prior Informed Consent
POPs	Persistent Organic Pollutants
SAP	National Strategic Action Plan
SDG	Sustainable Development Goals
SOP	Standard Operating Procedure
STELCO	State Electric Company
STO	State Trading Organisation
UNODC	United Nations Office on Drugs and Crime
WAMCO	Waste Management Corporation Limited
WHO	World Health Organization

Executive Summary

This report provides an overview of the overall landscape of chemicals consumption and management in the Maldives. It acts as a referential source for trends in the usage of chemicals in all major economic sectors and the associated environmental and health risks. This baseline assessment report supplements the National Chemical Profile developed in 2015 and maps agencies and major sectors that are relevant to chemical management and consumption. It compiles the analysis of available secondary and qualitative data acquired through government institutions, bilateral meetings and interviews held with relevant stakeholders, businesses and end-users. The data was then validated through the feedback received and a stakeholder validation meeting.

Maldives import a diverse range of chemicals for various applications broadly categorised as fertilizers, pesticides, petroleum or petroleum products, pharmaceuticals, industrial chemicals, consumer chemicals, explosives and other chemicals falling under Chapters 27 to 38 of the Harmonized Commodity Description and Coding System. In 2021, the gross value of the overall chemical imports to the country surpassed MVR 10 billion. While petroleum and petroleum products accounted for 70% (MVR 6,992 million) of imports, pharmaceuticals (MVR 880 million) and consumer chemicals (essential oils, perfumery, and cosmetics) accrued MVR 550 million. The most frequently imported chemicals were chlorine, commonly used as a water disinfectant, and monosodium glutamate, used as a flavouring agent in the food industry, amounting to a total of over 100 tonnes in 2021.

The largest chemicals consumers in the Maldives include key economic sectors; agriculture, health care services, energy and transport, tourism, food production, construction, and boat building. In general, the total value of chemicals imports shows a steady increase in all sectors from 2017 to 2021 apart from 2020, which is attributed to the COVID-19 pandemic and its impact on businesses. In 2020, a dramatic increase was noted for the import of disinfectants with a steady increase in the demand for pharmaceuticals and fertilisers imports.

Fertilisers and pesticides are the most common chemical applications in agriculture. In 2021, imported chemical fertilisers totalled 1,393.70 tonnes, consisting mainly of nitrogenous fertilisers and NPK fertilisers fortified with microelements. Pesticides in the categories of fungicides, herbicides, anti-sprouting products and plant-growth regulators, rodenticides, insecticides, and disinfectants were imported, with the latter three recording considerable consumption in tourism, industrial application, and domestic use. Excluding disinfectants, the bulk of pesticides imported were insecticides, with nearly a five fold increase from 2017 to 2021.

While pharmaceutical imports increased from 297.71 tonnes in 2018 to 1,071.83 tonnes in 2020, by 2021, the volume of imports rose by a significant margin due to a large number of COVID-19 vaccine imports. Over the last five years, there was a steady increase in the number of petroleum products with the exception of 2020, when the COVID-19 pandemic halted commercial activities.

Tourism being the country's major economic sector, was responsible for the import of a wide range of chemicals in 2021, including tanning and dyeing chemicals (48%), fertilisers (17%), pesticides (9%) and albuminoidal substances (9%). A total of 1,713.58 tonnes of chemicals were imported for the boat building sector in the same year, most of which were resins (618.93 tonnes), gelcoats (166.84 tonnes) and hardeners (1.70 tonnes) and bonding agents. A relatively small amount (12.15kg and 9.08l) of chemicals were imported for educational purposes. The quantity of chemicals issued import permits for laboratory analytical work amounted to 30,270.55l and 120.59kg, consisting mainly of solvents such as ethanol, methanol, and reagent alcohol. Nevertheless, data gaps in the consumption and management of chemicals in various economic sectors impaired detailed analysis of life cycle management.

Priority carcinogenic and highly toxic chemicals that are currently imported to the Maldives based on International Agency for Research on Cancer (IARC) include pesticides classified as potential human carcinogens, asbestos in several forms imported for use by the construction sector, styrene consumed by the boat building industry, formaldehyde, and minute amounts of compounds on nickel, cadmium and chromium (IV). From over 14 types of potentially carcinogenic pesticides imported in 2021, cypermethrin (2764l) was the most significant. Asbestos products worth MVR 71.80 million were imported across 2017 to 2021, mainly in the form of asbestos-cement sheets (21,7661.20 m²). In addition, 1,355kg of styrene, a possible carcinogen, was imported in 2021 for use in boat building. With the considerable amounts of potentially carcinogenic and toxic chemicals being consumed, stringent regulation is required to limit occupational exposure to hazardous chemicals.

There are considerable impediments to the sound management of chemicals in the Maldives, in particular, the absence of an overarching chemical legislation and the fragmented institutional framework for the lifecycle management of chemicals. However, efforts are underway to strengthen the legal framework, including the development of a 'Hazardous Chemicals Management' Bill. The lack of a centralised data management system presents another critical barrier, with chronic gaps in the available data especially in relation to usage and disposal of chemicals. Limitations in terms of suitable resources, inadequate technical competence, and infrastructural, financial, and institutional capacity have also proved challenging.

There is an urgent need to build infrastructure for chemical waste storage and disposal. Inadequate local capacity for testing chemicals to support enforcement and monitoring is another major impeding factor. It is crucial to raise awareness and understanding on the importance of sound chemicals management at all levels. There is a dearth of information and research in the area to support better policies for improved management of chemicals.

The failure of businesses and individuals to adhere to occupational health and safety best practices and unsatisfactory enforcement of the standards are major concerns for increased occupational exposure to carcinogenic and toxic chemicals.

The assessment elucidates and report overall gaps and challenges for the sound management of chemicals in the Maldives. It proposes recommendations for future improvement based on the observed limitations.

1. Introduction

The sound management of chemicals and wastes are major cross-cutting factors affecting the achievement of the 2030 Agenda for Sustainable Development as it contributes to most of the Sustainable Development Goals (SDGs)¹. Although chemicals are essential for advancement of the world economies, the pollution resulting from their use is responsible for key environmental crises witnessed across the globe, impacting ecosystems and human health. A complex interlinkage between climate change, chemical pollution and biodiversity loss is evident, as the emission of hazardous chemicals directly contribute to climate change. Chemical pollution is a major driver of biodiversity loss due to their persistent toxicity to the environment and associated organisms. Climate change compounds the damage by making ecosystems increasingly sensitive to chemical pollution and amplifying the release of pollutants to the environment².

The State of the Environment Report of Maldives has identified the inadequate management of waste and chemicals as a pressing environmental concern³. In 2019, the total waste generated in the country reached an estimated 432,792 tonnes and projections at the time suggested an increase of 4% each year⁴. Hazardous wastes and plastic wastes accounted for approximately 1.41% and 4.33% of the waste from the residential islands of Maldives, respectively⁵. The dispersed nature of the islands of the Maldives and logistical difficulties in transportation makes environmentally sound disposal of the waste challenging, especially dealing with hazardous wastes. This problem is exacerbated by the current waste disposal practices in the islands, including open-burning or dumping and stockpiling near the shoreline, which are likely to result in toxic chemicals and waste ending up in the ocean.

Although there is no production of chemicals in the country, increase in import and consumption was observed following the expansion and diversification of economic activities. From 2010 to 2014, the expenditure on chemical imports saw an average increase of 26.21% per year⁶. In addition, the absence of an overarching legislation and fragmented structure of governance in relation to chemicals management continues to impede sound management of chemicals in the Maldives.

¹ UNEP. (2022). Sound Management of Chemicals and Waste Factsheet.

² Groh, K., Vom Berg, C., Schirmer, K., & Tlili, A. (2022). Anthropogenic Chemicals as Underestimated Drivers of Biodiversity Loss: Scientific and Societal Implications. *Environmental Science & Technology*, 56 (2), 707-710.

DOI: 10.1021/acs.est.1c08399

³ MEE (2017). *State of the Environment Report 2016*. Ministry of Environment, Maldives.

⁴ Moosa, L. (2021). *Maldives National Waste Accounts 2018 & 2019*.

⁵ Shumais, M., Riyaz, M., & Leeza, A. (2022). *Waste Audit for Residential Islands in Maldives*. Geotech Maldives.

⁶ Ministry of Environment (2015) Maldives National Chemical Profile 2015

However, substantial efforts were made to improve the situation, including the enactment of pesticide legislation, hazardous chemical regulations and the 'Hazardous Chemical Bill' (currently under development)⁷.

To address the associated environmental and human health risks, the government has taken several steps to manage the growing chemicals and waste management challenges. Maldives is a party to a number of chemicals related conventions, including ratifying the Stockholm Convention on Persistent Organic Pollutants in 2006 and submitting its National Implementation Plan (NIP) in 2017.

This assessment contributes to the project "Eliminating Persistent Organic Pollutants through Sound Management of Chemicals" supported by United Nations Development Programme (UNDP) through the Global Environment Facility (GEF) and implemented by the Ministry of Environment, Climate Change and Technology. It also supplements the National Chemical Profile 2015⁸ with efforts to ensure the establishment of an environmentally sound and robust mechanism for chemicals management in the country.

1.1. Objectives of the assessment

The baseline assessment provides an overview of the overall landscape of national chemicals usage and management, acting as a referential source for the trends in the usage of chemicals and associated risks in all major industries in the Maldives. As such, this study explores the imports and consumption patterns of chemicals in the major economic sectors together with their associated risks on the environment and human health. High priority concerns related to the most prevalently consumed chemicals were evaluated across all stages of life cycle including imports, storage, transportation, usage, and disposal. In addition, the assessment reviewed current mechanisms for life cycle management of chemicals, including relevant legislations and institutional framework.

⁷ MoECCT (2021) *Desktop Review Report: Developing and Overarching Chemicals Management Bill for The Maldives*

⁸ Ministry of Environment. (2015). *Maldives National Chemical Profile 2015*.

<http://www.environment.gov.mv/v2/wp-content/files/publications/20161107-pub-mv-nat-chem-profile-nov2016.pdf>

Specific objectives of the assessment are to:

- identifying all major industries, sectors and stakeholders based on usage of chemicals,
- systematically assessing the relevant industries, sectors and stakeholders and evaluate common chemical consumption patterns and practices,
- conducting a comprehensive desk review of all relevant documents such as related literature, relevant government policy documents, import and export data of chemicals and all other related policies, plans and practices regarding chemicals usage in various sectors,
- identifying potential environmental and health risks associated with specific uses of chemicals, and
- determining key challenges for the sound management of chemicals in the Maldives.

2. Background Information

The Maldives is an archipelago in the Indian Ocean comprising of 1,190 coral islands that are grouped into 26 natural atolls. This narrow chain of islands stretches over 820km from north to south, and 130km from east to west. One of the most geographically dispersed nations in the world, the territory of Maldives is mainly made up of sea with only 1.4% land area. With a maximum natural elevation of 2.4 m and average elevation of 1.5 m above sea-level, it is also one of the lowest-lying countries in the world.

The country's coral reef system covers more than 21,000 km² and is the seventh largest reef system in the world as well as the largest in the Indian Ocean. The geographical makeup of the islands varies in terms of size, shape and vegetation with island sizes ranging from 0.5 km² to 5 km².

All Maldivian islands, other than the capital city (the greater Malé area), are divided administratively into 20 atolls of which 189 are inhabited islands, 164 are tourist resorts and 128 are leased for industrial or other activities. According to statistics from 2019, the total population of the country was 533,900, dispersed across the inhabited islands.

Due to its proximity to the equator, Maldives is characterized by a warm and humid tropical monsoonal climate. The southwest monsoon (the wet season) extends from May to November, while the relatively dry northeast monsoon is from January to March. The islands experience little variation in temperatures throughout the year with an annual mean temperature of 28°C and relative humidity varies from 71% to 84%. Variations in rainfall exist from the north to the south; the former drier while the latter is distinguished by high precipitation, with rainfall at an annual average of 1,786mm and 2,277mm respectively.

The geographic nature of the Maldives forces human settlement and economic activities to be built along the coastline, which exposes island communities to hazards such as coastal erosion, flooding, and extreme weather events. The effects of such calamities are worsened by climate change impacts combined with poorly planned coastal developments. Small, morphologically unstable islands featuring living coral reef platforms and precarious groundwater systems, like in the Maldives, are highly susceptible to even minor changes in climatic patterns. As one of the lowest countries in the world, it faces risk of sea-level rise, coastal storm surges, and associated flooding. Maldives is highly vulnerable not only because of its geographic disposition but also due to political and social factors, elevating the issue to an existential threat⁹.

⁹ Climate Risk Country Profile: Maldives (2021). The World Bank Group and the Asian Development Bank.

2.1. Economic Sectors

Akin to other Small Island Developing States, Maldives experiences unique challenges to sustainable development. Yet, mainly to its rapidly developing tourism sector, the country has seen considerable economic advancement over the last few decades. The Maldivian economy has shown a positive growth rate from 2016 to 2021 with the exception of a decline in 2020 attributed to the COVID-19 pandemic, with the GDP for the year 2021 at MVR 72,813 million. Tourism contributed to 21.4% of the gross GDP in 2021 (Figure 1)¹⁰, a key representation supplemented by the transportation and communication sector, public administration, wholesale and retail trade, real estate, as well as financial services. Economic sectors such as construction, fisheries, manufacturing, and agriculture made a comparatively lower contribution to the GDP. However, for generations, the livelihoods of local island communities have been mainly dependent on fisheries and agriculture to ensure food security and decrease reliance on imports¹¹.

The economy of Maldives is particularly vulnerable to external shocks such as the recent pandemic due to its mounting dependency on international tourism and heavy reliance on commodity imports. This is compounded by Maldives' vulnerability to the impacts of climate change and other natural disasters. Given that economic sectors such as tourism and fisheries are highly dependent on the country's marine resources and pristine environment, protecting them from pollution is of utmost importance.

¹⁰ Gross Domestic Product (2021). Maldives Bureau of Statistics, www.statisticsmaldives.gov.mv

¹¹ Ministry of Fisheries, Marine Resources and Agriculture (2019). National Fisheries and Agricultural Policy 2019 - 2029.

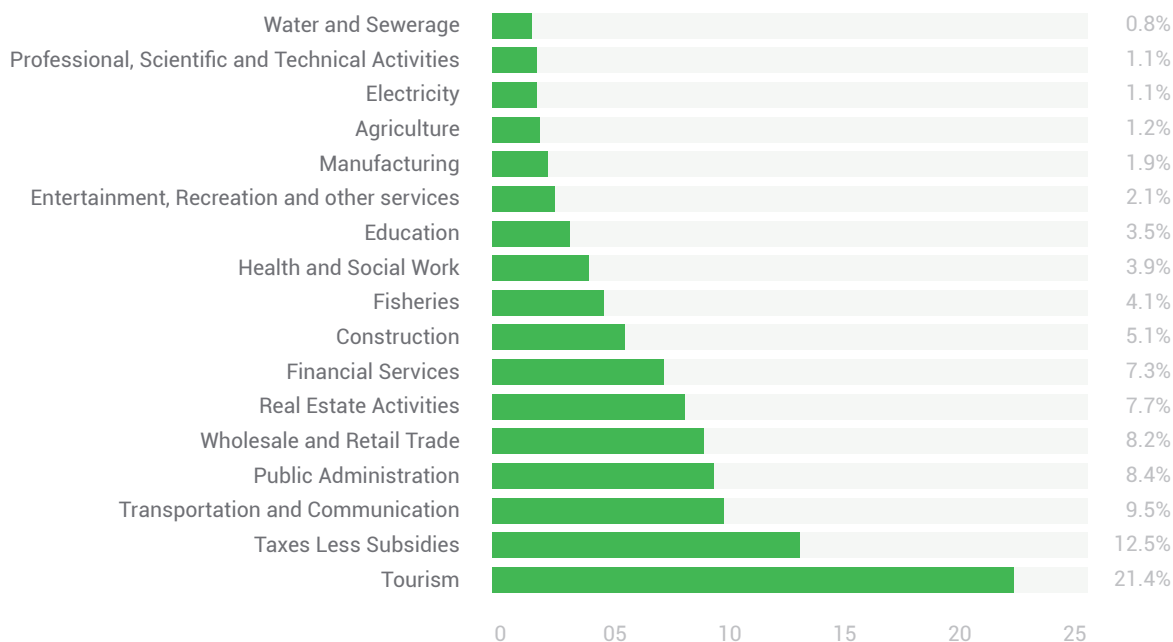


Figure 1 Nominal GDP percentage share of Maldives for the year 2021¹²

Several key economic sectors of the country are major contributors to chemical waste and resulting pollutants. Figure 2 depicts greenhouse gas (GHG) emissions by sector in the Maldives across 2019. The highest contributing sector for 2019 was transport, with 42.21% of total yearly emissions adding up to 1.22 million tonnes. The waste sector also contributed a significant 140,000 tonnes of emissions. In addition, chemical waste and emissions from economic activities have the potential to pollute soil, water and the marine environment.

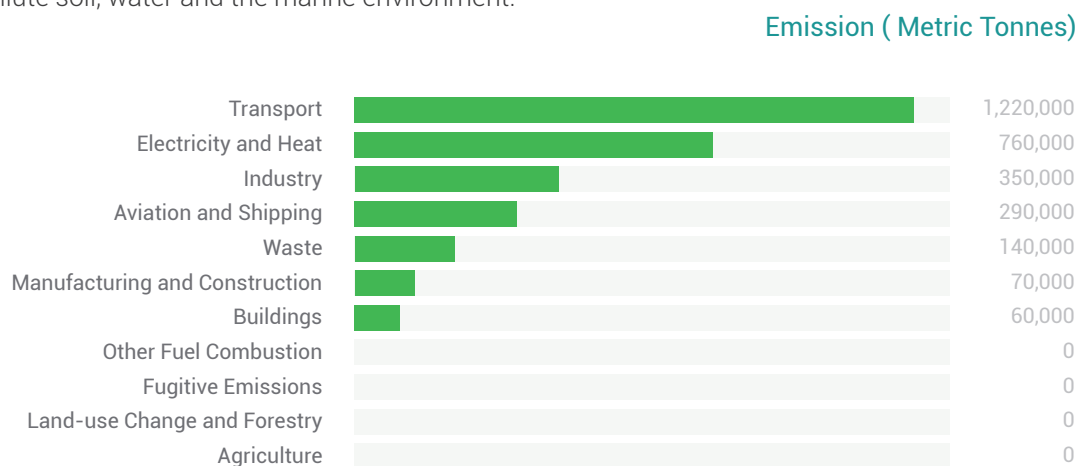


Figure 2 Greenhouse gas (GHG) emissions by Economic sector, Maldives, 2019¹³

¹² Gross Domestic Product (2021). Maldives Bureau of Statistics, www.statisticsmaldives.gov.mv

¹³ Our World in Data (2019). *Greenhouse gas emissions by sector, Maldives, 2019.*

<https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=latest&country=~MDV>

3. Study Approach and Method

3.1. Inception Meeting

An initial inception meeting was held with the Ministry of Environment, Climate Change and Technology (MoECCT), to discuss the scope of work and present a detailed work plan as well as proposed method for the baseline assessment. The study design adopted for the assessment is as follows:

- Undertake a comprehensive desk review through collection and systematic review of existing information and literature pertinent to usage and management of chemicals
- Identify agencies responsible for chemical management and major sectors and stakeholders importing and consuming chemicals
- Acquire and analyse any secondary data available including chemical import, approval and usage data
- Carry out collection of qualitative data through bilateral meetings and interviews with relevant agencies and stakeholders using guiding questionnaire
- Carry out data collection from the major industries and end users through interviews, discussions and site visits for verification of data using guiding questionnaires
- Analyse the primary and secondary data and validate the findings reported through a stakeholder meeting and feedback from relevant stakeholders

3.2. Desk Review

A comprehensive desk review was carried out to provide an understanding of the background information available for this assessment including the collection and systematic review of existing literature, policy documents, technical reports, papers, plans and grey literature pertinent to the management and use of chemicals in the Maldives. Key agencies engaged in chemicals management and major sectors consuming chemicals were identified. In addition, current gaps in the available materials were taken into consideration during the next stages of assessment and in data collection activities.

Key documents and information that were reviewed (but was not limited to) include:

- The Strategic Action Plan 2019 – 2023 (SAP),
- Maldives National Chemical Profile 2015,
- State of the Environment Report 2016,
- Export Import Act (Law no: 31/79),
- Import Prohibition Act (Law no: 4/75),
- National Implementation Plan (NIP) 2017 for the Stockholm Convention,
- Minamata Initial Assessment Report 2019,
- Technical Report- Drafting an Overarching Chemicals Management Bill for Maldives,
- Incident reports related to chemicals incidents- from MNDF Fire and Rescue Services

3.3. Secondary data

The assessment included collection and analysis of available secondary data relevant to import and management of chemicals. This included:

- Import data for the year 2017 to 2021 from the Maldives Customs Service for:
 - Mineral fuels, mineral oils, and products (HS code Chapter 27)
 - Chemicals and chemical products (HS Code Chapters 28 to 38)
 - Products containing asbestos (under HS Code Chapter 68)
 - Chemicals and chemical products for the tourism industry
- Chemicals Import permits issued for 2018 to 2021 from the Ministry of Defence
- Agricultural pesticide supply and usage data from January to September 2022 from the Agro National Corporation (AgroNAT)
- Chemical related incidents reported from 2016 to 2021 from MNDF
- Medicine disposal data from 2019 to 2021 from Maldives Food and Drug Authority
- Lists of banned and approved pesticides from Ministry of Fisheries, Marine Resources and Agriculture

Import data from the Maldives Customs Service database was the main source of reliable data that was available and therefore evaluated. In the absence of dedicated databases for supply and usage of chemicals in the country, information on the chemicals usage and trends was determined based on the import data. The wide range of chemicals imported were classified according to the Harmonized Commodity Description and Coding System (HS) and the items falling under HS Codes of Chapters 27 and Chapters 28 to 38 were also analysed. Chapter 27 is dedicated to mineral fuels, mineral oils, and products while Chapters 28 through 38 (11 chapters) cover chemicals and chemical products listed in Section VI of the Harmonized System – Products of the Chemical or Allied Industries. Data fields include year, HS Code, HS Description of product, Country of Consignment, Quantity (weight or volume or number), Unit and CIF (MVR) value. Details of the Chapters (Table 1) are as follows.

