



**MINAMATA INITIAL  
ASSESSMENT REPORT  
FOR GUINEA-BISSAU**

April  
2019





# FOREWORD



Mercury poses both local and international contamination problems. In its elemental form it may travel long distances through the atmosphere before oxidizing and being deposited in the environment. In aquatic systems, mercury from local and distant sources can be converted into methylmercury, a serious neurotoxin. High-dose exposure to methylmercury can lead to significant neurological damage, heart disease and fatalities. Low-dose exposure has been linked to developmental delays and neurological damage affecting brain and muscle capacity, especially in small children.

Thus, mercury represents a major global, regional and national threat to human health and the environment.

Although some mercury is released into the environment through natural phenomena, most of the mercury now found in the environment comes from human activities.

In support of global measures to address the increasing level of mercury in the environment, Guinea-Bissau joined the rest of the world to negotiate the Minamata Convention on Mercury, a global, legally binding treaty, and, having agreed the text of the Convention, ratified it on 22 October 2018. Guinea-Bissau is now working towards the implementation of the treaty.

To this end, Guinea-Bissau, through the State Secretariat of Environment and with the support of the Global Environment Facility (GEF), the United Nations Development Programme (UNDP) and the United Nations Institute for Training and Research (UNITAR)), initiated the Minamata Initial Assessment Project in 2016, with the objective of assisting Guinea-Bissau in completing pre-ratification activities under the Minamata Convention and to enable policy and strategic decision-making that prioritizes areas for future interventions on mercury-related issues.

The development and adoption of this Initial Assessment of mercury in Guinea-Bissau is a practical demonstration of the commitment of the Government of Guinea-Bissau towards the implementation of the provisions of the Minamata Convention on Mercury.

The document is presented to the people of Guinea-Bissau and our development partners to encourage the widest possible engagement with the Ministry of Environment and Sustainable Development, serving as the coordinating ministry, for the implementation of the Minamata Convention and the achievement of its objective to protect human health and the environment from the anthropogenic emissions and releases of mercury and mercury compounds.

# ACKNOWLEDGEMENTS

**Eng<sup>a</sup> Quite Djata**  
**Secretary of State of Environment**

The development of Minamata Initial Assessment (MIA) for Guinea-Bissau has enlisted the assistance, participation and cooperation of several key stakeholders and experts in both the public and private sector. I would like to express my appreciation and recognition to all stakeholders involved in this MIA, contributing to the preparation of this important document, which reflects the situation of the country vis-a-vis mercury issues.

I would like to take this opportunity to thank all the sectorial ministries, government departments, local government authorities, research and academic institutions, private sector, non-governmental organizations, civil society and other key institutions for participating in the development of this MIA.

Special recognition is extended to the national experts that participated in the elaboration of this MIA: (Júlio Biquer, Mario Batista Camala, Lourenço António Vaz, Edwige Lima N'zalé and Udimila Kadija Queta).

Acknowledgements are made to the United Nations Institute for Training and Research (UNITAR) team for their technical and scientific assistance in the compilation, which raised the technical quality of this MIA.

The Government of the Republic of Guinea-Bissau is very appreciative of all the financial and technical support that the Global Environment Facility (GEF), United Nations Development Programme (UNDP) and UNITAR have provided for the preparation of this Minamata Initial Assessment of the Republic of Guinea-Bissau.

**Viriato Luís Soares Cassamá, MSc, Director General**



**Directorate General of Environment, Secretariat of State of Environment**

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# EXECUTIVE SUMMARY

Mercury (Hg) is a persistent element in the environment. It is naturally released into the air as vapour during processes such as volcanic activity, weathering of rock, water body movement, forest fires, and biological processes. While natural releases continue, they do not account for the considerable increase in environmental mercury levels since the onset of the industrial age. It is clear that significant mercury is released from a range of human activities. It is now estimated that roughly 10 per cent of the emissions of mercury to the atmosphere are from natural emissions; a further 30 per cent is generated by current human activity; and the remaining 60 per cent is re-emissions (evaporation for example) of mercury already in the environment, mostly as a result of previous human activity (UN Environment, 2013a).

Anthropogenic activities contributing to mercury releases include the processing of some base metal ores, the burning of some coals and hydrocarbon fuels, the open use of mercury in industrial processes and in artisanal and small-scale gold mining, and the breakage and improper disposal of mercury-containing products.

There are three forms of mercury in the environment: elemental, inorganic, and organic mercury. Elemental mercury can combine with other elements to form inorganic mercury compounds (e.g. mercuric chloride, mercuric nitrate, mercuric oxide, mercuric sulphide). In addition, it may be subject to bio-transformation by aquatic microorganisms into the organic forms such as methyl mercury and ethyl mercury.