Table 1 Description of HS codes from chapters 27 to 38¹⁴

CHAPTER NO.	DESCRIPTION
Chapter 27	Mineral fuels, mineral oils and products of their distillation; Bituminous substances; mineral waxes.
Chapter 28	Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes.
Chapter 29	Organic chemicals
Chapter 30	Pharmaceutical products
Chapter 31	Fertilisers
Chapter 32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter; paints and varnishes; putty and other mastics; inks
Chapter 33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations.
Chapter 34	Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, "dental waxes" and dental preparations with a basis of plaster
Chapter 35	Albuminoidal substances; modified starches; glues; enzymes
Chapter 36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations
Chapter 37	Photographic or cinematographic goods
Chapter 38	Miscellaneous chemical products

Import permits issued for 2021 was analysed for specific chemical categories. Import permit data from previous years, although available, were not consistently recorded and hence not considered for the purposes of this assessment report.

¹⁴ International Trade Administration: Harmonized System (HS) Codes. <https://www.trade.gov/harmonized-system-hs-codes>

3.4. Questionnaire Formulation

Guiding questionnaires were formulated to address gaps identified in the desk review, to collect qualitative information from stakeholders via bilateral meetings and interviews. This included a separate set of questions for agencies engaged in chemicals management and another questionnaire designed for businesses and end-users. Overall, these questionnaires act as guiding instruments, although some questions were tailored for specific agencies depending on their role. The questionnaires used for the data collection process is attached in Annex A of this document.

3.5. Bilateral Stakeholder Meetings

Technical bilateral discussions were conducted with key stakeholders to better comprehend the present context of chemicals import and usage, chemicals management practices and associated risks. In general, agencies were questioned on their mandates and roles in chemical management, monitoring mechanisms, challenges in regulation and enforcement, technical capacity, trainings, awareness programmes, reported incidents, risks and safety requirements as well as their recommendations to improve the current practices. Furthermore, specifically tailored questions were used to extract additional information from selected stakeholders based on their role in chemicals management.

In addition, relevant state-owned companies were inquired about the types of chemicals imported and consumed, their application, storage, handling and safety practices and technical expertise available, and arrangements for disposal of chemicals. They were also invited to share experience of any chemical related incidents and the lessons learnt. The companies were also requested to provide any available data that was highlighted during the discussions.

Table 2 List of government and public stakeholders consulted

STAKEHOLDERS GROUP	STAKEHOLDERS DETAILS
Approval Authorities	<ul style="list-style-type: none"> ● Ministry of Defence ● Ministry of Fisheries, Marine Resources and Agriculture ● Maldives Food and Drug Authority ● Ministry of Environment, Climate Change and Technology
Other Government Agencies	<ul style="list-style-type: none"> ● Environmental Protection Agency ● MNDF Fire and Rescue Services ● MNDF Coast Guard ● Maldives Customs Service ● Ministry of Health ● National Disaster Management Authority
State-Owned Companies (Utility and Agriculture Related Service Providers)	<ul style="list-style-type: none"> ● Fenaka Corporation Limited ● State Electric Company Limited ● Male' Water and Sewerage Company ● Agro National Corporation

3.6. Interviews with industries and end users

Key stakeholders were identified from a list of available industries in the Maldives as per the Rev 4 classification listed in the International Standard Industrial Classification of All Economic Activities (ISIC). The objective was to verify information obtained from the desk review and identify common chemicals consumption patterns and practices in the sectors. In the case of Maldives, chemicals are mainly imported by suppliers or distributors who also own outlets and services. Hence, larger businesses can directly import any chemicals they consume in their activities.

Table 3 List of key economic sectors in the Maldives

ISIC SECTION	ISIC DIVISION	ECONOMIC SECTOR	%GDP
A	01	Agriculture	1.20
A	03	Fisheries	4.10
C	10	Manufacturing	1.90
D	35	Electricity	1.10
E	36-39	Water and Sewerage	0.80
F	41-43	Construction	5.10
G	45-47	Wholesale and Retail Trade	8.20
H / J	49-53 / 58-63	Transportation and Communication	9.20
I	55-56	Tourism	21.40
K	64-66	Financial Services	7.30
L	68	Real Estate Activities	7.70
M	69-75	Professional, Scientific and Technical Activities	1.10
O	84	Public Administration	8.40
P	85	Education	3.50
Q	86-88	Health and Social Work	3.90
R	90-93	Entertainment, Recreation and other services	2.10

Total 29 parties were interviewed in person, online or via phone, details of which are provided in Table 4 below. The interviews targeted a wider coverage of businesses and end users including small scale and commercial businesses in key sectors: agriculture, tourism, boat building, industrial processing and beauty. This is to capture information related to consumption, management and risks associated with chemicals at a micro or individual level, and for larger operations.

Table 4 List industries and end users consulted

STAKEHOLDERS GROUP	STAKEHOLDERS DETAILS
Agriculture	<ul style="list-style-type: none"> ● Alividha Maldives (importer and supplier of agricultural chemicals and inputs) ● Commercial agricultural island in Noonu Atoll ● Seven farmers from residential islands
Private Pest Control Parties	<ul style="list-style-type: none"> ● PestEX Maldives Pvt Ltd (imports pesticides, protection gear and provides pest control services) ● Pesterminators (pest control and pest management services utilizing Integrated Pest Management practices) ● Prime Maldives
Food Processing Industries	<ul style="list-style-type: none"> ● Maldives Industrial Fisheries Company ● ENSIS Fisheries Pvt Ltd ● Horizon Fisheries
Fuel Importers	<ul style="list-style-type: none"> ● State Trading Organisation PLC ● Villa Gas
Boat Building	<ul style="list-style-type: none"> ● Two fibre glass boat builders from Raa Alifushi
Tourism	<ul style="list-style-type: none"> ● Sun Island Resort and Spa ● Five guest houses from Kaafu Maafushi Residential Island
Beauty and Salons	<ul style="list-style-type: none"> ● Four salons in Malé

Information was collected about the type of chemicals being used, handling and storage approaches, as well as transport and disposal methods. In addition, interviews focused on associated risks and knowledge, health and safety protocols in place, related incidents, and training of personnel in the selected businesses and uses. Representatives were also questioned on the challenges they face in relation to chemicals management and were requested to share their views about ways to improve overall chemicals use and management in the Maldives.

3.7. Validation Workshop

A stakeholder validation workshop was conducted to share and discuss findings of the assessment report and obtain feedback from major stakeholder institutions. The workshop involved discussions and feedback provided by stakeholder representatives following the presentation of each chapter. The draft report was also shared with stakeholder agencies for further comments and input.

4. Policy Direction and Development

4.1. Obligations under International Conventions and Agreements

The government of Maldives has ratified a number of international Conventions to address the environmental and health concerns posed by hazardous chemicals, as well as to promote the safe and sound management of chemicals. Table 5 summarises the major international Conventions relevant to the management and use of chemicals that have been ratified by the Maldives.

Table 5 Key international conventions related to hazardous chemicals and waste ratified or to be ratified by the Maldives

NAME OF CONVENTION & DATE OF RATIFICATION	OBJECTIVES	SCOPE
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal Adopted by the Maldives on the 27th of July 1992	To protect human health and environment against the adverse effects resulting from generation, transboundary movements and management of hazardous wastes and other wastes.	Covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic and infectious wastes and "other wastes" namely household waste, incineration residues, and plastic waste. The convention regulates the transboundary movements of hazardous wastes and other wastes and to ensure that such wastes are managed and disposed of in an environmentally sound manner.
Stockholm Convention on Persistent Organic Pollutants Ratified on 17th October 2006 and it entered into force on 15th January 2007	To reduce the risks to human health and the environment from Persistent Organic Pollutants (POPs).	Requires adopting a range of control measures to eliminate production and use of intentionally produced POPs; minimise and where feasible eliminate releases of unintentionally produced POPs. To ensure stockpiles and wastes containing POPs are managed safely and in an environmentally sound manner.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade Ratified on 17th October 2006 and entered into force on 15th January 2007	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.	Covers pesticides and industrial chemicals that have been banned or severely restricted for health or environmental concerns. Requires establishing of the Prior Informed Consent (PIC) procedure for export and import. Need to facilitate exchange of information on a broad range of hazardous chemicals.
Minamata Convention on Mercury (to be ratified, work in progress)	To reduce or control sources of mercury pollution to protect human health and the environment.	The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury.

Basel Convention

On 27th July 1992, the Maldives ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (also known as the “Basel Convention”), which regulates the transboundary movement of hazardous wastes and other wastes, and requires parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.¹⁵ The Convention covers hazardous waste (toxic, poisonous, explosive, corrosive, flammable, ecotoxic and infectious wastes) and “other wastes” (wastes collected from household, incineration residues, and plastic waste). Parties are also required to minimize the quantities of waste that are being transported, to treat and dispose of wastes as close as possible to the place of generation (origin of the waste) as well as preventing or minimising the generation of wastes.

The key obligations under Basel Convention are:

- protecting human health and the environment against the adverse effects which may result from the transboundary movement of waste,
- reducing hazardous waste and the generation of “other waste”,
- ensuring the availability of adequate disposal facilities for environmentally sound management of hazardous wastes and “other wastes”,
- reducing transboundary movement of hazardous wastes and other wastes to a minimum, and
- regulating the Prior Informed Consent (PIC) procedure which applies to cases where transboundary movement is permissible.

¹⁵ MoECCT (2021) Desktop Review Report: Developing and Overarching Chemicals Management Bill For The Maldives

Stockholm Convention

The Maldives ratified the Stockholm Convention on Persistent Organic Pollutants (also known as the “Stockholm Convention”)¹⁶ on 17th October 2006 and it entered into force on 15th January 2007. Maldives have also ratified those amendments that have been made to Annexes A, B, and C of the Convention and submitted the National Implementation Plan (NIP) on 18th July 2017, which covers the initial 12 Persistent Organic Pollutant (POPs) as well as those added in subsequent conference of the parties (COP) COP4 and COP5.

Stockholm Convention is a global effort initiated to reduce risks of POPs on human health and the environment due to their bioaccumulation and environmental persistence posed by POPs. These chemicals are widely distributed within ecosystems. Some of these include organochlorine compounds such as polychlorinated biphenyls (PCBs), organochlorine pesticides (OC), hexa- and penta-chlorobenzenes, polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), brominated flame retardants such as polybrominated diphenyl ethers (PBDEs) and polybrominated biphenyls, and per fluorinated compounds such as perfluoro octane sulfonate and perfluorooctanoic acid.

Key objectives of the Stockholm Convention include:

- protecting human health and the environment from (POPs),
- prohibiting and/or eliminating the production and use, as well as the import and export, of the intentionally, produced POPs that are listed in Annex A to the Convention,
- restricting the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention,
- reducing or eliminating releases from unintentionally produced POPs that are listed in Annex C to the Convention, and
- ensuring that stockpiles, and wastes consisting of, containing, or contaminated with POPs, are managed in an environmentally safe and sound manner.

One of the national priorities established under the National Implementation Plan to the Stockholm Convention, is to develop legislation for chemicals management and to strengthen institutional capacity with a focus on improving data collection and management systems¹⁷. There are currently no systems in place to monitor POPs, and relevant policies, guidelines, as well as standards need to be formulated.

¹⁶ Stockholm Convention of Persistent Organic Pollutants.

(Link: <http://chm.pops.int/TheConvention/Overview/tabid/3351/Default.aspx>)

¹⁷ Ministry of Environment and Energy. (2016). *National Implementation Plan to the Stockholm Convention on Persistent Organic Pollutants*.

Rotterdam Convention

Maldives is a signatory to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (also known as the “Rotterdam Convention”)¹⁸. The convention promotes informed decision-making by countries regarding hazardous chemical trade and stipulates legally binding obligations for the implementation of the Prior Informed Consent (PIC) procedure. It covers pesticides and industrial chemicals that parties have banned or severely restricted for health or environmental concerns and which they have notified for inclusion in the PIC procedure.

Key provisions under the Rotterdam Convention include:

- establishing the Prior Informed Consent (PIC) procedure,
- establishing a system in which parties seeking to export a chemical that is not listed under the Convention (but which is banned or severely restricted in its territories) must provide an export notification to the importing country of the proposed export,
- promoting shared responsibility and cooperative efforts among parties in the international trade of certain hazardous chemicals, and
- contributing to the environmentally sound use of hazardous chemicals by facilitating information exchange about their characteristics, providing for a national decision-making process on their import and export, as well as disseminating the decisions to parties.

¹⁸ Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
<http://www.pic.int/TheConvention/Overview/tabid/1044/language/enUS/Default.aspx>

Minamata Convention

Although Maldives is not yet party to the Minamata Convention on Mercury (“Minamata Convention”), preparations are underway to ratify the convention. The island nation is vulnerable to the risks of anthropogenic mercury generated by improper waste disposal practices such as open waste burning, as well as the use and disposal of mercury-containing products including batteries, paints, dental amalgamation fillings, and laboratory or medical equipment¹⁹. The Minamata Convention is a multilateral environmental agreement that obligates parties to reduce or control sources of mercury pollution to protect human health and the environment. The Convention focuses on the anthropogenic releases of mercury throughout its lifecycle to the atmosphere, soil, and water from a multitude of sources.

Key provisions under Minamata Convention include:

- imposing a ban on new mercury mines and phasing-out existing mines,
- phasing-out and phasing down the use of mercury in specific products and processes,
- implementing control measures on emissions to air and releases to land and water,
- regulating the informal sector of artisanal and small-scale gold mining, and
- addressing interim storage of mercury and its disposal once it becomes a waste, sites contaminated by mercury as well as health issues.

UN Sustainable Development Goals (SDGs)

Several SDG targets explicitly indicate chemicals under Goals 3, 6 and 12, as summarised below (Table 6). Specific targets were also set for the sound management of chemicals, focused on affordable and clean energy under SDG7, Sustainable Cities and Communities under SDG 11 and Life Below Water under SDG14.

¹⁹ Ministry of Environment. (2019). *Minamata Initial Assessment Report 2019: Maldives Mercury Assessment*. <https://www.environment.gov.mv/v2/en/download/10252>

Table 6 Summary of SDG goals and targets related to chemicals management

SDG Goal	TARGET
Goal 3: Ensure healthy lives and promote well-being for all at all ages.	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination
Goal 6: Ensure access to water and sanitation for all.	6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
Goal 12: Ensure sustainable consumption and production patterns.	12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil to minimise their adverse impacts on human health and the environment

International Health Regulations 2005 (IHR 2005)

Maldives is a member of International Health Regulations 2005 (IHR 2005)²⁰ and houses a designated IHR focal point at its Ministry of Health. IHR regulations are legally binding for all WHO member States and with a mandate "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade". Since its entry into force on 15th June 2007, the IHR directs and governs certain WHO and States Parties activity, aiming to protect the global community from public health risks and emergencies that cross international borders. The core capacities assessed for each of the five IHR (2005) hazards (infectious, chemical, zoonoses, food safety, radio-nuclear) and points of entry include national legislation and policy, coordination, surveillance, response, preparedness, risk communication, laboratory, and human resource capacity.

²⁰ World Health Organisation (2016). International Health Regulations (2005), 3rd ed
<https://www.who.int/publications/i/item/9789241580496>

In addition to the above, the Maldives is also party to the:

- Chemical Weapons Convention by the Organization of Prohibition of Chemical Weapons (OPCW),
- Vienna Convention for the Protection of the Ozone Layer,
- Montreal Protocol on Substances that Deplete the Ozone Layer, and the
- Convention on Psychotropic Substances and the Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances 1988 (UNODC).

Despite being party to a number of chemicals-related conventions and agreements, there are several factors that obstruct the Maldives from fully implementing these provisions. These include limitations in financial and institutional capacity as well as the absence of an overarching chemicals related legislation. However, there have been positive advancements in forming of policies that were developed in accordance with the international requirements. Further, the country has developed a National Implementation Plan (NIP) to facilitate the implementation of the Stockholm Convention²¹, and the Minamata Initial Assessment (MIA) was carried out to determine the present state and existing difficulties in mercury management²².

4.2. Legislative and Regulatory Framework

One of the government policy objectives in SAP is the development and adoption comprehensive laws on chemical management, covering the life cycle of chemicals²³, by the year 2023. Nevertheless, there are at present, various sectoral laws and regulations in effect that establish crucial aspects pertaining to various life cycle stages of chemicals management (Table 7).

²¹ Ministry of Environment and Energy (2016). *National Implementation Plan to the Stockholm Convention on Persistent Organic Pollutants*.

²² Ministry of Environment (2019). *Minamata Initial Assessment Report 2019: Maldives Mercury Assessment*.
<https://www.environment.gov.mv/v2/en/download/10252>

²³ MoECCT (2021) *Desktop Review Report: Developing and Overarching Chemicals Management Bill For The Maldives*

Table 7 Overview of current legal instruments related to chemical management and use in the Maldives

LEGAL INSTRUMENT	RESPONSIBLE BODIES	CATEGORY OF CHEMICALS, BY-PRODUCT OR RELATED WASTE	LIFE CYCLE STAGE COVERED	OBJECTIVES OF LEGAL INSTRUMENT
Environment Protection and Preservation Act (Law number 4/1993)	MoECCT is the primary agency mandated	Harmful waste, oil, poisonous gases and hazardous/toxic or nuclear waste	Use, Transport, Disposal	Requires the mandated government authorities to provide necessary guidelines and advice on environmental protection in accordance with the prevailing conditions and needs of the country.
Ozone Layer Protection Act (Law number 41/2015)	MoECCT MED MCS	Ozone depleting substances and devices containing ozone depleting substances	Import, Usage	Regulates usage of ozone depleting substances as well as restricts import of chemical substances and devices containing ozone depleting substances.
Import Prohibition Act (Law number 4/1975)	MoD MNDF	Chemicals, acid, poisons, toxic substances, explosives	Import, Usage, Disposal, Storage	Regulates imports of prohibited substances.
Agricultural Pesticide Control Act (Law number 21/2019)	MoFMRA	Agricultural pesticides	All stages	Regulates the management, use and distribution of agricultural pesticides with the objective of protecting human, animal and plant health and the marine and terrestrial environment.
Public Health Protection Act (Law number 7/2012)	MoH HPA	Chemicals of public health significance	All stages	Covers health risk or possibility of health risk to the people working or living in surrounding areas from any gas, smoke, chemical, radiation or vibration emitting from an inhabited or uninhabited building (allows classification as a public health risk).
Drugs Act (Law number 17/2011)	MoH NDA MCS MPS	Drug precursor chemicals, narcotic and psychotropic substances	All stages	Regulates import and licensing, producing, processing, storing and the export of precursor chemicals as well as narcotic and psychotropic substances.
Waste Management Regulation (Regulation no 2013/R-58)	MoECCT EPA	Hazardous waste (such as explosives, flammable liquid or solids, corrosives, toxic or poisonous substances or	Import, Export, Storage, Transport, Disposal	Implements national policies on waste management. Issues permits and licenses, conducts monitoring and surveillance, maintains database and keeps records.

		organic peroxides, etc) Special waste (e.g. combustible/ reactive/ corrosive/ poisonous waste)		
Hazardous Chemical Regulation (Regulation number 2019/R-1057)	MoD	Hazardous chemicals	Import, Usage, Storage, Disposal	Classifies hazardous or dangerous chemicals and sets forth the rules to be abided by importers of hazardous chemicals.
Agricultural Pesticide Control Regulation (Regulation number 2021/R-12)	MoFMRA	Agricultural pesticides	All stages	Sets forth the rules to regulate sustainable usage, sales, transportation, storage, and disposal of agricultural pesticides, while responsibly safeguarding the health and safety of all living things, including the surrounding environment.
Medicine Regulation (Regulation No R-46/2014)	MoH MFDA	Pharmaceuticals	All stages	Regulates the import, sale, handling, transport, storage, and disposal of pharmaceuticals.
Regulation on Protecting and Conservation of Environment in the Tourism Industry made pursuant to the Maldives Tourism Act (Law No. 2/99)	MoT	Toxic and hazardous waste	Disposal	Protects the environment from activities carried out in the tourism industry by providing details related to the import and usage of chemicals, management, and disposal of waste in resorts, picnic islands, marinas and other such places leased for tourism purposes.
Regulation on Handling, Usage and Storage of Petroleum Products (Regulation number 2015/R-160)	MoD	Petroleum products	Storage, Sale, Transport and Handling	Establishes a mechanism to regulate the handling, usage and storing of all petroleum products.
Regulation on Ozone Depleting Substances and Devices Containing Ozone Depleting Substances (Regulation number 2017/R-9);	MoECCT MED MCS	Ozone Depleting Substances and Devices Containing Ozone Depleting Substances	Import, Usage	Regulates the usage of substances depleting the ozone layer and on restricting the import of chemical substances that deplete the ozone layer to the Maldives
Regulation on Carriage of Dangerous Good by Air (Regulation number MCAR-18);	MCAA	Dangerous goods (explosives, gases, flammable, toxic, oxidising, radioactive and corrosive and multiple hazard material)	Transport (domestic and international)	Governs the transport of dangerous goods by air (for both domestic and international operations).

Important legal instruments that have direct or indirect implications on the usage and management of chemicals in the Maldives, throughout the various phases of its life cycle, are summarised below.

Environment Protection and Preservation Act (Law number 4/1993)

This Act contains provisions governing hazardous waste management, setting forth rules that regulate the disposal of oil and hazardous waste and identify which authorities are tasked with overseeing the mandate. Section 7 and 8 of the Act outline requirements for the disposal of any type of waste, oil, poisonous gases, hazardous/toxic or nuclear waste, or other substances that may pose harmful effects to the environment, while stipulating that such substances shall not be disposed within the territory of Maldives. If the disposal of the substances becomes absolutely necessary, the Act affirms that disposal must take place only within areas designated for such purposes by the government, having taken appropriate precautions to avoid causing harm to the population. The Act also states that permission should be obtained from the relevant authority at least three months in advance for any transboundary movement of such hazardous or nuclear wastes through the territory of the Maldives. Currently, the Ministry of Environment, Climate Change and Technology is the primary agency mandated to implement and enforce this law.²⁴

Import Prohibition Act (Law number 4/1975)

This Act outlines the restrictions and limitations placed on the import of several goods, ranging from weapons, fireworks, explosives, pornography to chemicals. The Act classifies hazardous chemicals as a controlled substance, stating that hazardous chemicals, chemical-based acids, and toxins that do not fall under the category of explosives may be imported or used in the Maldives after obtaining a special permit from the Ministry of Defence, in accordance with regulations made pursuant to the law. The Act also states that the confiscation and disposal of any hazardous chemicals that fall under the ambit of the law lies with the Ministry of Defence.²⁵

²⁴ MoECCT (2021) *Desktop Review Report: Developing and Overarching Chemicals Management Bill For The Maldives*

²⁵ Ibid.,

Agricultural Pesticide Control Act (Law number 21/2019)

This Act sets forth the rules related to the import, export, sales, production, usage, storage, and disposal of agricultural pesticides. In this regard, MoFMRA, the ministry granted legal authority by this Act, is tasked with publishing a register of approved pesticides. The Act provides licensing requirements and regulatory procedure relevant to all stages in the lifecycle of agricultural pesticides. Moreover, the Act promotes safety measures related to the use of pesticides to prevent environmental and health risks. To this end, the Act mandates the publication of a register of approved pesticides for production, use, sale, import and export in the Maldives. The law requires that, among other things, the published registry must contain the common name, scientific name, formulation, concentration, approved activities of the pesticide, and details to be contained in the label or safety data sheet provided with the product. The Act also stipulates that no persons shall use pesticide in any other way than that which is specified under said data sheet, or for any usage other than that which is provided in the data sheet, and that no person shall instruct their employees to do so as well. The Act places the onus on the person using the pesticide to take all necessary safety precautions whilst handling the pesticide.²⁶

In addition to the legislations referred above, additional laws that are related to the various aspects of chemicals management are listed below.

- The Drugs Act (Law number 17/2011) grants power to the Ministry of Health and to the National Drug Agency to regulate importing and licensing, producing, processing, storing, and exporting of precursor chemicals and narcotic and psychotropic substances.
- The Ozone Layer Protection Act (Law number 41/2015) outlines provisions on regulating the usage of substances depleting the ozone layer and on importing and restricting importation of chemical substances that deplete the ozone layer, to the Maldives.
- The Protection of Public Health Act (Law number 7/2012) states that if there is a health risk, or the possibility of a health risk, to the people working or living in surrounding areas caused by any gas, smoke, chemical, radiation, or vibration that is emitted from a building, it would be categorised as a public health risk.

²⁶Ibid.,

- The Sea Vessels Act (Law number 69/1978) confers power to the Ministry of Transport and Civil Aviation (MoTCA) to prescribe standards and procedures for the carriage of hazardous goods and waste on vessels and to regulate the discharge of waste from vessels in the marine environment of the Maldives.
- The Land Transport Act (Law number 5/2009) grants MoTCA the power to classify quality and types of vehicles to be used for waste transport, stipulating that vehicles carrying waste shall not be operated in a manner that may disturb the public or other vehicles and, that may lead to land-based waste leakage. However, the Act does not specify whether this is applicable for the general waste or that of hazardous waste.

Pursuant to these legislations, several regulations that directly and indirectly relate to the sound management of chemicals were enacted. These regulations are as follows.

Hazardous Chemical Regulation (Regulation number 2019/R-1057)

The objective of this regulation is to set forth the rules and manners under which non-explosive hazardous chemicals, such as various types of toxic chemicals including acidic formulations, can be imported, stored, and used within the territories of Maldives. The primary objectives of this regulation are to classify hazardous/dangerous chemicals and set forth the rules that must be abided by importers of hazardous chemicals. To this end, the act outlines the parameters within which hazardous chemicals can be imported, stored, disposed, and used, including the safety measures that must be applied in association with the use of such chemicals. It provides procedural rules on obtaining import permits, such as having to obtain a separate permit for each shipment and places the legal authority with the Ministry of Defence.²⁷

²⁷Ibid.,

Agricultural Pest Control Regulation (Regulation number 2021/R-12)

The key objectives of this regulation are to set forth the rules to regulate sustainable usage, sales, transportation, storage, and disposal of agricultural pesticides while safeguarding the health and safety of all living things including the surrounding environment in the most responsible manner. The regulation places emphasis on implementing measures to avoid or mitigate any hazardous incidents that may occur due to the use of agricultural pesticides and toward preventing the hazardous use of pesticides. It provides key provisions on the safe disposal of pesticides such as the types of pesticide waste required for disposal, the standards for management of pesticide waste, and the prohibited areas or manners in which pesticides shall not be disposed. The regulation sets out standards for storage facilities of pesticides and for vessels that transport pesticides²⁸.

Additional regulations related to the sound management of chemicals include the:

- Waste Management Regulation (Regulation number 2013/R-58) that provides details of hazardous waste,
- Regulation on Protecting and Conservation of Environment in the Tourism Industry made pursuant to the Maldives Tourism Act (Law No. 2/99) which provides the details related to the import and usage of chemicals, management, and disposal of waste in resorts, picnic islands, marinas and other such places leased for the purposes of tourism,
- Regulation on Handling, Usage and Storage of Petroleum Products (Regulation number 2015/R-160) which establishes a mechanism to regulate the handling, usage and storing of all petroleum products,
- Regulation on Ozone Depleting Substances and Devices Containing Ozone Depleting Substances (Regulation number 2017/R-9),
- Regulation on the Carriage of Dangerous Good by Air (Regulation number MCAR-18),
- Regulation on Pharmaceuticals (Regulation number 2014/R-46)²⁹.

The main policies that have implications for chemicals management in the Maldives are the 5 years policy document of the government, The Strategic Action Plan 2019 – 2023 and National Policy on Waste Management (2015). Further, the National Policy on Healthcare Waste Management (2016) has a focus on the safe management of health care waste.

²⁸ Ibid.,

²⁹ Ibid.,

The Strategic Action Plan 2019 – 2023 (SAP)

A key strategy under SAP is to strengthen the legal and regulatory framework for environmental management to ensure environmental protection and conservation. This necessitates the development of overarching legislation on chemicals management, paying special attention to diversity and usage across their lifecycle, in order to ensure effective management and safe disposal of chemicals. The Ministry of Environment, Climate Change and Technology is the lead implementing agency for this action³⁰.

National Waste Management Policy 2015 (NWMP2015)

The 2015 National Waste Management Policy aims to formulate and implement the guidelines and means for solid waste management with the intent of maintaining a healthy environment. The policy encompasses waste reduction, the formulation and implementation of waste management plans, establishing waste management systems in all inhabited islands including the allocation of resources, as well as establishing regional waste management facilities and regional waste collection services. Furthermore, the policy also focuses on education, awareness, and training in addition to establishing a trust fund for waste management and maintaining waste statistics at island and national levels. For the purposes of implementing NWMP2015, the country was divided into seven zones with each regional waste management facility serving one or more zones. The main agency tasked with implementing NWMP2015 is the MoECCT.

National Policy on Healthcare Waste Management 2016 (NPHCWM2016)

The National Policy on Healthcare Waste Management 2016³¹ is an overarching document that covers the related framework of strategies, legal regulations, guidelines, and operational procedures, and that creates a legal obligation to implement safe and environment friendly healthcare waste system. The policy focuses on protecting human health (patients, health workers, and public) and the environment from hazardous healthcare waste. It emphasises the promotion of economically sustainable practices for waste management in healthcare and adopting practices that support the international treaties such as Stockholm Convention and Basel Convention. The lead implementing agency for this policy is the Ministry of Health.

³⁰ SAP (2019). Strategic Action Plan 2019 – 2023: Government of Maldives. <https://presidency.gov.mv/SAP/>

³¹ Ministry of Health (2016). National Healthcare Waste Management Policy: Maldives. <http://extwprlegs1.fao.org/docs/pdf/mdv205059.pdf>

4.3. Coverage of chemical lifecycle stages by existing legal instruments

A number of sectoral laws and regulations that address specific aspects of chemicals management are currently in effect within sectors such as environment, agriculture, health, national security and others. Table 8 provides an overview of the scope of legal instruments developed to manage the chemicals across their life cycle.

Table 8 Scope of legal instruments applicable to chemical management

CATEGORY OF CHEMICAL								
	IMPORT	PRODUCTION	STORAGE	TRANSPORT	DISTRIBUTION/ MARKETING	USE / HANDLING	EXPORT	DISPOSAL
Pesticides (Agriculture, public health & consumer use)	✗		✗	✗	✗	✗		✗
Fertilisers	✗		✗	✗	✗	✗		✗
Industrial chemicals (manufacturing and processing)	✗		✗	✗	✗	✗		✗
Petroleum products	✗		✗	✗	✗	✗	✗	✗
Consumer products	✗		✗	✗	✗	✗		✗
Chemical Waste	✗		✗	✗	✗	✗	✗	✗
Pharmaceuticals	✗		✗	✗	✗	✗		✗
Others	✗		✗	✗	✗	✗		✗

✗ denotes presence

As highlighted above, existing laws and regulations related to chemicals management are fragmented and have limited focus. The regulatory framework addressing specific aspects of chemicals management is dispersed amongst sectoral laws in environment, agriculture, health, and national security. An overarching legislation is required thus, a Chemical Bill that covers all aspects related to import, handling, use, storage, and disposal of chemicals is currently being drafted by MoECCT.

5. Institutional Framework and Mechanisms

5.1. Responsibilities of Relevant Ministries and Agencies

The governance and administration of regulatory functions relevant to the use and management of chemicals also requires a cross-sectoral approach, with shared responsibilities between various government agencies. This includes agencies responsible for import authorisation, transport, and disposal, as well as agencies with a mandate to attend to chemical incidents. Details of some key institutions directly and indirectly involved in Maldives chemical management framework are collated in Table 9 below.

Table 9 Key institutions directly or indirectly involved in the management of chemicals

NAME OF INSTITUTION	ROLES AND RESPONSIBILITIES IN CHEMICAL MANAGEMENT	CATEGORY OF CHEMICALS, BY-PRODUCTS OR RELATED WASTE
Ministry of Environment, Climate Change and Technology	<ul style="list-style-type: none"> ● Overall mandate for environmental protection, covering pollution and chemicals ● Carries out obligations under international environmental treaties and organizations ● Verification authority for import of Ozone Depleting Substances 	<ul style="list-style-type: none"> ● All hazardous chemicals ● Ozone Depleting Substances
Environment Protection Agency	<ul style="list-style-type: none"> ● Set standards for pollution including those resulting from chemical sources. ● Attends to environmental incidents including oil spills and chemical-related incidents 	<ul style="list-style-type: none"> ● All hazardous chemicals
Ministry of Defence	<ul style="list-style-type: none"> ● Acts as the frontline gatekeeper for dangerous chemicals, including hazardous chemicals and issues permits for import of chemicals ● Regulates, amongst other duties, the import of dangerous chemicals into the country ● Obligated by the Chemical Weapons Convention (CWC) to monitor/control the flow of chemicals categorised as chemical weapons 	<ul style="list-style-type: none"> ● All dangerous goods and hazardous chemicals

<p>Maldives National Defence Force</p> <p>MNDF Fire and Rescue</p> <p>MNDF Coast Guard</p>	<ul style="list-style-type: none"> ● Provides technical support to MoD in chemical and storage facility inspections. ● Disposal of chemicals given that chemicals are seen as a safety and security issue ● Acts as first responders during emergency situations that involving mishandling, illegal transactions and accidents related to hazardous chemicals ● First responders in emergency situations and accidents in the marine environment related to oil spills and hazardous chemicals 	<ul style="list-style-type: none"> ● All dangerous goods and hazardous chemicals
<p>Ministry of Fisheries, Marine Resources and Agriculture</p>	<ul style="list-style-type: none"> ● Regulates import, export, sales, production, usage, storage, and disposal of agricultural pesticides ● Verification authority for import of agricultural chemicals ● Maintains a register of pesticides banned and approved pesticides in the Maldives for import, export, production, usage, and sales 	<ul style="list-style-type: none"> ● Agricultural chemicals (pesticides and fertilisers)
<p>Ministry of Health, National Drug Agency, Maldives Food and Drug Authority, Health Protection Agency</p>	<ul style="list-style-type: none"> ● Regulates hazardous healthcare waste for the protection of human health (patients, health workers, and public) and environment ● Verification authority for import of Chemicals controlled under Narcotic Drugs Act 17/2011 ● Regulates Approved drugs/ pharmaceuticals and is the verification authority for import of chemicals detrimental to public health ● Implements and enforces policy involving health risk or potential health risk to the people working or living in surrounding areas due to the emission of any gas, smoke, chemical, radiation, or vibration 	<ul style="list-style-type: none"> ● Chemicals controlled under Narcotic Drugs Act 17/2011 ● Chemicals of public health significance ● Approved drugs for medical purposes ● Hazardous health care waste
<p>Ministry of Tourism</p>	<ul style="list-style-type: none"> ● Set standards for waste management for tourist facilities. ● Enforces the management and disposal of waste in resorts and other tourism facilities 	<ul style="list-style-type: none"> ● Toxic and hazardous waste
<p>Maldives Customs Service</p>	<ul style="list-style-type: none"> ● Verify permits before clearing any shipments containing chemicals and withhold any chemicals that do not have permits from MoD 	<ul style="list-style-type: none"> ● All dangerous goods and hazardous chemicals

Other relevant agencies with a role management of chemicals include:

- Maldives Civil Aviation Authority
- Maldives Transport Authority
- Waste Management Corporation Limited (WAMCO)
- Maldives Ports Limited
- Maldives Police Service

5.2. Mechanism for Import of Chemicals

Much of Maldives' chemical management work is handled by the Ministry of Defence (MoD), with a focus on national security. In addition to acting as the frontline for gatekeeping and approvals, MoD also maintains the 'Makudi' online platform, which is a Chemical Information Management System that facilitates the management of import permits for dangerous chemicals. Under Article 5(a) of Act No. 4/75 (Goods Prohibited to import to Maldives), permits must be sought to import dangerous chemicals, toxic acids, and poisons into the Maldives. It also states that all dangerous chemicals (except for fireworks), including acids, and other poisonous items produced using these chemicals, can only be imported into the country with written permission from the ministry and in accordance with such rules and regulations set out by the ministry.

Figure 3 illustrates the process involved with issuing a permit for the import of hazardous chemicals to the Maldives. Such imported chemicals must be approved by MoD prior to the shipment's arrival. MoD has published an open "list of chemicals that do not require permit" for import into the Maldives. For other hazardous chemicals, importers must submit a permit to Maldives Customs Service to clear any containing shipments. Importing parties may apply for permits from MoD through the Makudi system. Information about the chemicals to be imported that needs to be provided when applying for a permit, and whenever requested, include names, amounts and the desired place of storage and the Safety Data Sheet.

After the online application is submitted, if it contains chemicals that are controlled or monitored by other state bodies, it will be forwarded for agency verification. Verification agencies for the specific categories of chemicals are as follows.

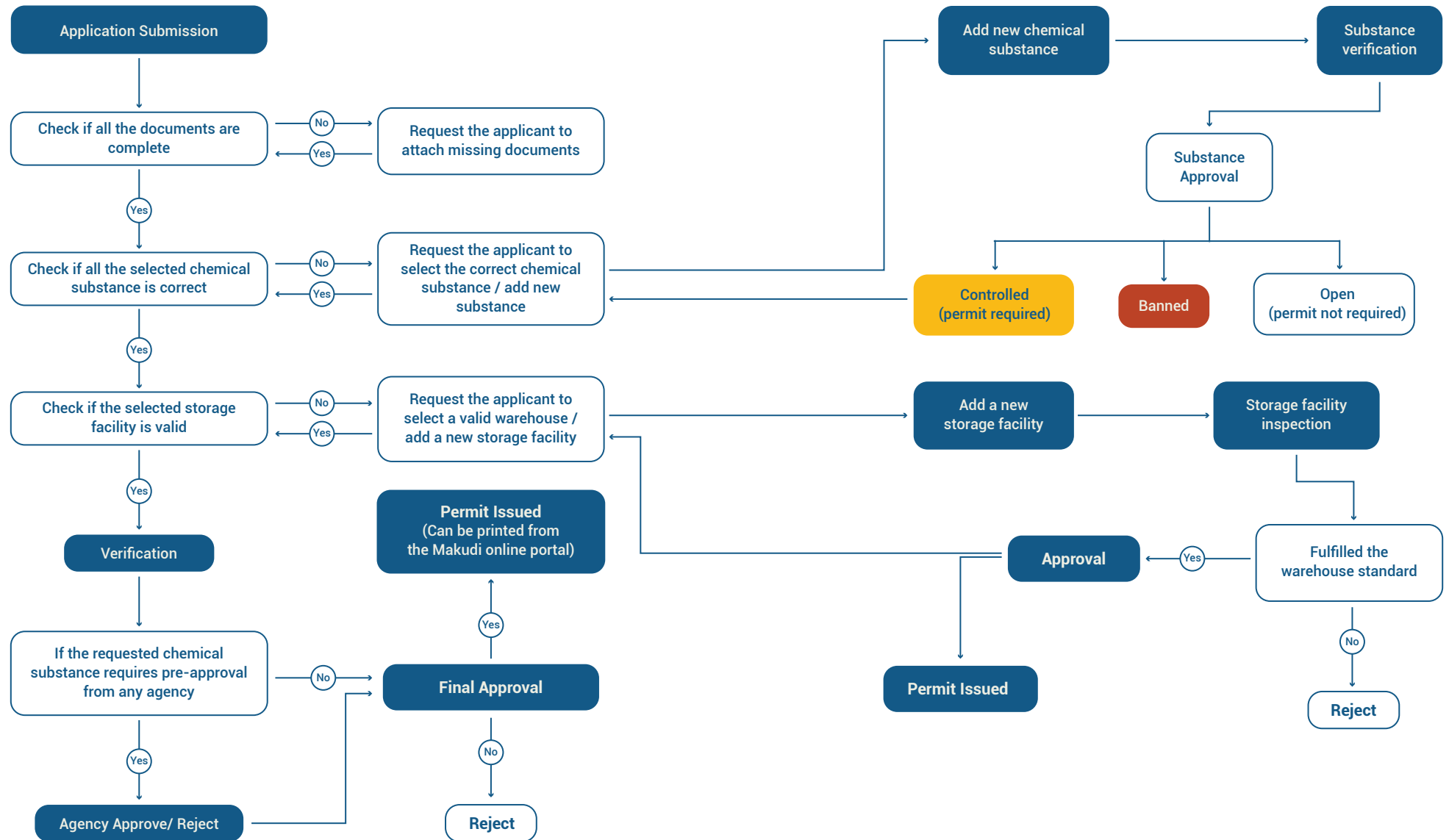
- Pesticides and fertilizers: Ministry of Fisheries, Marine resources, and Agriculture
- Chemicals detrimental to public health: Maldives Food and Drugs authority
- Chemicals controlled under Narcotic Drugs Act 17/2011: National Drug Agency
- Ozone Depleting Substances: Ministry of Environment, Climate Change and Technology

Any requests to import a new chemical that is not yet listed in the database under approved chemicals would be subject to an evaluation and substance verification run by MoD before a permit may be issued. Based on the evaluation it will be classified as either open (permit not required), controlled (permit required) or banned. If the chemical is classified as open, it would henceforth be added to the "list of chemicals that do not require permit".

MNDF Fire and Rescue Service provides technical support to MoD when conducting chemical storage facility inspections. When requesting permit for import of more than 200g of any hazardous chemical, the importing party must identify a registered chemical storage facility that fulfils the specific requirement pertaining to the chemical, as per the Hazardous Chemical Regulation 2019/R-1057 (Amended)³².