In 2001, the United Nations Environment Programme (UN Environment) conducted a global assessment on mercury and its compounds, which included several aspects, such as health and environmental impacts, mercury sources, long-range transportation, and prevention and control technologies relating to mercury. This assessment provided sufficient evidence of global adverse impacts caused by mercury and its compounds and the need for global action to reduce the use of this metal and diminish the risks to human health and environment. In this regard, governments were encouraged to adopt national initiatives and goals to use environmentally-sound methods to manage mercury and mercury compounds and proceed towards the reduction or elimination of its use.

In 2009, the Governing Council of UN Environment agreed that voluntary actions to date had not been sufficient to address the concerns relating to mercury and decided on the need for further action, including the preparation of a global, legally-binding instrument. An Intergovernmental Negotiation Committee (INC) to prepare the treaty was established and began its work in 2010. The INC concluded its fifth session in Geneva, Switzerland in January 2013 by agreeing the text of the Minamata Convention. The Convention was adopted and opened for country signature later that year at a Diplomatic Conference (Conference of Plenipotentiaries), held in Kumamoto, Japan (9-11 October 2013).

The overall objective of the Convention is to protect human health and the environment from anthropogenic emissions and releas-

es of mercury and mercury compounds (UN Environment, 2013). It was adopted to promote the use of alternatives, best available techniques and best environmental practices - across a wide range of products, processes and industries where mercury is used, released or emitted, and provides for the control and phasing out and or phasing down of mercury and mercury-added products (UN Environment, 2013).

Guinea-Bissau signed the Convention of Minamata on 24 September 2014, adopted it nationally on 10 August 2018 at the National People's Assembly and ratified it on 22 October 2018.

The Minamata Convention on mercury establishes a financial mechanism to provide adequate, predictable and timely resources to support developing country Parties and Parties with economies in transition in implementing their obligations under the treaty. The Global Environment Facility (GEF) is identified as a key element of this financial mechanism.

During the project "Strengthen National Decision Making Towards Ratification of the Minamata Convention and Build Capacity Towards Implementation of Future Provisions", Guinea-Bissau developed its Minamata Initial Assessment (MIA) with financial support from the GEF. The project was implemented by UNDP with technical support provided to Guinea-Bissau by the United Nations Institute for Training and Research (UNITAR). The overall objective of the MIA was to support Guinea-Bissau in its preparations to ratify and implement the Minamata

Convention. The MIA provides relevant information for identifying future priority areas for intervention and policy decisions. The Guinea-Bissau MIA is structured as follows:

## National Background Information (Chapter 1)

This Chapter provide a brief country profile in order to place the MIA strategies and action plans in a country-specific context, summarizing key information on geography and population, the country's political, institutional, legal and economic profile, membership of regional and international organizations and agreements, environmental conditions and priorities.

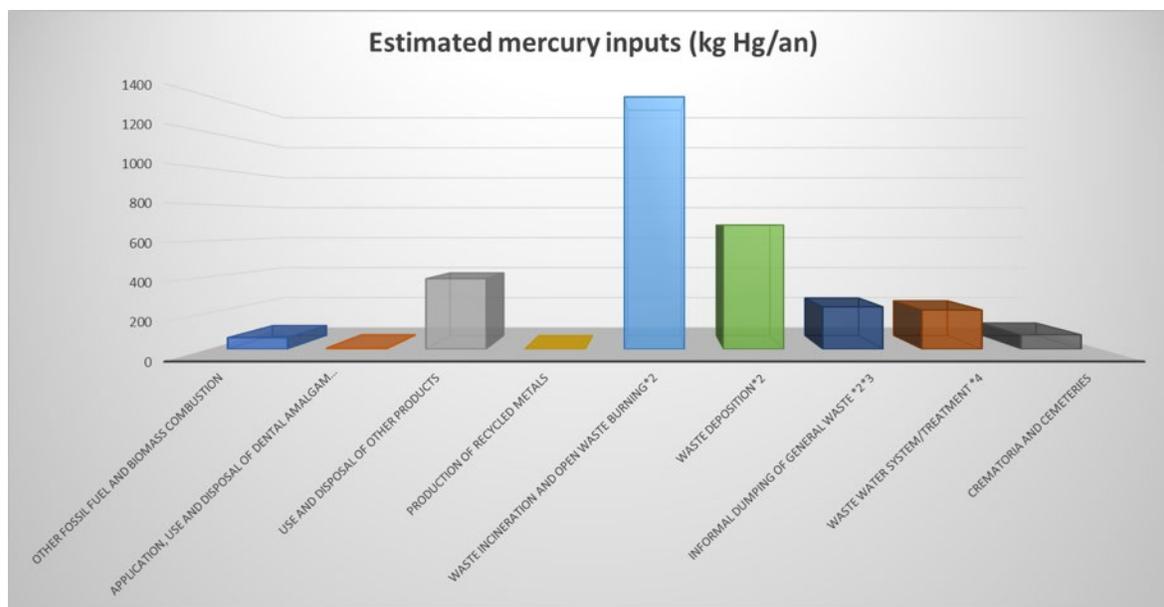
This chapter shows that Guinea-Bissau is experiencing rapid population growth, with its population rising from 1,673,509 in 2011 to 1,900,000 in 2017 and is estimated to be more than 2,000,000 in 2020. From the point of view of territorial distribution, the population of Guinea-Bissau is mainly rural, although there is currently a strong migration to urban areas, particularly due to difficult living conditions in rural areas. In terms of the economy, the primary sector, particularly agriculture and fisheries, represents the most significant sector with 49 per cent of economic output. It is followed by the tertiary sector which accounts for 38 per cent, and the secondary sector with 13 per cent. In addition, the country faces many phenomena such as land degradation, deforestation, air pollution, desertification and waste pollution.