³²Amendment to the Hazardous Chemical Regulation 2019. <https://www.gov.mv/en/files/2151.pdf>

Figure 3 Maldives permit approval procedure for chemicals imports



Maldives Customs Services is mainly involved with screening the items whether it requires a permit through the ASYCUDA system, which is an integrated customs management system for international trade and transport. Once the cargo declaration form is submitted. Customs then verify the chemical import permit that was submit through the Makudi system, before clearing any shipments containing hazardous chemicals. They should withhold shipments that do not bear a pre-authorised permit in a designated storage area at the ports. Maldives Customs Service maintains records of chemicals and other items imported via the ASYCUDA system, classified (mainly) for tariff purposes according to the Harmonised Commodity Description and Coding System of Items.

Maldives Food and Drug Authority is responsible for regulating pharmaceutical products and utilises 'Dhirithi Portal'³³, a dedicated platform that provides the following online services:

- Medicine importer registration,
- Medicine registration,
- Pharmacy and warehouse registration,
- Import permit for sample medicines, and
- Pre-authorisation.

5.3. Responding to chemical related emergencies and incidents

Several agencies are involved in the emergency response protocols that follow any chemical-related incidents. The agencies that would be mobilised depends on the nature of the incident. For instance, if the incident is related to fire, the Fire and Rescue services of MNDF will also be activated. MNDF acts as first responders should there be a need for an emergency regarding situations that involve mishandling, illegal transactions and accidents involving chemicals.

The coastguard will be triggered for any marine related incidents, including oil spillage or leakages. A standing committee for marine related operations includes members from the following institutions:

- Environmental Protection Authority,
- Ministry of Fisheries, Marine Resources and Agriculture,
- Ministry of Transport and Civil Aviation,
- Maldives Police Services,
- Ministry of Health, and where necessary,
- Island or city councils.

³³Maldives Food and Drug Authority, Dhirithi Portal. <https://dhirithi.egov.mv>

Ordinarily, the EPA would be tasked with responding to environmental incidents. However, chemical-related incidents are rare. Hence, as EPA's mandate here is largely centred around pollution, and not from a public security perspective, presently chemicals management is directed more towards the Ministry of Defence. The agency also sets standards for handling pollution including that which results from chemical sources.

The NDMA becomes involved when a community or communities are affected by chemicals-related incidents and works in coordination with MNDF during such incidents. While the NDMA has concentrated on emergency response and mitigation measures resulting from natural disasters in the past, industrial, and chemical disasters are covered in their plans. Further, the government is currently in the process of developing a National Chemical Response Plan that will require NDMA to respond if a community or communities are affected by such an incident.

At present, the chain of command for dealing with chemical-related incidents is obscure with instructions that are fragmented through the multiple institutions that play a role in response efforts. The current approach has different stakeholders forming their own response plans, which need to be consolidated and harmonised. The national response plan for chemical spills, fires and poisons that is under development is expected to significantly improve coordination between agencies during a chemical spill event.

Weak coordination and partial overlap of institutional mandates create significant blockades in the attempt to address the country's chemicals management challenges. For instance, the enforcement of requirements listed under the Pesticides Act and related regulations is currently inadequate. Although MoFMRA has a mandated responsibility to approve of pesticide imports under the Act, at the time of publishing, all chemical import permits are issued by Ministry of Defence. The former acts as a verification agency for agricultural pesticides routed through the Ministry of Defence. A more coordinated system for management of chemicals, with clear mandates for all agencies engaged in the process, is imperative to strengthening the current framework.



6. Core areas of Chemical Management: Imports

Maldives does not have a chemical industry; hence, there is no production of chemicals or exports of chemicals, nor imports and exports of raw materials needed to produce chemicals. All the nation's chemical requirements, including energy-related petroleum products, are met through importation.

6.1. Total expenditure for chemical imports

A diverse range of chemicals are imported into the Maldives by different sectors for various applications. Chemicals imports are categorised according to HS Codes that indicate the economic sector to which the chemical belongs, based on the Globally Harmonised System of Classification and Labelling of Chemicals. In some categories, such as petroleum and petroleum products, industrial chemicals, pharmaceutical products, consumer chemicals, explosives, fertilizers, pesticides and other substances, the chemicals are subcategorised.

Expenditure from 2017 to 2021 for major groups of chemicals imported into the Maldives are presented in Table 10. The total value of chemical imports generally shows a steady increase as shown in Table 10 apart from 2020, which can be attributed to the COVID-19 pandemic and its vast economic impact. The pandemic, however, increased demand for disinfectants, showing a substantial rise in 2020, alongside a steady rise in the import of pharmaceuticals and fertilisers. In 2021, chemical imports into the Maldives totalled over MVR 10 billion. Petroleum and petroleum products account for around two thirds (MVR 6,992 million) of the gross value of chemical imports in the same year. This is followed by pharmaceutical products, which add up to MVR 880 million and consumer chemicals (essential oils, perfumery, cosmetics), the import of which was valued at MVR 550 million. In contrast, the market share held by industrial chemicals (organic and inorganic chemicals, tanning or dyeing extracts, albuminoidal substances, and photographic or cinematographic chemicals) was generally low. Similarly, in 2021, fertilisers and pesticides accounted for total of MVR 102 million.

Table 10 Value of chemical imported in to the Maldives from 2017 to 2021

HS CHAPTER	CATEGORY	SUBCATEGORIES	IMPORT IN MVR MILLIONS				
			2017	2018	2019	2020	2021
27	Petroleum and petroleum products	Aviation Gas	341.94	419.41	426.34	192.05	258.97
		Cooking fuel/gas	152.65	181.21	187.53	109.77	206.84
		Marine gas oil (diesel)	3,603.09	5,389.14	5,429.32	3,182.47	5,527.65
		Petrol	575.46	785.68	909.30	429.53	799.93
		Others	159.90	422.20	216.90	152.71	198.59
		Total	4,833.05	7,197.65	7,169.39	4,066.54	6,991.98
28	Inorganic chemicals	Inorganic chemicals	33.66	27.53	28.72	16.43	25.52
29	Organic chemicals	Organic chemicals	29.56	19.02	17.31	15.00	15.87
30	Pharmaceutical products	Pharmaceutical Products	402.69	490.64	555.48	650.43	879.69
31	Fertilisers	Organic fertilisers	14.59	22.61	26.15	27.98	19.58
		Inorganic fertilisers	9.42	11.30	9.77	11.03	10.55
		Other fertilisers	0.90	0.30	0.45	0.46	0.05
		Total	24.91	34.22	36.38	39.47	30.18
32	Tanning or dyeing extracts	Tanning or Dyeing Extracts	374.85	476.20	624.94	349.79	475.60
33	Essential oils, perfumery, cosmetics	Essential oils, perfumery, cosmetics	429.25	445.85	495.68	358.21	549.82
34	Soaps, surfactants and household chemicals	Soaps, surfactants and household chemicals	281.95	302.92	360.99	303.35	365.92
35	Albuminoidal substances	Albuminoidal substances	51.84	66.03	45.55	33.91	35.20
36	Explosives	Explosives	10.62	15.71	11.23	6.49	10.79
37	Photographic or cinematographic	Photographic or Cinematographic	4.78	5.31	4.49	4.37	3.84
38	Other chemicals	Miscellaneous	180.97	220.94	292.71	372.16	539.72
		Unspecified	42.42	62.14	30.35	17.69	17.52
39	Pesticides	Insecticides	25.80	27.64	31.19	24.95	26.50
		Fungicides	1.02	0.65	0.61	0.55	0.85
		Herbicides, anti-sprouting products and plant-growth regulators	0.16	0.06	0.21	0.26	0.77
		Rodenticides	0.65	0.39	0.63	0.36	0.56
		Disinfectants	15.89	33.10	19.73	142.64	43.63
		Total	43.52	61.83	52.37	168.77	72.32
TOTAL			6,744.07	9,425.97	9,725.57	6,402.62	10,013.96

6.2. Major Countries of Import

According to statistics from Maldives Customs Service, the Maldives imports chemicals from 95 countries. The top ten countries that supplied chemicals to the Maldives (by value in MVR) in 2021 are listed in Table 11. In terms of value, Oman was the largest supplier in 2021 due to bulk imports of petrol and petroleum products. The second largest importing country was India, with imports worth over MVR 1,457 million, which also makes it the leading supplier in terms of the amount (248,672 tonnes) of items that were imported.

Table 11 Top ten countries of chemicals imports to the Maldives in 2021

COUNTRY	VALUE (MVR MILLIONS)	TOTAL WEIGHT (METRIC TONNES)	TOTAL VOLUME (CUBIC METRES)
Oman	5,067.85	761.46	22.57
India	1,457.38	248,672.27	2,707.79
UAE	1,388.29	9,484.97	3,473.62
Singapore	1,191.71	4,499.92	4,839.27
Malaysia	525.41	6,030.30	2,868.86
China	349.94	5,345.00	2,433.35
Indonesia	228.48	1,368.69	2,748.42
Sri Lanka	223.12	6,173.29	2,759.65
Bahrain	127.49	12.60	0.00
Germany	127.03	203.61	187.71

6.3. Organic and Inorganic Chemical Imports

The most imported inorganic chemical imported in 2021 was chlorine, which is generally used as a disinfectant. This was followed by the organic chemical monosodium glutamate, which is used as a flavouring in the food industry. In 2021, more than 100 tonnes of chlorine and monosodium glutamate were imported into the Maldives (Table 12).

Table 12 Major imports of organic and inorganic chemical to the Maldives in 2021

TYPE	CHEMICAL	METRIC TONNES
Inorganic	Chlorine	115.48
Organic	Monosodium Glutamate	101.07
Inorganic	Argon	66.16
Inorganic	Sodium Metabisulphite	64.93
Organic	Acetone	53.54
Inorganic	Hydrochloric Acid	51.94
Inorganic	Sodium Carbonate	45.87
Inorganic	Halides	45.48
Organic	Unsaturated Acyclic Hydrocarbons	40.37
Inorganic	Calcium Carbonate	26.91
Organic	Freon	23.98
Inorganic	Carbon Dioxide	19.75
Inorganic	Carbon Monoxide	16.06
Inorganic	Sodium Bicarbonate	13.18
Organic	Citric Acid	8.27



7. Core Areas of Chemical Management: Consumption of Chemicals by Major Sectors and Associated Risks

The key economic sectors in the Maldives that relies on chemicals are agriculture, health, energy and transport, tourism, food and fish processing, construction and boat building, education, and laboratory services. An overview of chemical use across these major sectors and the associated environmental and health risks are listed below.

7.1. Agriculture Sector

Fertilisers and pesticides are the two most common chemical applications in agriculture. Fertilisers, both organic and inorganic, are widely used in the agriculture sector of the Maldives. Figure 4 depicts the quantity of organic and inorganic chemical groups of fertilisers, as well as the total quantity of fertilisers imported. During the five-year period, a greater quantity of organic fertilisers was imported compared to inorganic fertilisers with a gradual increase till the year 2020. Overall, the number of inorganic fertilisers that were imported over the five-year period was observed to be constant. In 2021, India was the main supplier of fertilisers, accounting for 57% of total imports.

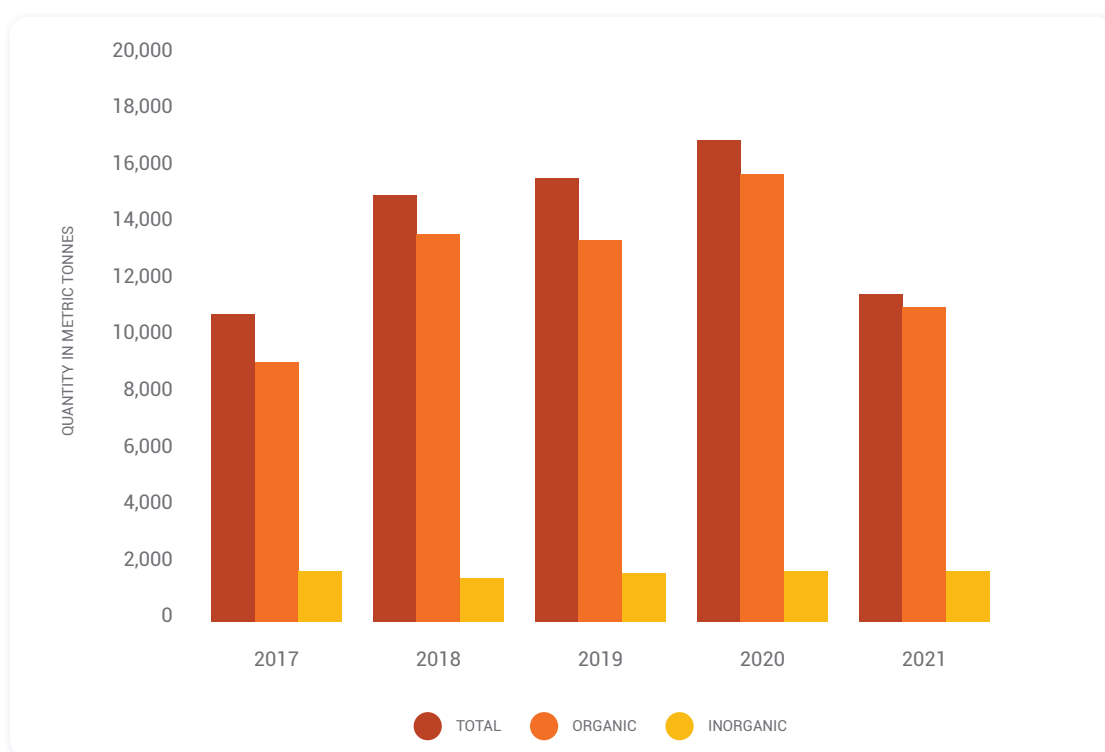


Figure 4 Quantity of organic and inorganic fertilisers imported to the Maldives from 2017 to 2021.

In 2021, the major groups of chemical fertilisers imported as shown in Table 13 were nitrogenous fertilisers and Nitrogen (N), phosphorus (P), Potassium (K) NPK fertilisers fortified with microelements. The total quantity of chemical fertilisers imported was 1,393.70 tonnes.

Table 13 Types of chemical fertiliser groups imported to the Maldives in 2021

GROUP	FERTILISER TYPE	METRIC TONNES
Nitrogen Fertilisers	Ammonium sulphate	12.55
	Ammonium sulphate salts and mixtures	198.26
	Ammonium nitrate with calcium carbonate mix	0.97
	Nitrogenous, non-specified	536.64
	Urea	30.75
Potash	Potassium chloride	0.50
Phosphatic Fertilisers	Superphosphates	0.50
With Microelements	N P+micro elements	48.06
	N P K+micro elements	546.53
Other	Other fertilisers. NES	1.19
	Other fertilisers in packages	17.76
TOTAL CHEMICAL FERTILISERS		1,393.70

From 2017 to 2021, pesticides in the categories of fungicides, herbicides, anti-sprouting products and plant-growth regulators, rodenticides, insecticides, and disinfectants were imported to the country in various quantities, reported in weight or volume (Table 14). For instance, “Disinfectants” are considered antimicrobial pesticides and are inclusive³⁴. Pesticides imported are not exclusively set for use by the agricultural sector, and chemicals under categories like rodenticides, insecticides, and disinfectants, with considerable consumption in other sectors such as tourism and industrial applications, household, and commercial uses. With the exception of disinfectants, the bulk of pesticides imported into the Maldives were insecticides, with a gradual increase from 229.63 tonnes to 1,292.54 tonnes observed over the five-year period. Due to the increased demand for disinfectants caused by the COVID-19 pandemic, the import of disinfectants increased substantially (1,335.90 cubic metres) in 2020, with the numbers still high in 2021. This category also includes hand sanitisers that were imported in large quantities during the pandemic.

³⁴ USEPA (2022). Basic Information about Pesticide Ingredients.
<https://www.epa.gov/ingredients-used-pesticide-products/basic-information-about-pesticide-ingredients>

Table 14 Pesticides imported to the Maldives from 2017 to 2021, in weight or volume

PESTICIDE CATEGORY	WEIGHT OR VOLUME	2017	2018	2019	2020	2021
Fungicides	Metric Tonnes	2.49	3.55	9.90	4.23	13.72
Herbicides, anti-sprouting products & plant-growth regulators	Metric Tonnes	3.46	1.88	38.62	6.98	2.35
Rodenticides	Metric Tonnes	18.67	2.80	6.23	5.70	12.10
Insecticides	Metric Tonnes	229.63	160.28	810.17	962.49	1,292.54
Disinfectants	Metric Tonnes	595.84	136.26	104.60	146.85	218.17
Total	Metric Tonnes	2,867.09	2,322.76	2,988.51	3,146.24	3,559.88
Fungicides	Cubic Metres	10.05	2.78	0.00	0.00	0.00
Herbicides, anti-sprouting products & plant-growth regulators	Cubic Metres	0.43	0.02	0.00	0.00	0.00
Insecticides	Metric Tonnes	193.87	236.96	7.38	0.00	0.00
Disinfectants	Metric Tonnes	152.43	182.54	230.52	1,335.90	828.64
Total	Metric Tonnes	356.77	422.31	237.90	1,335.90	828.64

In general, an increase in the total amount of pesticides imported was observed between 2018 to 2021, with 3,559.88 tonnes of pesticides imported in 2021 (Figure 5).

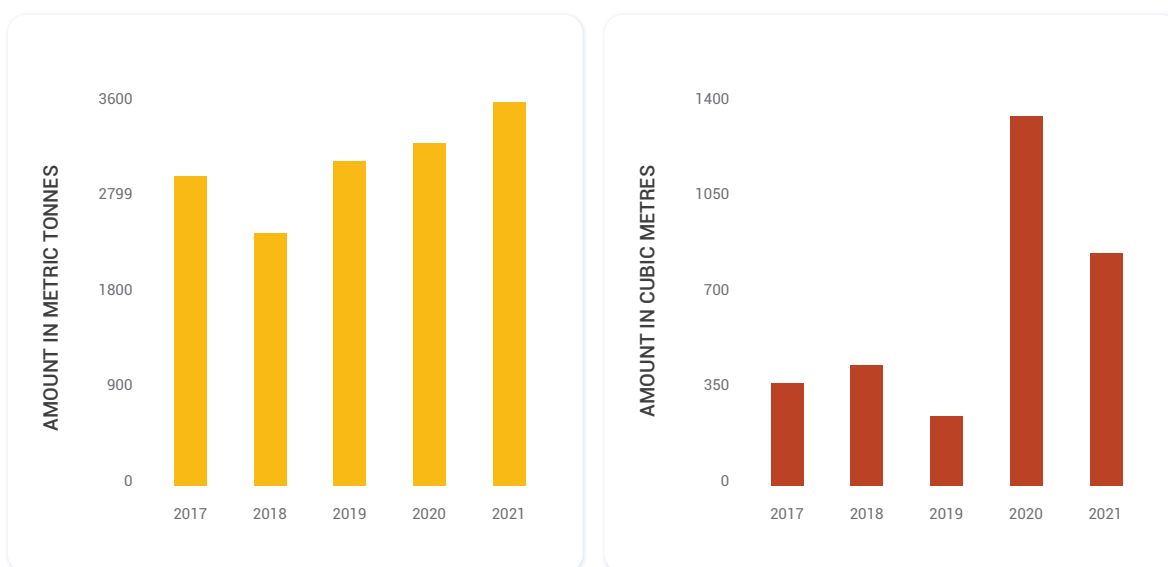


Figure 5 Pesticides imported to the Maldives from 2017 to 2021, in - a) weight or b) volume *Data reported in two different units (metric tonnes or cubic meters)

Table 15 lists the data on the use of agricultural pesticides from January to October 2022. The data was obtained from AgroNAT, a State-Owned Enterprise that has an overall mandate to assist with developing the agricultural sector, based on the procurement and distribution of pesticides to contract farmers. The majority of farmers in the Maldives are contracted by AgroNAT, with a total of 718 farmers currently working with the enterprise and a further 358 farmers yet to be contracted. Hence, these quantities are representative of a large proportion of pesticide use in the country, including types of pesticides consumed.

Table 15 Agricultural pesticides distributed to farmers by AgroNAT from January to October 2022

PESTICIDE, DESCRIPTION	CATEGORY	TOTAL AMOUNT	UNIT
Neem Oil ,500ml Bottle	Pesticide and fungicide	243.5	L
Neem Oil 250ml Bottle	Pesticide and fungicide	3.5	L
Abamectin, 100ml Bottle	Insecticide	23.3	L
C-Cron, 100ml Bottle	Insecticide	1.2	KG
Dithane / Mancozeb - Fungicide 100g	Fungicide	66.4	KG
Starkle G, 250g Packet	Insecticide	41.25	KG
Admire – insecticide 100ml Bottle	Insecticide	17.8	L
Folica – Fungicide 50ml Bottle	Fungicide	1.6	L
Cypermethrin, 100ml Bottle	Insecticide	16.5	L
C- Cron, 100ml	Insecticide	3.2	L
Folica, 100ml	Fungicide	2.1	L

Dimethoate 500ml	Insecticide	0.5	L
Thiram 200g	Fungicide	0.2	KG
Starkle G, 100g	Insecticide	6	KG
BT - 100ml Bottle	Insecticide	0.2	L
Starkle G 100GM	Insecticide	6	KG
Profenophos 100ml	Insecticide (Organophosphate)	16.7	L
Acetamiprid - 100ml Bottle	Insecticide	1.6	L
Carbaryl (sevin) 100g	Insecticide	14.4	KG
Carbendazim - 100ml bottle	Fungicide	0.2	L
Dinotefuran (Starkle G), 100g Packet	Insecticide	13.7	KG
Thiram - 100grm packet	Fungicide	1.4	KG
Carbendazim 50% WP (Anustin) - 100GM	Fungicide	5.2	KG

The mismanagement of chemicals, and exposure to hazardous substances can have everlasting adverse impacts on public health as well as the surrounding environment. Pesticides in the toxicity category WHO class I (Ia Extremely hazardous and Ib Highly hazardous) or any other pesticides in the banned pesticide list³⁵ issued by MoFMRA are not permitted for import to the Maldives. A permit must be obtained prior to importing any pesticides that are not in the approved list issued by MoFMRA³⁶. Moreover, there are specific requirements for storage of pesticides under the pesticide legislation, and such substances cannot be stored in proximity to residential areas.

Farmers misusing, or engaging in excessive application of, agricultural pesticides and other similar substances was a major point of concern highlighted by several stakeholders. Workers in the agriculture industry are particularly exposed to potentially toxic pesticides due to a lack of awareness and use of adequate personal protective equipment. In many instances, farmers fail to follow label instructions, leading to an excessive use of pesticides, which subsequently builds resistance, requiring higher and higher doses to protect their crops from pests. The implications from direct or indirect exposure to these chemicals are high in terms of negative health consequences for farmers as well as consumers. Exposure to the toxic effects of pesticides can occur via air (inhalation), direct contact with skin and eyes, and through contaminated water or food (oral exposure).

³⁵ Ministry of Fisheries, Marine Resources and Agriculture. (2019). Approved and Banned Pesticide list (Updated on April 29, 2019), <https://www.gov.mv/en/guidance-and-regulations/approved-and-banned-pesticide-list-updated-on-april-29-2019>

³⁶ ibid

Although there is no published data about these impacts in the Maldives, the negative effects of hazardous pesticides on the environment and the surrounding biodiversity are unavoidable due to their solubility, with leachate contaminating the shallow water lens and surrounding marine environment. Over-exposure to these substances is known to pose neurotoxic, endocrine disruptive and carcinogenic effects on humans although a definite link between pesticides and cancer has not been established³⁷.

In addition to the misuse of pesticides, farmers frequently apply fertilisers at concentrations higher than the levels suggested by the manufacturer. Their leachate may lead to increased nitrogen, phosphorus, and nutrient levels in the marine environment due to surface run, thus affecting marine biodiversity. Further, improper application can degrade soil quality and contaminate groundwater. In addition to the generally low awareness among farmers on their risks, many migrant workers currently working on farms may not be able to comprehend the label instructions, which are usually written in either English or Dhivehi language. Hence, it is essential that any effort to address the urgent need of fostering awareness among farmers, must be expanded to include educating migrant workers so that they too are aware of best practices and can follow label instructions properly.

Table 16 summarises information acquired from agriculture businesses and end users. Some challenges and issues identified across chemical usage include resistance of pests due to pesticide overuse, low awareness of farmers and improper monitoring, as well as hesitancy of farmers to switch to safer alternatives and bio-pesticides. Certain unacceptable practices, such as use of lethal pesticides not intended for that particular produce, or the common use of mixed pesticides (sometimes in place of nutrient remedies) and the continued use of some banned pesticides were reported. Farmers claimed that while they were aware that there were risks involved, they were ill informed about the exact dangers. In addition, further drawbacks that were indicated was the unavailability of local analytical capacity for testing soil and pesticide residues and low levels of awareness regarding schemes such as GAP (Good Agricultural Practices).

³⁷ Burns, C.J. & Juberg, D.R. (2021). Cancer and occupational exposure to pesticides: an umbrella review. *International Archives of Occupational and Environmental Health*. 94(5), 945-957. doi: 10.1007/s00420-020-01638-y.

Providers of pest control services expressed concerns that the public are allowed access to pest control chemicals and the fact that there are no legal requirements for the registration of such services. As a result, parties without adequate knowledge about chemical applications and safety procedures are able to offer discounted services. Currently, there is no monitoring mechanism that ensures the safe application and proper handling of chemical products used in pest control.

Improvements suggested by these pest service providers included mandating the application of Integrated Pest Management, use of ultra-low volume sprayers and following the Economic Threshold Level (ETL) for spraying. Increased awareness on the safe use of chemicals and the impacts, availability of safer products and support to farmers, and making such information more accessible was identified as key areas that need to be addressed. Emphasis was given to the strengthening of regulatory and monitoring mechanisms for pesticides and establishment of a criterion for use of safer and approved chemicals in the case of food products and food storages (for fumigation).

BUSINESS TYPE	COMMERCIAL AGRICULTURAL ISLAND	LOCAL FARMERS FROM AGRICULTURAL ISLAND	IMPORTER AND SUPPLIER / OUTLET	PEST CONTROL SERVICE PROVIDERS
Main types of Chemicals used / supplied	Pesticides and fertilizer	Pesticides, fertilizers, nutrients for hydroponics	Bio and chemical pesticides; Fertilizers and bio-fertilizers; Pheromone traps; Soil; Agricultural inputs	Pesticides & fertilizers, Nutrients / Pesticides & Insecticides (approved by WHO, EPA, HACCP & other bodies) / Agricultural and Household pesticides/ HACCP certified chemicals
Chemical Management	<p>Purchase: Suppliers in Malé</p> <p>Transport (if any): By Dhoani</p> <p>Store: Island warehouse</p> <p>Use (follow Instructions): Yes, follow instructions</p> <p>Dispose (if any):</p>	<p>Purchase: Shops from island or Malé</p> <p>Transport (if any): If buying from Malé, use supply boats</p> <p>Store: Some keep them at home / some store in a separate storage room</p> <p>Use (follow Instructions): Follow instructions on labels/ Follow instructions given by shopkeepers/ Some do not read the labels or instructions</p> <p>Dispose (if any): Throw to waste bin; hand over to the council for disposing</p>	<p>Purchase: Imports</p> <p>Transport (if any): Boat</p> <p>Store: Four storage facilities in Malé for fertilizers, inputs and accessories/ One facility in Thilafushi for pesticides, fertilizers and other inputs</p> <p>Use (follow instructions): NA</p> <p>Dispose (if any): No requirement of disposing, only small amounts of pesticides handled. If requirement arises, will inform MNDF</p>	<p>Purchase: Imports</p> <p>Transport (if any): Dhoni or supply boat</p> <p>Store: Storage facilities in Thilafushi</p> <p>Use (follow Instructions): Yes, follow instructions</p> <p>Dispose (if any):</p>

Trainings received/ provided	Education in Agricultural Sciences /No in service training	Some farmers attended training sessions / Some say they have no training/ For others, training given by government or Agriculture Ministry	Conduct training sessions for farmers	Hired trained and experienced individuals from abroad / Does not provide trainings to others All new staffs are trained in house/ Training programs are conducted every two months covering pest control and, safe handling of chemicals
Awareness received/ provided on usage and risks	Very toxic to humans and animals	Most are aware that there are risks involved but they do not know about the specific risks / Aware of the safety measures	Conduct awareness sessions for farmers in agricultural islands/ they have a 24 hours helpline to support farmers.	Aware of the risks/ Spraying chemicals on foods and over spraying of pesticides is not a good practice
Safety measures practiced	Use of hand gloves, safety masks and safety shoes	Use of safety measures such as gloves and masks/ Spraying pesticides away from body/ Not overuse fertilizers	No requirement or safety procedures for handling pesticides as it is in small amounts and are already in packages/ staff aware of chemicals inside/ label provided in local language too	Have different SOPs for different treatments and services/ have protocols and safety procedures to follow
Level of awareness and public health related incidence	Overuse and improper use of chemicals leads to phytotoxicity and residual problems on the produce	Most are not aware of any incidents / Others know of one incident through a documentary on TVM about farming practices		Staffs are provided with the knowledge of safety measures safety equipment/ Have an instruction leaflet for all agricultural inputs, as some products do not have readable labels for farmers
Challenges and issues in using chemicals	Resistance of pests towards pesticides	Expensive to buy chemicals/ Difficulty in the availability of chemical products/ Difficult to earn an income as the cost of buying chemicals are high/ Lack of awareness and monitoring	Increase of overhead costs as shipping containers with even small amounts of pesticides have to be taken to Thilafushi directly and rest of the items have to be brought back to Malé Farmers are hesitant to change current practices although safer alternatives and bio-pesticides are made available Some unacceptable practice by farmers seen: using lethal pesticides not intended for that particular produce/ Common use of mixed pesticides, sometimes for nutrient remedies/ low level of safety, sometimes chemical mixing with hands/ some banned pesticides are still in use There is no local analytical facility for testing soil and residues in environment and fresh produce Low levels of awareness of farmers in the application of pesticides / low awareness on opportunities and related benefits such as GAP scheme	Everyone has access to chemical products used for pest services Pest control services are not required to be registered Some parties are not aware of safe practice and opt for cheaper alternatives Safe use and handling of chemicals are not monitored Storage guidelines are difficult as they must rent out space for storage; costly to handle agricultural products due to some rules in place

<p>Suggestions for improvements in the future</p>	<p>Follow Integrated Pest Management / Use ultra-low volume sprayers / Follow Economic Threshold Level (ETL) for spraying</p>	<p>Awareness on the safe use of chemicals and its impacts/ Availability of safer products and support to farmers/ Having accessible information on the safe use of chemicals and risks associated</p>	<p>Farmers to be trained on safe and correct use of pesticide/ instructions in local language</p> <p>To promote use of biopesticides by introducing some incentives, drive the change</p> <p>Concerned authorities to support and provide technical assistance to farmers and facilitation of GAP certification</p> <p>National testing for pesticide MRLs of fresh produce and soil testing to be available</p> <p>Need for Agriculture Bill</p> <p>More trained technical people with correct information and technical capacity building should be prioritized</p> <p>Introduce new technology in farming such as release controlled amounts of chemicals to the fields/ increase R & D efforts</p>	<p>Need to implement and properly monitor existing policies</p> <p>Provide training and awareness for farmers on safety measures, health and environment risks</p> <p>To facilitate proper storage and disposal of agricultural products</p> <p>Make it obligatory for use of food safe and approved chemicals for the fumigation of food warehouses</p> <p>Unsafe and banned pesticides should be regulated, and properly monitored</p> <p>Making consumers and farmers aware of unsafe use of pesticides in fresh produce</p> <p>Need to check the content of pesticides in fruits and vegetables that are imported</p>
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7.2. Health Sector

Workers may be exposed to a variety of hazardous chemicals in a health care setting. These chemicals may be used:

- for treatment (anaesthetic gases, aerosolised medications, hazardous drugs including cancer drugs,
- cleaning, disinfectants and sterilise purposes (for example phenolics, quaternary ammonium compounds, bleach),
- laboratory analysis (fixative for tissue specimen, xylene, toluene, formaldehyde),
and
- others (such as mercury, pesticides used in health-care settings and for the control of vector borne diseases).

Public health workers also employ pesticides and insecticides control vector-borne diseases such as dengue fever and chikungunya. According to the Health Protection Authority (HPA), their aim is to use chemicals sparingly and only during vector-borne disease outbreaks. The use of Deltacide and Malathion for fogging was discontinued and replaced by the less toxic "King Fog" which contains Deltamethrin, a pyrethroid insecticide. Temephos granules (larvicide) is used to control mosquito breeding in ponds, uncovered tanks, and other exposed water sources.

Table 17 lists the total quantity of imported medications in tonnes and cubic metres from 2017 to 2021. The total amount (weight and volume) of medicine imported varies from 2017 to 2021 (Figure 6). However, 2021 saw a considerable rise in the volume of medicines imported owing to the large quantities of COVID-19 vaccines that were imported.

Table 17 Quantity of pharmaceuticals imported to the Maldives from 2017 to 2021

YEAR	TOTAL WEIGHT (METRIC TONNES)	TOTAL VOLUME (CUBIC METRES)
2017	739.44	536.85
2018	297.71	958.70
2019	629.08	1,214.47
2020	1,071.83	946.91
2021	358.15	1,271.57

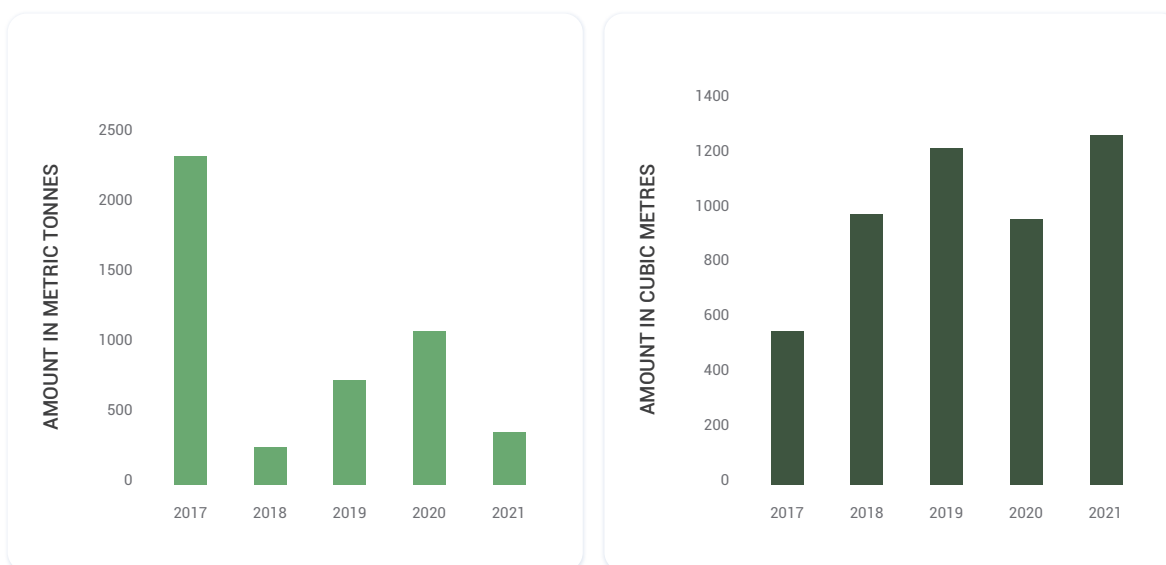


Figure 6 Pharmaceuticals imported to the Maldives from 2017 to 2021, in a) weight or b) volume

The Maldives Food and Drug Authority issues permits, licences and clearance for the regulation of imports and the sale of medicines. Table 18 highlights the approvals or licences granted in 2019 and 2020 for pharmaceutical products and veterinary medicine³⁸. The number of health clearances issued for importing chemicals of public health significance was 2156 and 1197, for 2019 and 2020, respectively.

³⁸ Maldives food and drug authority, Medicine and therapeutic goods division Newsletter 2019 – 2020. <https://health.gov.mv/storage/uploads/NAq7JnYe/og3sqhpe.pdf>

Table 18 Approvals or licences granted in 2019 and 2020 for pharmaceutical products and veterinary medicine

ACTIVITY	2019	2020
Registration of pharmaceuticals	50	47
Approvals of veterinary medicine	10	28
Purchase authorisation for controlled drugs (psychotropic substances for medical purposes)	630	399
Purchase authorisation for controlled drugs (narcotics for medical purposes)	203	194
Import licence issued for controlled drugs (psychotropic substances for medical purposes)	62	58
Import licence issued for controlled drugs (narcotics for medical purposes)	35	16
Health clearance for chemicals of public health significance	2,156	1,197
Import permits for sample medicines	77	30

7.2.1. Energy and Transport Sector

Imported petroleum and petroleum products comprise the bulk of imported chemicals and are the country's principal source of energy supply.

Major petroleum products that enter the Maldives include marine gas oil or diesel, cooking fuel or liquefied petroleum gas, aviation gas, and petrol. Diesel is the most frequently imported fuel, accounting for 84% of fuel imports in 2021 (Figure 7). Petrol contributes to 10% of fuel imports and is mainly used for road transportation. Diesel is mainly used for the generation of electricity (39%), industry applications (fisheries and water desalination), and to power domestic and international sea transport (35%)³⁹.

Figure 8 shows the quantity of petroleum products that was imported into the country from 2017 to 2021. Apart from 2020, when imports of petroleum products decreased, the average trend during the 5-year period indicated an increase in the weight of petroleum products imported. The drop in 2020 is attributed to the pandemic, which saw restricted consumption due to drastically reduced travel over emergency scenarios and import limitations caused by delays in the international transit of products.

³⁹ Asian Development Bank (2020). *A brighter future for Maldives powered by renewables road map for the energy sector 2020-2030*
<https://www.adb.org/sites/default/files/publication/654021/renewables-roadmap-energy-sector-maldives.pdf>

Figure 7 Major categories of petroleum and petroleum products imported to the Maldives in 2021

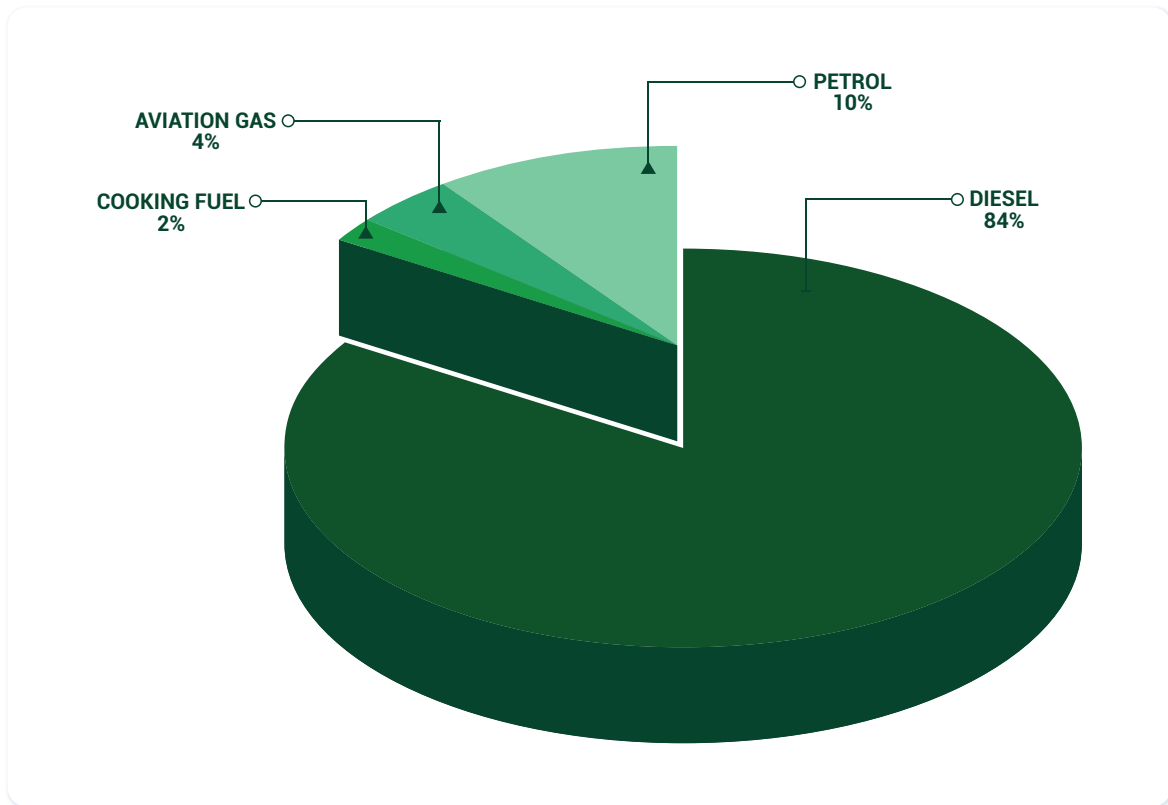
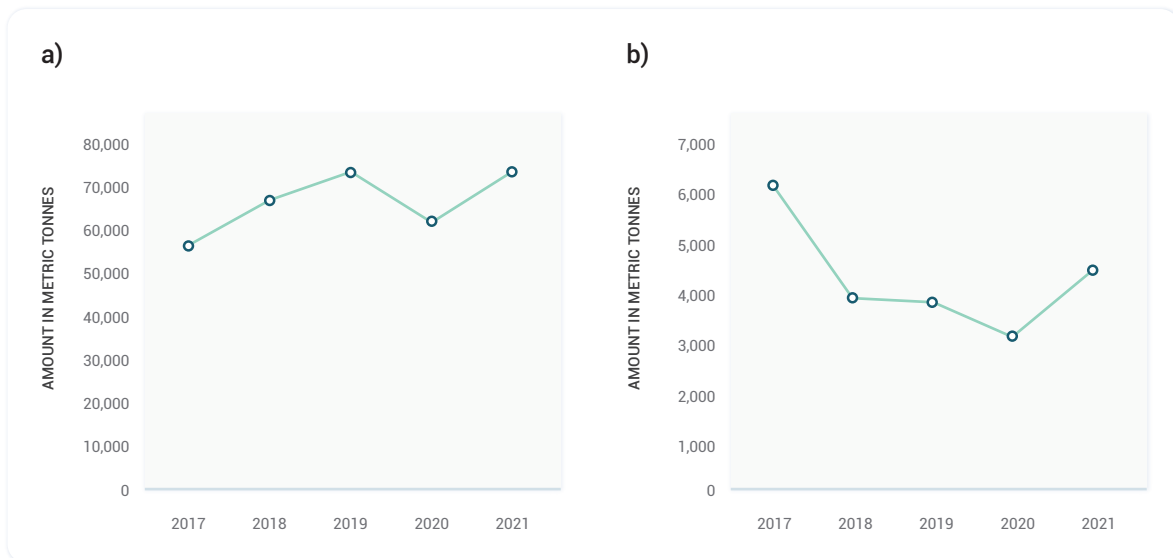


Figure 8 Petroleum and petroleum products imported to the Maldives from 2017 to 2021, in a) weight and or b) volume



Diesel generators produce particulate matter (PM), volatile organic compounds (VOCs), nitrous oxide (NOx) among other harmful pollutants that create smog and exacerbate respiratory conditions. Air contaminants and green house gases.

Due to the proximity of power plants to residential areas, many islands are already vulnerable to the air emissions from powerhouses. Diesel engines are major contributors to environmental pollution from the resulting exhaust emissions that can also lead to several health problems. The main pollutant emissions from diesel generators include nitrogen oxides (NO_x), carbon monoxide, carbon dioxide and particulate matter (PM). Data obtained from IGMH indicated that in 2006, a patient as young as one-year-old was treated from toxic effects of an unidentified petroleum product, however, the circumstances surrounding the cause of such accidents were not recorded. There have also been several incidents of oil spills into the marine environment, although only a small number of spills were witnessed, and the impact was locally contained.

In the past, the Maldives has experienced mostly TIER I and TIER II oil spills to the marine environment. The TIER I level of emergency, under which most of these incidents fall, categorises small operational spills that can be dealt with immediately by utilising local resources. On the other hand, TIER II refers to spills of up to 1000 litres of diesel or marine gas oil. Upon report of a spill or leakage, MNDF Coast Guard will physically visit the location to check, and vessels will be activated based on the amount of spill and containment required. Thus far, Maldives has only experienced small incidents where the spillage was contained and burnt or evaporated. However, due its geographical location, many international vessels pass the maritime boundary of the Maldives, which in turn increases its vulnerability through a heightened probability of larger oil spill incidents. Larger scale spills or failure of containment will require mobilisation of national stockpiles and resources, or international assistance if the spill is beyond the current containment capacity. Hence, the country's capacity for attending to large scale oil spills must be strengthened, with better coordination to prevent potentially negative impacts on biodiversity and the marine life.

7.3. Tourism sector

Currently, the tourism sector imports a wide variety of chemicals for a variety of applications. Table 20 shows the total amount of imported chemicals categorised according to HS codes (categories). There were no recognisable import trends in the tourism sector over the years 2019 to 2021. However, in 2020, a decline in imports from all categories was observed, in both quantity and value, due to the COVID-19 pandemic and the subsequent shut-down of tourism businesses as global borders were closed.

Table 19 Total quantity and value of chemicals imported by the tourism sector from 2019 to 2021

HS CODE	CATEGORY	YEAR	TOTAL VOLUME (CUBIC METRES)	VALUE MVR MILLIONS	TOTAL WEIGHT (METRIC TONNES)	VALUE MVR MILLIONS
27	Petroleum and petroleum products	2017	123.52	5.69	83.09	3.45
		2018	56.45	2.53	1,735.18	10.14
		2019	26.08	1.61	83.22	5.58
		2020	25.52	1.28	22.55	1.83
		2021	86.99	4.06	10.62	1.00
		Total	318.56	15.16	1,934.66	22.00
28	Inorganic chemicals	2017	4.71	0.26	96.53	2.15
		2018	4.04	0.18	69.26	3.05
		2019	13.01	1.61	96.44	3.37
		2020	2.29	0.10	95.66	1.43
		2021	4.41	0.21	38.25	1.90
		Total	28.45	1.83	396.14	11.91
29	Organic chemicals	2017	0.18	0.02	1.09	0.31
		2018	4.80	0.19	1.83	0.49
		2019	0.25	0.08	2.57	0.50
		2020	0.44	0.05	1.59	0.32
		2021	0.07	0.01	1.93	0.52
		Total	5.74	0.35	9.02	2.14
30	Pharmaceuticals	2017	0.86	0.45	18.82	0.48
		2018	0.54	0.03	1.06	0.26
		2019	20.74	0.22	1.70	0.67
		2020	0.13	0.06	1.18	0.07
		2021	0.20	0.21	1.27	1.90
		Total	22.47	0.89	24.03	2.21
31	Organic, inorganic	2017	-	-	1,077.34	3.45
		2018	-	-	2,756.82	7.36
		2019	-	-	1,138.18	3.84
		2020	-	-	1,210.78	2.74
		2021	-	-	1,006.88	2.67
		Total	-	-	7,190.00	20.07

32	Tanning or dyeing	2017	3,911.69	46.19	3,568.38	48.73
		2018	1,213.79	58.53	6,849.27	72.90
		2019	1,085.88	53.01	5,140.89	129.05
		2020	1,013.86	38.65	3,419.63	48.01
		2021	404.31	26.85	1,843.75	24.66
		Total	7,629.52	223.23	20,821.92	323.35
33	Essential oils, perfumery cosmetics	2017	601.70	42.38	236.41	14.43
		2018	216.79	47.54	235.18	16.90
		2019	282.35	63.03	219.91	19.25
		2020	102.15	26.21	415.20	8.40
		2021	281.51	36.04	1,373.81	48.88
		Total	14,84.50	215.20	2,480.52	107.86
34	Soaps, surfactants and household chemicals	2017	479.48	18.75	944.49	9.10
		2018	540.24	22.26	642.06	9.73
		2019	624.57	26.94	220.10	10.95
		2020	179.79	10.10	43.98	4.65
		2021	326.91	20.70	461.09	7.90
		Total	2,151.00	98.75	2,311.72	42.34
30	Albuminoidal substances	2017	3.99	0.53	837.29	17.81
		2018	3.29	0.65	874.95	28.25
		2019	20.98	1.07	580.48	13.34
		2020	21.31	0.98	1,458.12	11.41
		2021	1.81	0.24	204.71	8.48
		Total	51.38	3.47	17.81	79.28
31	Pesticides (including disinfectants)	2017	323.96	8.56	611.27	17.38
		2018	140.79	9.95	1,356.12	19.41
		2019	99.96	7.77	907.56	20.11
		2020	95.85	11.33	734.96	15.57
		2021	72.37	9.03	482.52	10.39
		Total	732.93	46.64	4,092.43	82.87

From 2017 to 2021, the main category of chemicals imported to the tourism industry fell under HS code 32, which include tanning and dyeing chemicals (48%). In addition, considerable amounts of fertilisers (17%), pesticides (9%) and albuminoidal substances (9%) were imported for consumption by the tourism sector (Figure 8).

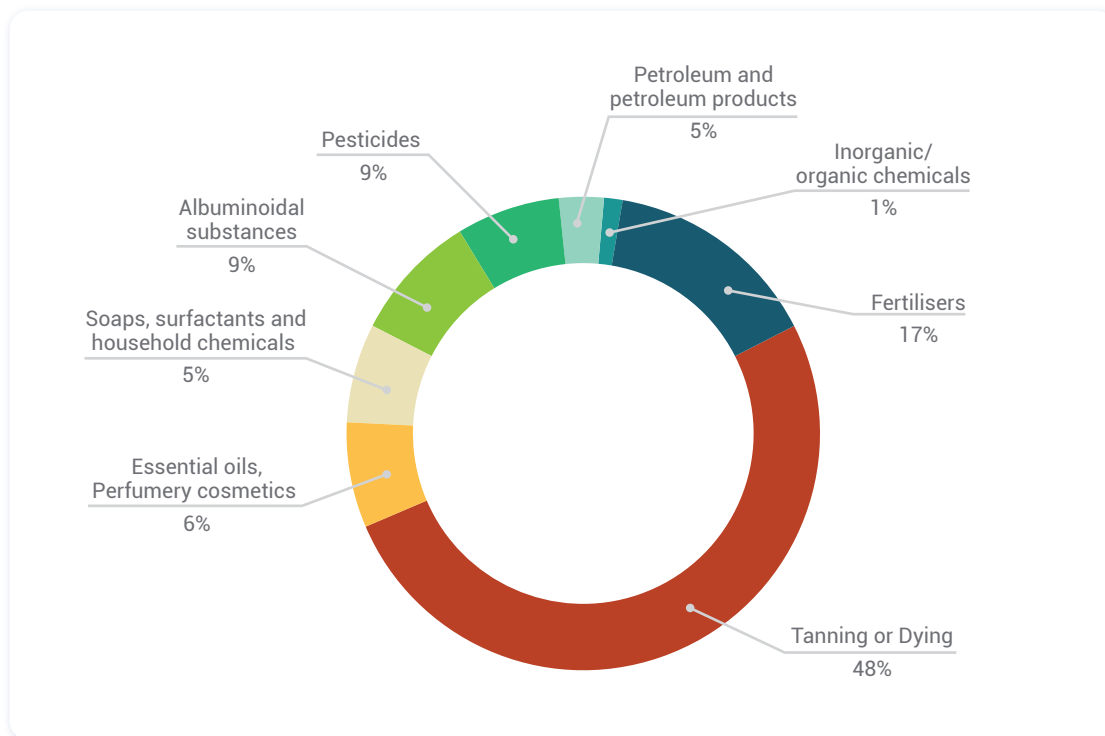


Figure 9 categories of chemicals imported to the Maldives from 2017 to 2021 by the tourism sector

7.4. Food and Fish Processing Sector

The main types of chemicals consumed by the food and fish processing sector include refrigerants and coolants, gas, chlorine, and laboratory chemicals. Two major food processing businesses, Maldives Industrial Fisheries Company and Ensis Fisheries Pvt Ltd, were interviewed and the information they provided are included below.

The primary substances used in their fish processing facilities and activities are refrigerants and coolants. Some of these chemicals are imported, while others are sourced from stores in Malé. These companies provide training to employees on correct handling and safety procedures. Furthermore, MIFCO is aware of the potential danger their ammonia facilities present to employees and identified challenges such as difficulties in acquiring the materials before they run out, lack of a designated storage area, and the need for specialised shipping containers to carry dangerous chemicals. Suggestions for improvement included training individuals on the correct handling of chemicals and establishing a centre to enable such training. The main challenge reported by Ensis Fisheries Pvt Ltd was difficulties arising from the need to seek approval from MNDF for each chemical shipment.

Table 20 Summary of Information from interviews with large scale fish processing businesses

INDUSTRY	MIFCO	ENSIS
Main types of Chemicals used / supplied	Refrigerants and Coolants, Gas	Gas, Refrigerants and coolants, Chlorine, laboratory chemicals (Histamine standard, Methanol)
Chemical Management	<p>Purchase: Shops in Malé and some are imported as well</p> <p>Transport (if any): Brought in by supply boats</p> <p>Store: Stored in the facility, Ammonia is stored separately with proper ventilation. Working on a separate storage room.</p> <p>Use (Following instructions): -</p> <p>Dispose (if any): Empty containers are either thrown away to garbage area or reused. Sometimes empty bottles are given away to be sold</p>	<p>Purchase: Local shops and mostly imports</p> <p>Transport (if any): -</p> <p>Store: MNDF approved storage unit in Hulhumalé</p> <p>Use (follow instructions): -</p> <p>Dispose (if any): Expired and leftover chemicals are diluted and drained, rarely have excess products to discard</p>
Trainings received/ provided	<p>Only staffs with expertise and training will handle and use chemicals</p> <p>Trainings are provided to new staffs on proper handling and safety measures.</p>	<p>Staffs are trained in the relevant standards</p> <p>These trainings include handling, storage and disposal of chemicals</p>
Awareness received on usage and risks	Some risks to the staffs who are exposed to the ammonia plants	
Safety measures practiced	No written SOPs in handling and using chemicals	<p>Use of PPE in storage room, MSDS</p> <p>SMETA certified factories (includes health and safety measures)</p> <p>Only authorized individuals can access the chemical store room</p>
Challenges in using chemicals	<p>Currently, not having a specific storage room</p> <p>Difficulty in procuring the product before they run out</p> <p>As some products are categorized dangerous, they require to use different shipping containers</p>	<p>Repeatedly filling in paperwork to import the same chemicals</p> <p>Need for MNDF approval every time even if the chemicals are in the approved list</p>
Suggestions for improvements in the future	<p>Training of people who use chemicals (gas handling, chemical management, ammonia usage)</p> <p>Need a training centre to provide training on the use of chemicals such as ammonia</p>	Allow permanent approval for certain chemicals

7.5. Construction and Boat Building

Workers in the construction and boatbuilding sector are frequently exposed to potentially hazardous chemicals such as styrene, uncured resins, hardeners, auxiliary agents, paints, coating systems and fibreglass reinforced plastic dust. Table 21 presents a list of products that were issued import permits for use by the fibre glass boat building industry in 2021. A total of 1,713.58 tonnes of chemicals were imported to be used in boat building sector. Most of these products were resins (618.93 tonnes), gelcoats (166.84 tonnes) and hardeners (1.70 tonnes) and bonding agents. In addition, 1,355kg of styrene, a possible carcinogen, was imported in 2021 for use in boat building.

The effects of exposure are increased by inadequate personal protection gear (such as masks, goggles, and gloves) the lack or poor use of which can result in long-term damage to the neurological system, liver, and kidney. Furthermore, the substance called formaldehyde that is often used in the construction industry and boat building, is a recognised carcinogenic chemical that can cause respiratory problems in the short-term while long-term exposure can lead to cancer. The construction industry continues to import asbestos containing construction material, and this is mainly in the form of sheets and corrugated sheets. Asbestos is a proven carcinogen, and the inhalation of airborne asbestos fibres can cause fatal respiratory diseases.

Table 21 Categories of chemical products imported by the boat building sector in 2021

CATEGORY	NAME OF PRODUCTS	WEIGHT (KG)
Hardeners	Catalyst (hardener)	270.00
	Chockfast orange (hardener)	5.00
	Hardener	1,420.00
Resins	Chockfast orange (resin)	5.00
	Crystic 349E PA (Resin)	2,750.00
	Cyrstic 2.446PA (Resin)	54,200.00
	Epoxy Resin	220.00
	Resin	201,105.00

	Siropol (Resin)	64,900.00
	Unsaturated Polyester resin	295,745.00
Gelcoats	Crystic (Gelcoat)	78,160.00
	ISO (Gelcoat)	30,420.00
	Polycor (Gelcoat)	54,200.00
	Sirogel (Gelcoat)	4,060.00
Others	Crestafix 621CC 45 (Bonding agent)	1,300.00
	Crestomer 1152PA (Adhesive)	200.00
	Seajet 117 (Multipurpose epoxy primer)	150,755.00
	Styrene (Monomer)	1,355.00

Information was collected from the boat building community on the way handling and management of chemicals takes place across the industry (Table 22). They indicated that chemicals were purchased from outlets in their resident island or from capital city Malé. The items are transported on cargo ships and kept in separate chemical storage rooms or sometimes stored in the boat-building area. The chemicals are used as per standard user instructions, and the waste chemicals are sent to the respective island council for disposal. In terms of public health hazards associated with improper chemical handling, there was a broad understanding of correct chemical handling practices and the associated dangers. In addition to taking precautionary steps, chemical handlers used protective equipment. Reducing chemical waste and finding ways to dispose chemical waste was cited as a significant obstacle. Moreover, their suggestions for improvements included the introduction of sound disposal methods for chemical waste, increasing availability of community-level methods to dispose chemical waste, and proper monitoring of chemical use within the sector.

Table 22 Summary of Information from interviews with the boat building sector

INDUSTRY	BOAT BUILDING
Main types of Chemicals used / supplied	Fiber, hardeners, thinners, pigment, accelerator, resin, gel coat
Chemical Management	<p>Purchase: Island shops or Malé</p> <p>Transport (if any): Products are brought in by cargo boat</p> <p>Store: Separate storage room for chemicals, some chemicals are kept in the boat building area</p> <p>Use (follow instructions): Follow instructions on the labels or instructions given by supplier</p> <p>Dispose (if any): Council takes initiative to burn waste, Fibre glass waste is kept in the waste dumping area</p>

Trainings received/ provided	Vocational training by Maldives Institute of Technology, trainers from Sri Lanka
Awareness received on usage and risks	Not to mix chemical hardeners or accelerators. Careful storage of certain chemicals, some chemicals should not be placed together. Do not keep chemical hardeners at home
Safety measures practiced	Use of masks, safety gloves, safety wear. Proper ventilation where chemicals are being used or kept
Level of awareness and public health related incidence	Lung or respiratory problems may occur if using chemicals without proper ventilation. Allergies or skin issues may occur if using chemicals without gloves
Challenges in using chemicals	Challenges in the availability of products Issues with transportation of products due to weather Materials are expensive Reducing chemical waste and finding ways to dispose chemical waste
Suggestions how it can be monitored and improved in the future	Proper disposal methods of chemical waste Community-level methods of disposing chemical waste Proper research and monitoring of chemical use

7.6. Educational sector and laboratory services

In 2021, a total of 12.15kg and 9.08l of chemicals were issued import permits to be used for educational purposes. This involved the import of a relatively small volume of chemicals compared to imports from other sectors, and included ethanol, calcium carbonate and magnesium oxide

The National Health Laboratory at MFDA, and some private laboratories, use chemicals for various analytical investigations. In 2021, the quantity of chemicals for which import permits were issued to serve the needs of laboratory analytical work totalled 30,270.55l and 120.59kg. Most common types of chemicals imported for the purpose include solvents such as ethanol, methanol, and reagent alcohol. Chemicals imported for laboratory use include small amounts of formaldehyde and nickel chloride, both of which are widely considered to be potentially carcinogenic substances.



⚠ DANGER
Chemical storage.

8. Storage and Transportation of Chemicals

It is mandatory for the importers of hazardous chemicals (bringing in over 200kg) to have a registered chemical storage facility that has been inspected and approved by the Ministry of Defence. Before registration and approval can occur, the storage facility undergoes inspection by MNDF Fire and Rescue Service against specific requirements laid out in the Hazardous Chemical Regulation 2019/R-1057⁴⁰.

Following 2019's fire incident that occurred in Henvairu, hazardous chemicals storages have been moved out of capital city Malé and are required to be situated away from residential areas. Hence, there are no registered storage places in Malé that are designated for the storage of hazardous chemicals. However, minor quantities of chemicals are stored in Malé, especially small volumes of chemicals that are used by testing laboratories, but such hazardous chemicals cannot be stored in a residential building.

As per current regulations, storages housing hazardous chemicals (chemicals classified between IMDG Class 2 and 9) should have a minimum distance of 20ft (6.1 metres) distance a residential location. Presently, there are registered storages for hazardous chemicals in the Hulhumalé industrial zone, Thilafushi, certain specific islands (Himmafushi, Thulushdhoo, Dhiffushi, Kashidhoo, Alifushi, Guraidhoo) and Addu atoll.

Furthermore, several stakeholders consuming chemicals in their operations reported using their own registered storage facility. Notable storage locations include MoFMRA's pesticide storage in Funadhoo (Shaviyani Atoll), MWSC's storage facilities in Hulhumalé and Gulhifalhu (the latter holding the larger amount of chemicals) and an interim storage facility managed by Maldives Ports Limited at Malé's ports area. These were described as having sufficient ventilation and a proper drainage system as precautionary measures for chemical storage and were said to meet MNDF's requirements for chemical stores. These facilities also require chemicals stored in the facilities to be properly segregated and labelled.

⁴⁰ Amendment to the Hazardous Chemical Regulation 2019/R-1057. <https://www.gov.mv/en/files/2151.pdf>

The designated storage space made available when a temporary storage of chemicals is required at Malé ports, is an open-air shed made with concrete and a drain. Chemicals belonging to different classes are stored separately. In general, chemicals are kept at the ports for periods ranging between 24 hours up to ten days. The port has the capacity to handle any minor spillage in the area, alongside MNDF efforts, including being outfitted with personal protective gear and spill kit.

Dangerous cargo and chemicals are taken directly from the ports by the consignee and transported via sea to their approved storage facility. There is no information about the way chemicals are handled by the untrained staff or boat crew that handles these products during transportation. Awareness and trainings on the safe handling of chemicals need to be generated and disseminated among the people working in this sector.

In terms of safety in chemicals transportation, due to the dispersed nature of the islands and related safety restrictions, chemicals are imported into the country and then upon arrival, transferred to their respective destinations via sea transport.

9. Management and Disposal of Chemical Waste

The issue of chemical waste disposal continues to persist in the sound management of chemicals, causing potentially adverse impacts on the environment and human health. One of the limitations in Maldives' with regard to the management and disposal of chemicals waste is due to the lack of adequate infrastructure for the collection as well as disposal of chemical waste. The Environmental Protection and Preservation Act (Law no 4/93) stipulates that any type of waste, oil, poisonous gases, any substances that may have harmful effects on the environment, hazardous/toxic or nuclear waste shall not be disposed within the territory of Maldives.

Most of the inhabited islands have Island Waste Management Centres (IWMCs) for the collection and disposal of waste. However, adequate machinery and technical expertise are limited in these facilities deterring effective waste management. Waste generated from across the Greater Malé Area and its surrounding region are collected and then transported to the Thilafushi Waste Management Site.

Over the last decade, the amount of waste generated in the country has risen exponentially (by 155% in capital city Malé and 57.6% in the atolls) and produces volumes that require handling beyond Maldives' current capacity. The annual growth of waste generation is projected at a staggering 4% per year. The tourism sector generates 17.84% of total waste with the highest per capita waste generation in resort islands, amounting to 3.5kg per person per day. Solid waste is currently generated at a rate of 1.8kg per person per day in capital city Malé and 0.8kg per person per day on the other inhabited islands. Open burning, stockpiling, and dumping waste near the shoreline are still among the most common methods of waste disposal practised in residential islands, and leads to further pollution of air, ground water resources and the marine environment. Over this period, hazardous waste and plastic waste accounted for respectively 1.41% and 4.33% of the waste from residential islands of Maldives⁴¹.

The Thilafushi landfill island currently has a designated interim storage facility that holds hazardous waste until they are exported for disposal. However, the country does not have a proper storage and disposal facility that meets the required standards. MoECCT is currently working on establishing a Hazardous Chemicals and Waste Management System for the treatment of chemicals waste prior to their final disposal which would help to address the issue in the future. .

⁴¹ Shumais, M., Riyaz, M., & Leeza., A. (2022). *Waste Audit for Residential Islands in Maldives*. Geotech Maldives.

It was noted that MNDF Fire and Rescue Service currently takes up most of the responsibility in the endeavour to dispose of hazardous chemicals. Any expired chemicals or hazardous waste are collected by MNDF and transported to Thilafushi. However, the mechanism for collecting and disposing chemical waste is not well organised. Currently, there is no proper system for reporting and collection, which causes a delay in providing services when requested by agencies or private parties that handle chemicals.

One of the perilous risks posed by chemicals occur through the mismanagement of waste and waste disposal. Current waste disposal methods, such as open-air burning and burying, can discharge hazardous pollutants into the air as well as toxic substances that can leak into groundwater through the soil. The resulting unintentional POPs have been linked to respiratory and heart diseases, cancer, neurological damage, birth defects, and problems with the immune system. As these toxic fumes are released from the burning of waste, the oil that is used to burn the waste also leaks into the ground water and ultimately into the sea, especially due to the high permeability of limestone and absence of underground protection measures. Another by-product of unsustainable practices in both waste management and industrial processing is that it can generate unintentional hazardous chemicals, such as dioxins and furans (PCDD/F), which are toxic to human health and the environment.

Till date, no proper records on chemicals waste that is generated in the country has been maintained. This issue is reinforced by the country's present waste disposal procedures. Households, for example, do not separate chemicals waste from municipal waste stream. As a result, waste disposal sites continue to receive mixed waste from islands, which is often disposed of without segregation.

Pharmaceutical products are disposed of by the MFDA with the support from WAMCO. MFDA maintains an inventory of pharmaceutical products that are requested for disposal.

Stakeholders pointed out the absence of mechanisms for proper chemical waste disposal as a major concern associated with better chemical management. They noted, foregoing segregation of wastes, delays in response for the relevant authorities and lack of contamination tracing as key challenges associated with the safe disposal of chemicals waste.

10. Chemical related Incidents

The sound management of chemicals is crucial for the long-term protection of public health and to ensure the protection of environment. In addition to the risks outlined above, the mismanagement of chemicals can lead to incidents and disasters which can be fatal to people's lives, and any damages caused to property can also impact on the environment. While such incidents may not be common, chemical-related accidents have occurred in the Maldives as well. In 2019, a fire that began in a chemical warehouse caused the death of one individual and rendered over 400 people homeless. In addition, the MoD reported a total of 13 incidents related to chemicals that took place over the last 5 years. Table 23 provides a brief overview of the chemical-related incidents and accidents.

Table 23 Chemical related incidents and accidents reported from 2016 to 2021

YEAR	LOCATION	DETAILS OF INCIDENT AND ACCIDENTS
2016	At a warehouse	A 27-litre bleach tank burst, causing leaks onto the road drainage system
2016	At a pickup	Incident relating to chemical packets
2017	At a pickup	Coolant leaking due to a leak in the pickup radiator
2018	At a road	Spillage of chemicals used in construction
2019	Roashanee Building	Malathion leak
2019	At a warehouse	A container with calcium hypochlorite burst and leak
2020	Ice plant (Addu City)	Ammonia leak
2020	At a residential house	Chemical odours
2020	At a residential house	Chemical odours
2020	At a warehouse	Spillage of Foam liquid due to a leak in a 200 Litre Foam Barrel
2020	MPL	Water leaking into sodium packets, causing a fire
2020	At a powerhouse in a resort	Chemicals stored in powerhouse caught fire
2021	At a pickup	Can of bug spray exploded
2021	At a house	Chemical odours
2021	At a school	Leak in nitride and nitrogen cylinder

It is evident from reports of chemical-related incidents, that they were caused by the mismanagement of chemicals. Leaks or spills of chemical substances, chemical odours, and similar events that occur in public areas, or in vehicles, on roads, in schools and residential houses all pose major public health risks. As such, the management of chemicals must involve the utmost care and attention, particularly in ensuring and monitoring the safe storage of chemicals and in the secure transportation of chemicals. Such incidents serve as stark reminders of the importance and of delivering guidance, instructions and setting a mechanism that ensures the safe and secure management of chemicals and hazardous substances.

MPL reported a fatal situation in 1997 that involved mishandling of a chemical-carrying container in a cargo ship that caused it to explode. This occurred during unauthorised maintenance work and resulted in the death of an engineer on deck. This emphasises the need for awareness and importance of following due process and procedure when handling chemicals.

The fire accident that occurred in the Henveiru Ward of capital city Malé in 2019 was a wakeup call for agencies on the hazards that such incidents may wreak in the Maldives. Not only did the chemical-related accident result in one fatality, it necessitated a temporary, but potentially traumatic, loss of home for 400 residents. The fire originated in a three-storey chemical storage facility and destroyed seven residential buildings as well as several commercial facilities (garages, storage facilities)⁴² before it was extinguished. This incident led to the moving of most chemical storages out of Malé and away from residential areas.

According to the NDMA, none of the authorising agencies had been aware of hazardous chemicals being stored in the specific facility where the incident took place. The environmental impacts of such incidents are not easily identifiable due to the lack of biodiversity in urban areas but there is definitely irreversible infrastructural damage and evidence of impacts on the health of local communities. Therefore, the public should be made aware of these dire consequences and action must be taken to prevent the storage of hazardous chemicals in proximity to residential areas.

⁴² PSM News (2019, sep 23) MNDF launches chemical storages inspection in Malé City. <https://psmnews.mv/en/57338>

There is a pressing need for people to be made aware about the impacts of chemicals on their health and the environment. Awareness needs to be created on the safe and correct use of chemicals, along with ways to report indicators of misuse or mishandling (recognising potential leaks and identifying effects on health and environment) so that further action can be taken to mitigate the risks.

11. Initiatives by Stakeholders on Chemical Management

There are a few ongoing projects or initiatives targeted towards strengthening governance of chemicals management in the Maldives, led by government agencies and other stakeholders engaged in the field.

MoECCT has an ongoing project related to chemicals management. The EPA is currently working on developing an SOP that outlines a step-by-step procedure for a marine oil spill response. Both entities are also working on creating an air quality monitoring network throughout the country.

The Ministry of Fisheries, Marine Resources and Agriculture routinely conducts awareness programs in all major agricultural islands on the best practices and safe handling of pesticides. As per the Ministry, although these farm plots are owned by locals, there is little supervision of the farm workers, who are mostly expatriates. Their awareness on the proper handling of chemicals is low, at best, and oftentimes the information provided by the ministry on these matters do not reach them. The Ministry also has an ongoing project on antimicrobial resistance (focusing on livestock), supported by FAO, which may be relevant as some farmers use antimicrobial agents for plant diseases (for example, oxytetracycline and streptomycin for citrus greening in lemon plants). Another scheme initiated by MoFMA is "GAP" (Good Agricultural Practices scheme), a voluntary certification program for farmers to adopt safe and sustainable food production.

AgroNAT has conducted seven long-term trainings and held a total of 115 one-on-one information sessions carried out to all the coordinators in local farms, to raise awareness regarding agricultural chemical usage and relevant safety practices.

12. Sound Management of Priority Carcinogenic and Highly Toxic Chemicals

The term carcinogens refers to substances that can cause cancer, and even small amounts of a carcinogen can be extremely harmful to human health. Risks associated with such compounds typically do not emerge until several years after exposure. Certain chemicals, such as benzene, beryllium, asbestos, vinyl chloride, and arsenic, are associated with causing cancer in humans⁴³. Risk of developing cancer in an individual may be raised by household, occupational or environmental exposure to certain chemicals.

Chemical toxicity indicates the capacity of a substance to cause harm to the body. Substances with an oral LD50 greater than 50 mg/kg, a lethal concentration of greater than 200ppm, or any chemical with unknown properties, are considered highly toxic. Over 170 chemicals are classified by the International Agency for Research on Cancer (IARC) as known or probable human carcinogens (Groups 1 and 2a, respectively while approximately 250 further substances are classified as possibly carcinogenic in humans (Group 2b)⁴⁴.

A substantial proportion of these recognised carcinogens are related to occupational exposure. For example, at least 45 of the 113 agents recognised by the IARC as human carcinogens (Group 1) involve chemicals expressly used in the workplace or which require handling in specific occupations and industries⁴⁵.

The risk posed by chemical carcinogens varies depending on the quantity, chemical properties, or exposure levels. High-risk situations involve the use of a highly potent chemical carcinogen, large quantities of chemical carcinogens, the use of compounds with high vapor pressure or procedures that have an increased potential for aerosol production or contamination. A basic approach to protecting workers from occupational carcinogens is to eliminate the use of the carcinogenic material, or to control exposure to a level where the risk is acceptable, as classified by an Occupational Exposure Limit (OEL).

43 Hosseini, B., Hall, A. L., Zendejdel, K., Kromhout, H., Onyije, F. M., Moradzadeh, R., Zamanian, M., Schüz, J., & Olsson, A. (2021). Occupational exposure to carcinogens and occupational epidemiological cancer studies in Iran: A Review. *Cancers*, 13(14), 3581. <https://doi.org/10.3390/cancers13143581>

44 International Agency for Research on Cancer. (2022). IARC Monographs on the identification of carcinogenic hazards to humans, Volumes 1–132. <https://monographs.iarc.who.int/agents-classified-by-the-iarc/>

45 Purdue, M. P., Hutchings, S. J., Rushton, L., & Silverman, D. T. (2015). The proportion of cancer attributable to occupational exposures. *Annals of Epidemiology*, 25(3), 188–192. <https://doi.org/10.1016/j.annepidem.2014.11.009>

Maldives does not have a national registry of cancer patients and consequently, no precise data on cancer incidence patterns is currently available. In addition to recording data related to cancer, it is essential to investigate the risk factors, especially related to occupational exposure risk. The Health Research Priorities in Maldives 2022-2025 report identifies cancer research as the top clinical research priority to address this data gap.

In 2020, the Global Cancer Observatory reported 496 new cancer cases and 264 cancer-related deaths⁴⁶. According to WHO, 40% of premature deaths in 2020 caused by non-communicable diseases in the Maldives were attributed to cancer⁴⁷. Breast cancer was the most common cancer type among females, with 83 cases (16.7%), while lung cancer was the most common cancer seen in males, with 37 cases (14.4%). In 2017, occupational exposure was responsible for 2.9% of cancer deaths in the country⁴⁸.

12.1. Inventory of Carcinogenic Chemicals

There are several agencies, including IARC, that compile lists of carcinogens. These assessments are based mainly on an evaluation of an agent or some other exposure circumstance's potential to cause cancer (the hazard). The following list is of carcinogens currently imported to the Maldives is based on IARC's compilation of known carcinogens.

- Pesticides classified as possible human carcinogen
- Asbestos in several forms
- Styrene
- Formaldehyde
- Nickel compounds as Sulphates of Nickel and Nickel Chloride
- Cadmium compounds in the form of standard solutions
- Chromium (IV) compounds in the form of a standard solution

⁴⁶ Global Cancer Observatory. (2020). Estimated number of deaths in 2020, all cancers, both sexes, all ages: Maldives. International Agency for Research on Cancer. <https://gco.iarc.fr/>

⁴⁷ World Health Organisation. (2020). Cancer Country Profile 2020: Maldives https://cdn.who.int/media/docs/default-source/country-profiles/cancer/mdv-2020.pdf?sfvrsn=f15d07d1_2&download=true

⁴⁸ *ibid*

Pesticides

Pesticides are widely used for agriculture, health, and domestic purposes. Pesticides are described as chemical agents used to prevent, eradicate, repel, or neutralise any pest, including insects (involving insecticides), rats (involving rodenticides), and weeds (involving herbicides), as well as microorganisms" (involving algacides, fungicides, or bactericides). According to worldwide statistics, roughly 1.8 billion people are involved in agriculture, and most use pesticides to safeguard the food and commercial goods that they produce⁴⁹.

Pesticides are toxic, and exposure to them may have adverse effects on one's health. Farmers who handle pesticides for their crops, people residing near crop areas where pesticides are being used, and those who engage in domestic pest control measures are the most exposed demographics. Even if the detrimental effects of pesticides are not evident in the short-term, the exposed population may develop several chronic diseases over time. Acute health impacts include burning eyes, rashes, blisters, blindness, nausea, dizziness, and diarrhoea while more chronic health effects include malignancies, congenital disabilities, reproductive damage, as well as neurological and endocrine disruption⁵⁰. Several studies have shown links between pesticides and cancer; however, the data available is insufficient to establish a definitive connection⁵¹. Moreover, multiple studies have linked the use of pesticides to various cancer types, including leukaemia, lymphoma, brain tumours, breast cancer, and prostate cancer⁵².

Pesticide exposure is one of the major environmental risk factors that contribute to the increased incidence of cancer in all industrialised countries and is now recognised as a severe global environmental health problem⁵³.

⁴⁹ Varghese, J., Sebastian, E., Iqbal, T. & Tom, A. (2021). Pesticide applicators and cancer: a systematic review. *Reviews on Environmental Health*, 36(4), 467-476. <https://doi.org/10.1515/reveh-2020-0121>

⁵⁰ Weichenthal, S., Moase, C., & Chan, P. (2010). A review of pesticide exposure and cancer incidence in the Agricultural Health Study cohort. *Environmental Health Perspective*, 118(8), 1117-1125. doi: 10.1289/ehp.0901731.

⁵¹ Burns C.J. & Juberg D.R. (2021). Cancer and occupational exposure to pesticides: an umbrella review. *International Archives of Occupational and Environmental Health*. 94(5),945-957. doi: 10.1007/s00420-020-01638-y.

⁵² Bassil K.L., Vakil, C., Sanborn, M., Cole, D.C., Kaur, J.S., Kerr, K.J. (2007). Cancer health effects of pesticides: systematic review. *Canadian family physician* .53(10),1704-11. PMID: 17934034; PMCID: PMC2231435.

⁵³ Jaga, K., Dharmani, C. (2005). The epidemiology of pesticide exposure and cancer: a review. *Reviews on Environmental health*. <https://doi.org/10.1515/reveh.2005.20.1.15>

Several international studies have revealed that farmers and pesticide applicators, pesticide manufacturing employees, and market gardeners are more likely to develop and die from certain malignancies than the general population⁵⁴.

Although the Ministry of Fisheries, Marine Resources and Agriculture has imposed limitations on certain pesticides based on their toxicity, there are no restrictions on pesticides based on their potential to cause cancer. More than 14 types of potentially carcinogenic pesticides were imported in 2021. Table 24 summarises the number of pesticides for which import permits were issued in 2021, with cypermethrin (2,764l) being the most significant pesticide imported by quantity in terms of volume and weight.

Table 24 Amounts of potentially carcinogenic pesticides issued imported permits to the Maldives in 2021

CHEMICAL	CANCER CLASSIFICATION	QUANTITY (L)	QUANTITY (KG)
Alpha-Cypermethrin	Group C: possible human carcinogen	2,064.00	-
Bifenthrin	Group C--Possible Human Carcinogen	290.00	-
Captan	Likely at prolonged, high-level exposures, but not likely at dose levels that do not cause cytotoxicity and regenerative cell hyperplasia	-	101.00
Carbendazim	Group C--Possible Human Carcinogen	-	29.00
Cypermethrin	Group C--Possible Human Carcinogen	2,764.00	-
Diazinon*	Group 2A: Probably carcinogenic to humans	1,220.00	-
Dimethoate	Group C--Possible Human Carcinogen	1,131.00	-
Fipronil	Group C--Possible Human Carcinogen	1,447.00	105.00
Malathion	Suggestive Evidence of Carcinogenicity, but not sufficient to assess Human Carcinogenic Potential	342.00	-
Mancozeb	Group B--Probable Human Carcinogen	50.00	650.00
Nitrobenzene*	Reasonably anticipated to be carcinogenic to humans	110.00	225.00
Permethrin	Likely to be Carcinogenic to Humans	150.00	56.00
Propiconazole	Group C-- Possible Human Carcinogen	4.00	-
Tebuconazole	Group C-- Possible Human Carcinogen	4.00	-

⁵⁴ Varghese, J., Sebastian, E., Iqbal, T. & Tom, A. (2021). Pesticide applicators and cancer: a systematic review. *Reviews on Environmental Health*, 36(4), 467-476. <https://doi.org/10.1515/reveh-2020-0121>

Asbestos

Asbestos refers to six naturally occurring minerals that may be split into thin, durable threads for commercial and industrial applications. These fibres are heat-, fire-, and chemical-resistant, and do not conduct electricity. Due to these features, asbestos is used extensively in a variety of sectors.

The U.S. Department of Health and Human Services (HHS), the U.S. Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC) all recognise asbestos as a human carcinogen (1, 2, 3). There is sufficient evidence, according to the International Agency for Research on Cancer, that asbestos causes mesothelioma (a relatively rare cancer of the thin membranes lining the chest and abdomen) as well as lung, throat, and ovarian cancers⁵⁵. In fact, asbestos exposure is considered responsible for most mesotheliomas⁵⁶. Asbestos exposure may also raise the chance of asbestosis (a lung disease characterised by shortness of breath, coughing, and persistent lung damage) and other noncancerous lung and pleural disorders.

Individuals may be exposed to asbestos in their homes, communities, and places of employment. Asbestos fibres are released into the air upon agitation of asbestos-containing materials. Asbestos fibres that are inhaled may become trapped in the lungs and can remain there for a lengthy period. Inhaling asbestos fibres in the air is toxic. Sealed and undamaged asbestos materials carry negligible risk, while in-situ asbestos cement products similarly represent minor risk (provided they are also in good condition). However, if the corrugated sheet is ripped, sawed, drilled, or otherwise disturbed, the asbestos becomes friable and poses a danger to health. Furthermore, heat, weathering, and ageing may also cause asbestos-containing sheets to degrade and release asbestos fibre dust into the atmosphere. The sheets must be kept wet throughout removal to prevent asbestos fibres from becoming airborne.

⁵⁵ IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2012). Arsenic, metals, fibres, and dusts. *IARC monographs on the evaluation of carcinogenic risks to humans*, 100(Pt C), 11–465.

⁵⁶ Robinson B. M. (2012). Malignant pleural mesothelioma: an epidemiological perspective. *Annals of Cardiothoracic Surgery*, 1(4), 491–496. <https://doi.org/10.3978/j.issn.2225-319X.2012.11.04>

There is currently no limit on the import of asbestos containing materials to the Maldives. Table 25 shows the total amount and value of asbestos materials imported from 2017 to 2021. Asbestos-cement sheets (21,7661.20 square metres) constituted the largest amount of imported asbestos products.

Table 25 Amounts and value of asbestos products imported in to the Maldives from 2017 to 2021

ASBESTOS PRODUCTS	QUANTITY (UNIT)		CIF (MVR MILLIONS)
Corrugated sheets of Asbestos -cement	126,445.03	(m ²)	42.75
Sheets of Asbestos-cement	217,661.20	(m ²)	9.42
Tube and Pipe-rigid	39,277.60	(Metres)	3.11
Tiles	3,536.23	(m ²)	0.29
Ceiling strip of asbestos	26,625.00	(Metres)	0.39
Hose	22,743.00	(Metres)	0.45
Articles made of asbestos-cement	8,388.00	(No. of pairs)	0.96
Footwear	5,338.00	(Number)	0.74
Headgear	18,562.00	(Number)	0.26
Clothing and clothing accessories	66,379.00	(Number)	0.00
Fabricated asbestos fibers; mixtures with basic & magnesium carbonate; article of such	137,855.00	(Number)	0.38
Masks	573,729.00	(Number)	2.03
Tape	6,665.00	(Number)	0.37
Cord and string whether or not plaited	13,584.00	(Number)	0.08
Gland packing	1,145.00	(Number)	0.29
Tube and pipe fittings	114,601.00	(Number)	3.62
Panel of asbestos	769.00	(Number)	0.21
Cornices	300,511.50	(Number)	6.68
TOTAL			71.80

Table 26 Sheets of asbestos-cement and corrugated sheets of asbestos-cement imported to the country Maldives from 2017 to 2021

SHEETS OF ASBESTOS-CEMENT			CORRUGATED SHEETS OF ASBESTOS-CEMENT		
YEAR	QUANTITY (M ²)	CIF (MVR MILLIONS)	YEAR	QUANTITY (M ²)	CIF (MVR MILLIONS)
2017	12,325.30	1.71	2017	58,978.82	20.51
2018	46,722.62	2.89	2018	16,980.62	6.17
2019	25,993.76	1.25	2019	45,949.93	15.24
2020	47,794.76	1.95	2020	4,479.84	0.62
2021	84,824.80	1.63	2021	55.80	0.20
TOTAL	217,661.20	9.42	TOTAL	126,445.03	42.75

Styrene

Styrene (vinyl benzene) is an industrial chemical used extensively in the manufacture of synthetic rubber, polyesters, plastics, and various industrial resins. In the Maldives, styrene is predominantly imported for use in the fibreglass boatbuilding industry. Figures from the chemical permit data indicate that in 2021, a total of 1,955.00kg of styrene was imported into the country for consumption by the boat building industry.

Styrene is designated as possibly carcinogenic to humans (Group 2B) by IARC⁵⁷. High mortality and increased incidences of leukaemia or lymphoma, with suggestive evidence for pancreatic and oesophageal tumours, were reported amongst workers handling styrene⁵⁸. Although the quantities of styrene imported to the country are relatively low, measures must be taken to prevent occupational exposure to workers in the boat building industry. Further, local communities on islands where fibre glass boat building activities are carried out, should be protected, and advocating for their safety is paramount. At present there is a requirement for fibreglass boatbuilding sites to be situated at least 150ft (45.7 metres) away from residential areas.

⁵⁷ International Agency for Research on Cancer.(2022). *IARC Monographs on the Identification of Carcinogenic Hazards to Humans. Agents Classified by the IARC Monographs, Volumes 1–132*. <https://monographs.iarc.who.int/agents-classified-by-the-iarc/>

⁵⁸ Huff, J., & Infante, P. F. (2011). Styrene exposure and risk of cancer. *Mutagenesis*, 26(5), 583–584. <https://doi.org/10.1093/mutage/ger033>

Formaldehyde and Other Chemicals

Formaldehyde is used primarily in pressed wood goods including plywood and fibreboard, glues and adhesives, permanent-press textiles, paper product coatings, and some insulating materials, as well as intermediates in the production of other chemicals. Tiny quantities of formaldehyde are also utilised in agriculture, laboratory reagents, cosmetics, and photography. Formaldehyde exposure is related to a variety of health problems, including respiratory illnesses, and chronic exposure has the potential to cause cancer. IARC classifies it as a known human carcinogen, while the US EPA classifies it as a potential human carcinogen.

The following quantities of formaldehyde and other known carcinogenic chemicals were permitted for import in to the country in 2021:

- Formaldehyde - 170l
- Formalin tablets - 2200g
- Nickel compounds such as Nickel Chloride - 100g

12.2. Other Highly Toxic Chemicals

Mercury

Mercury found in the Maldives originates from mercury-containing items and technology, including batteries, compact fluorescent lights (CFL), sphygmomanometre, thermometer, and dental amalgam that were imported to the country⁵⁹. Major contributors to mercury inputs include waste incineration and open burning of waste; the application, use, and removal of dental amalgam fillings; other fossil fuel and biomass; and combustion emitted via air, water, and general waste. Maldives' mercury inventory indicated output-pathways as being emissions to air, direct release to water, direct release to land and identified other outputs including products, general waste, and sector-specific waste treatment⁶⁰. In this respect, it is important to note that open-air burning of general waste is chief among the local causes of air pollution, and therefore of mercury emissions. The second greatest source of mercury pollution in the Maldives originates from the use and disposal of mercury-containing items such as batteries, paints, and other laboratory and medical equipment.

⁵⁹ Ministry of Environment (2019). *Minamata Initial Assessment Report 2019. Republic of Maldives.: Maldives Mercury Assessment.*
<https://www.environment.gov.mv/v2/en/download/10252>

⁶⁰ Ibid.

In 2017, import permits to the Maldives were issued for 1,502l of mercury (the element) and in 2021, mercury was imported in the form of standards solution (200ml) and mercury (II) iodide (100g). Emission to the atmosphere from waste incineration and open waste burning contributed to roughly 1,090kg Hg/y, or nearly 96% of the total quantity of mercury emitted into the atmosphere. It is estimated that, on a yearly basis, the "use and disposal of mercury containing" contributes 37.2kg Hg to the atmosphere, or 3% of the total amount.

Mercury may be released into the atmosphere due to the combustion of mercury-containing goods or the diffusion of mercury vapour, such as in the case of small-scale fuel burning, electric lamp breaking, dental preparation for laboratory use, landfills, and so on. Discharge into water via 'wastewater treatment systems' (22.6kg Hg/y), the 'use, and disposal of other products' (19.6kg Hg/y), and 'use, and disposal of dental amalgam fillings' (1.6kg Hg/y) are the primary sectors responsible for mercury discharges into water.

According to the HPA, mercury containing thermometers and sphygmomanometers are still being used by some healthcare facilities, despite the Ministry of Health having discontinued the procurement of equipment containing mercury for state-owned-facilities many years back, as this requirement was not imposed on equipment procured for other facilities and through other sources. However, the implementation of "Mercury Free Policy for Health Care 2018" is still in progress. This project seeks to compile of a complete inventory of public and private sector usage, including some of the health-care facilities located in resorts. Nevertheless, mercury management guidelines for health care facilities were developed and disseminated.

Global attempts have been undertaken to restrict mercury emissions through the Minamata Convention on Mercury, which recognises the chemical as a hazardous pollutant that has harmful environmental and neurological effects when released into the air and water. Maldives has not ratified the Convention yet, but has expressed its intention to ratify the Convention in 2016.

12.3. Occupational Exposure and Challenges

Given the increased incidence of cancer globally and locally in recent years, the management of carcinogenic substances has emerged as a pressing challenge. Currently, there are some restrictions on the importation, usage, or placement of carcinogenic substances on the local market. Pesticides on the banned list issued by MoFMRA are prohibited from import and consumers must apply for a permit for the import of other pesticides or chemicals that are classed as hazardous. The Agricultural Pesticide Control Act places onus on the pesticide consumer to take all necessary safety measures whilst handling the chemicals.

Construction Site Health and Safety Regulation⁶¹ covers some occupational health and safety aspects such as respiratory protection where required for workers in the industry. However, weak enforcement combined with the absence of a comprehensive legislation to cover occupational health and safety in major economic sectors, are contributing factors that need to be addressed. As a considerable amount of potentially carcinogenic chemicals or products are being consumed in some sectors, stringent control is required to limit occupational exposure to hazardous chemicals. Limitations in available data makes it challenging to identify the exact quantity and types of carcinogenic substances that are being utilised in the country and thereby determine possible levels of exposure. Issues such as the lack of a carcinogenic-chemical inventory, absence of a harmonised mechanism for managing chemicals, and the ambiguity of chemicals used by sectors as well as populations that are exposed to carcinogenic chemicals, remain a serious obstacle to the sound management of priority carcinogenic chemicals. Moreover, the lack of mechanisms to determine the usage and levels of pesticide residues in the environment needs to be addressed to ensure the effective regulation of carcinogenic pesticides.

⁶¹ Construction Site Health and Safety Regulation (2019). Ministry of National Planning, Housing and Infrastructure. <https://planning.gov.mv/storage/uploads/Ko2xGdYQ/cuql7idi.pdf>

13. Key Challenges in Sound Management of Chemicals

There are several challenges and impediments to the sound management of chemicals in the Maldives. As current mechanisms demonstrate severe gaps, effecting good governance, monitoring, evaluation, and allocating resources that can pave the way for effective chemical management is extremely challenging.

Absence of overarching chemical legislation and fragmented governance structure

The **absence of an overarching legislation**, as well as the cross-cutting and **fragmented structure of governance** and regulations in connection to chemical management, continue to be significant obstacles to tackling chemical management challenges. In addition to the overlapping nature of institutional mandates, weak coordinating mechanisms are also an issue of concern. Due to the absence of comprehensive chemical management legislation, the regulatory system remains inadequate. Laws pertaining to the movement and disposal of chemicals in the Maldives are also inadequate. Currently, there are no penalties for violations related to chemical imports. This must be addressed to ensure better management of chemicals and the requirements for fining the consignees should be included. Some existing sectoral laws pertaining to chemical management are not effectively enforced or monitored.

Consequent to the above, the Maldives is in urgent needs of a consolidated chemical management framework at the national level, as well as domestic laws, to meet international obligations. Enactment of the Overarching Chemicals Management Bill for The Maldives that is currently under development is expected to alleviate the regulatory inadequacies to some extent.

Lack of centralized data management

One of the most critical barriers to the development of better-informed policies is the **lack of centralised data management**. At present, data about chemicals is managed by a number of institutions. With the establishment of the online 'Makudi Portal' platform, via which import permits for hazardous chemicals and chemical storages are issued and relevant import data is managed, there were some developments in data management. However, there is also the absence of a national chemicals database indicating usage and disposal. Significant data gaps in chemical management may be attributed to lower levels of coordination among various stakeholders. As a result, it is necessary to initiate a planned and determined effort to integrate data collection and collation procedures across multiple organisations and agencies, ideally achieved through a single window system.

Limitations in suitable resources, inadequate technical competence, infrastructural, financial, and institutional capacity

The **limitations in terms of suitable resources, inadequate technical competence, and infrastructural, financial, and institutional capacity** remain significant constraints to achieving comprehensive and sound chemical management. There is a clear need to improve technical competence in the domain of chemical management. Systematic processing of chemical management through workers and infrastructural capacity to ensure its safe handling, storage and disposal is equally necessary. A delay in communication or resource constraints can be life-threatening.

Crucial infrastructure for chemical waste storage and disposal must be established in the country. Furthermore, the high expense and difficulty of transporting chemicals and waste across islands, as well as insufficient storage alternatives, make it challenging to securely dispose of waste and hazardous chemicals. This is further aggravated by the country's dispersed geographical nature and the low-lying disposition of islands.

It is challenging to handle dangerous cargo (including chemicals) at the main entry point of import due to restrictions in space, as the current storage area is not isolated and does not meet regulatory requirements. Plans made for the future include designating a storage space for different classes of chemicals as well as better restriction and isolation of the storage space to avoid any incidents that may cause collateral damage. This issue will be addressed when the port is moved to the new facility, which is expected to be developed in Gulhifalhu within three years. In addition, the technical expertise of staff tasked with handling chemicals at the entry points needs to be strengthened. Although the ports authority currently has health and safety inspectors who are active in the area, a safety manager with the correct technical knowledge and training required for handling hazardous chemicals has not been appointed.

Limited capacity for testing chemicals

Local **capacity for testing chemicals is unavailable** to support enforcement and monitoring and this issue needs serious attention. It has been identified by numerous stakeholders as one of major challenges in the management of chemicals. Monitoring and sampling for routine testing is infrequent and can be improved by increasing technical capacity for testing. At the time of publishing, the laboratory at Maldives Customs Service is non-functional and samples are sent to the Police Forensic Laboratory or overseas when necessary for enforcement, which is very costly and time-consuming. The National Health Laboratory currently has the capacity to test the levels of major chemical contaminants in water and has limited capacity for testing chemicals in food and pharmaceuticals. However, testing facilities for POPs, heavy metals, and other important parameters (such as pesticides) are not available. A central laboratory that could serve the testing required for enforcement, monitoring and industries is recommended.

Need to raise awareness and understanding at all levels

There is also a critical **need to raise awareness and understanding** surrounding the importance of sound chemical management at all levels including policymakers, stakeholders, businesses, workers, end-users, and consumers. More awareness needs to be fostered among farmers and workers in other sectors on the proper handling and correct use of hazardous chemicals. Even the general public requires a better understanding of potential incidents and the negative health consequences associated with indirect exposure of such chemicals via food, water and other mediums. People need to be informed on the detrimental effects that chemicals can wreak on the environment and its biodiversity. The lack of information held by the public on chemical associated impacts, for example eutrophication due to fertilizer overuse, impacts the reporting of such incidents as well.

Maldives' Good Agricultural Practices (GAP) scheme was endorsed and introduced by the relevant government authority in 2015. This is a voluntary certification program for farms to adopt practices for safe and sustainable food production. However, to date, only two businesses have been certified under the scheme, a situation that is likely due to a lack of awareness about the scheme and the associated benefits. A number of effective alternatives to the use of chemical pesticides in agriculture, such as pheromone traps, that are currently on the market. However, low confidence in the products, resistance to change as well as general lack of knowledge and technical know-how might be impeding factors in the adoption of new, safer alternatives by consumers.

Lack of information and research

There is a **dearth of information and research** studies to support policies and decision making for better management of chemicals. For example, frequent contamination of ground water from sources such as fuel and agricultural chemicals have been implicated but the specific levels have not been studied. Farmers from Thoddoo, Alif-Alif Atoll claim that they are unable to grow crops without high fertilizer levels, suggesting soil infertility - an issue that needs to be investigated.

Residue levels of pesticides in locally grown fresh produce have not been reported. Many stakeholders emphasised on the need for research to make better evidence-based decisions related to the management of hazardous chemicals. Specific suggestions include chemical mapping, studying levels in different matrices from the agriculture sector and tracking the exposure of heavy metals such as lead and mercury, POPs, and hazardous chemicals in the environment.

Non-adherence to occupational health and safety best practices

Workers are frequently exposed to occupational health and safety hazards due to widespread **non-adherence to occupational health and safety best practices** by those handling hazardous or toxic chemicals. There are several carcinogenic and toxic chemicals imported and used by various economic sectors such as agriculture, construction and boat building. Limitations in the regulatory framework, combined with inadequate enforcement and monitoring, results in poor compliance to occupational health and safety best practices by businesses as well as workers.

14. Recommendations

There are several recommendations for Improvements based on the gaps and challenges identified from the study in relation to the current scene of chemical management in the country.

- There is an urgent need to develop a consolidated chemical management framework at the national level, to minimise existing overlaps as well as to introduce an overarching legislation that can improve the current situation and meet international obligations. Enactment of the Overarching Chemicals Management Bill for the Maldives that is currently under development is expected to alleviate the regulatory inadequacies to some extent.
- There is a requirement for a planned and determined effort to integrate data collection and collation procedures across the multiple organizations and agencies, ideally through a single window system, to improve the current deficiency in data management related to hazardous chemicals.
- The limitations in terms of suitable resources, inadequate technical competence, infrastructural, financial, and institutional capacity that remains significant constraints to comprehensive and sound chemical management needs much attention at all levels. There is a clear need for better infrastructure, especially in the areas of import, transport, and disposal of chemicals as well as improved technical competence across the agencies.
- Establishment of a central laboratory with adequate resources to conduct the testing required for enforcement, monitoring and industry is highly recommended as it will greatly improve the local capacity for testing chemicals.
- Increased efforts are required to raise awareness and understanding on the importance of sound chemical management at all levels including policymakers, stakeholders, businesses, workers, end-users, and consumers.
- The need for research to make informed, evidence-based decisions concerning the management of hazardous chemicals must be addressed by prioritising as well as increasing internal and external funding and resources for conducting scientific studies.
- There is an immediate need to strengthen occupational health and safety standards in all economic sectors with increased adherence to occupational health and safety best practices.

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Annex A: Guiding Questionnaires used for data collection

STAKEHOLDER	QUESTIONS
Government Ministries / Approval Authorities	<ol style="list-style-type: none"> 1. Please provide us details of your mandate in regards to chemical management and your responsibilities as an approval authority. 2. What are the specific chemicals that fall under your mandate as an approved authority? 3. What are the current mechanisms in place regarding chemical management? <ol style="list-style-type: none"> a. The procurement or import of chemicals b. Safe storage of chemicals c. Safe transportation of chemicals d. Ensuring the safety conditions in usage of chemicals e. Safe disposal of chemicals 4. Please provide details of the approval process and the conditions under which approval is given? 5. Are these chemicals under the mandate of any other approval authority? 6. If so, what are the challenges this poses in the regulation of chemicals? 7. Given that many institutions are involved in the management regime for chemicals, how is the inter-agency coordination between your ministries? 8. What are the challenges? 9. There is no single legislation regarding chemical management, instead there are several legal documents that are involved in the matter. As an approval authority what are the regulatory challenges you face due to inadequacies of the legal framework? 10. What are the challenges and capacity constraints faced by the ministry? 11. What are the ongoing/planned projects related to chemical management? 12. What are the recent developments in promoting the sound management of chemicals? 13. The impacts of chemicals on our surrounding environment and public health are still very under researched. Please provide your understanding on the impacts of chemicals and the current chemical management in the Maldives. 14. What are the past chemical related public health incidents that the ministry would like to highlight? 15. What are the lessons learned from these past incidents in regards to usage and sound management of chemicals? 16. What are the works being done to promote the sound management of chemicals among both the public and private sector? 17. Are there any guidelines or standards to be followed in the usage of chemicals? 18. Are there any monitoring systems that these guidelines or standards are followed?

	<p>19. Are there training systems in place on chemical usage as per the guidelines?</p> <p>20. What are the mechanisms in place to prepare for chemical-related incidents or accidents involving hazardous substances?</p> <p>21. Are there any mechanisms in place to monitor the use of chemicals in the country?</p> <p>22. What are the mechanisms for management of data at your institution?</p> <p>23. Do you have a data base on chemical approvals? What is the period for which data is available?</p>
Other Government Agencies	<p>24. What are your responsibilities as a government agency in chemical management?</p> <p>25. What is your role in the regulation of chemicals and in assisting your relevant ministry?</p>
Defence Related	<p>26. Please provide the use and importance of 'Makudi Portal' and how it has helped the work of the ministry.</p>
Environment Related	<p>27. What is the current process of chemical waste management in the country?</p> <p>28. Have there been records kept on the amount of chemical waste generated in the country?</p> <p>29. What is the impact of current waste disposal methods such as the generation of unintended chemicals?</p> <p>30. What is the action being taken to mitigate the impact of such chemicals?</p> <p>31. What are the facilities required for the sound management and disposal of chemicals?</p>
Utility Providers/ Fuel Importers/ Private Sector	<p>32. What are the types of chemicals used by your organisation and please provide details of their function, how it's used and for what purposes?</p> <p>33. How important or indispensable are these chemicals for these works and what are the difficulties you face in sourcing them?</p> <p>34. Please provide details of your distribution mechanisms - What happens to the chemicals after being imported to the country?</p> <p>35. Please provide details of your chemical procurements. What types of chemicals do you import the most?</p> <p>33. How important or indispensable are these chemicals for these works and what are the difficulties you face in sourcing them?</p> <p>36. What are the current mechanisms or process gone through chemical management?</p> <ul style="list-style-type: none"> a. The procurement or import of chemicals b. Safe storage of chemicals c. Safe transportation of chemicals d. Ensuring the safety conditions in usage of chemicals e. Safe disposal of chemicals

	<p>37. What are the challenges you face regarding:</p> <ul style="list-style-type: none"> a.The procurement or import of chemicals b.Safe storage of chemicals c.Safe transportation of chemicals d.Ensuring the safety conditions in usage of chemicals e.Safe disposal of chemicals <p>38. Given that many institutions are involved in the management regime for chemicals, are there any challenges your organisation faces in obtaining them?</p> <p>39. Do you have any storage facilities? Please provide us details of how chemicals are stored and where.</p> <p>40. Do you have SOPs for safe handling and storage of chemicals?</p> <p>41. Do you use MSDS (Material Safety Data Sheets) sheets?</p> <p>42. Are relevant staff trained on safe handling of chemicals?</p> <p>43. What are the systems in place to monitor the usage of chemicals and ensure that safety conditions are always met?</p> <p>44. What are the risks associated in the mismanagement or misapplication of these chemicals?</p> <p>45. What are the impacts of the current process of disposing these chemicals?</p> <p>46. What are the mechanisms in place to prepare for chemical related incidents or accidents involving hazardous substances?</p> <p>47. Are there any mechanisms in place to monitor the use of chemicals in the country?</p> <p>48. What are the mechanisms for management of data at your institution?</p>
<p>End Users (Agriculture, Industrial, Tourism, Salons)</p>	<p>49. What are the types of chemicals used and please provide details of their function, how it's used and for what purposes?</p> <p>50. How important or indispensable are these chemicals for these works and what are the difficulties you face in sourcing them?</p> <p>51. What is the current process to:</p> <ul style="list-style-type: none"> a.The procurement of chemicals b.Safe storage of chemicals c.Safe transportation of chemicals d.Ensuring the safety conditions in usage of chemicals e.Safe disposal of chemicals <p>52. What are the challenges you face regarding</p> <ul style="list-style-type: none"> a.The procurement of chemicals b.Safe storage of chemicals c.Safe transportation of chemicals d.Ensuring the safety conditions in usage of chemicals e.Safe disposal of chemicals <p>53. Are you familiar with the safety conditions in using chemicals? What are the precautionary measures that you take?</p>

	<p>54. Have you received any training on the safe usage of chemicals and/or provided any such training to your employees?</p> <p>55. What are the systems in place to monitor the usage of chemicals and ensure that safety conditions are always met.</p> <p>56. What are the risks associated in the mismanagement or misapplication of these chemicals?</p> <p>57. What are the impacts of the current process of disposing these chemicals?</p>
<p>Associations/ International Organization</p>	<p>58. What are the mechanisms in place to prepare for chemical related incidents or accidents involving hazardous substances?</p> <p>59. Please provide us details of your role, and relevance to chemical management.</p> <p>60. What are the ongoing activities related to chemical management?</p> <p>61. What are the planned projects related to chemical management?</p> <p>62. What are the challenges in the Maldives regarding:</p> <ul style="list-style-type: none"> a. The procurement or import of chemicals b. Safe storage of chemicals c. Safe transportation of chemicals d. Ensuring the safety conditions in usage of chemicals e. Safe disposal of chemicals <p>63. Given that many institutions are involved in the management regime for chemicals, what do you believe are the regulatory challenges in the sound management of chemicals?</p> <p>64. What are the key challenges and capacity constraints that your organisation faces?</p> <p>65. The impacts of chemicals on our surrounding environment and public health are still very under researched. Please provide your understanding on the impacts of chemicals and the current chemical management in the Maldives.</p> <p>66. What are safety considerations to human health? In your opinion, are there adequate procedures in place for safe handling and storage of chemicals?</p> <p>67. Does the staff have adequate training and awareness on safe handling of chemicals?</p>



Eliminating Persistent Organic
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