## Mercury Inventory (Chapter 2)

This chapter summarizes the results of the national inventory. Through the use of the UN Environment Toolkit for the identification and quantification of mercury releases (UN Environment, 2017), sources of mercury emissions to air and sources of releases to land and water, trade in and stocks of

mercury and mercury-added products, and industries intentionally using mercury were identified in Guinea-Bissau. The main sources of mercury in Guinea-Bissau are: waste incineration, open waste burning, and the use and disposal of mercury-containing products (Figure i).

Figure i : Estimated mercury (Hg) inputs



Source: National mercury inventory, Guinea-Bissau

## Political, Regulatory And Institutional Frameworks Assessment

This chapter was developed to identify existing relevant domestic legislation and additional legal and administrative actions that might be necessary for ratification, to identify institutions responsible for implementing relevant legislation and their current capacities, and to identify national stakeholders whose engagement will be necessary for

the successful implementation of the treaty. Guinea-Bissau does not have specific legal instruments to regulate the use, emissions and releases of mercury and mercury compounds at the national level. Therefore, in order to meet the obligations of the Articles of the Convention, Guinea-Bissau will need to strengthen legal, regulatory and institutional frameworks and strengthen the national capacity of the key institutions to manage its actions as a Party and to identify financial resources.

# List of Acronyms and Units

%	Percent
*	Multiplied by
/	Divided by
/Y	Per Year
<	Inferior to
>	Superior to
°C	Degrees Celsius (centigrade)
µg	Micrograms
ASECNA	Agency for the Safety of the air traffic
ASGM	Artisanal and small-scale gold mining
CECOME	Medicines Essential Purchase Central
CEMTEC	Cement and Mining Technology
CFL	Fluorescent Lamps Compact
CIA	Central Intelligence Agency (United States of America)
CMB	City hall of Bissau
CNGP	National Commission for Pesticide Management
COP	Conference of the Parties
DGA	General Direction of Customs
DGGM	General Direction of Geology and Mines
DGRH	General Direction of hydric resources
EAGB	Company of Electricity and Waters of Guinea-Bissau
ESP	Electrostatic Precipitator; equipment used to reduce the emission of certain pollutants from combustible gases
EU	European Union
FAO	The Food and Agriculture Organization of the United Nations
FF	Fabric filters; filter used to capture particles (combustible gases)
G	Gram
GDP	Gross domestic product
GEF	Global Environmental Facility
GNI	Gross National Income

Hg	Mercury
HS	The nomenclature system of the Harmonized System
IEA	International Energy Agency
INASA	National Institute of Public Health
INE	National Institute of Statistics
Kg	kilogram
KWh	Kilowatt k hour / Unit of energy
LNG	Liquefied natural Gas
LNSP	National Laboratory of Public Health Laboratório Nacional da Saúde Pública
M	Meter
MADS	Ministry of Environment and Sustainable Development
MC	Ministry of Commerce
MCS	Ministry of Social Communication
MAFP	Ministry of Agriculture, Forestry and Livestock
MAI	Ministry of Internal Affairs
MEES	Ministry of Education and Higher Education
MEF	Ministry of Economy and Finance
MFPRAT	Ministry of Public Administration, Administrative Reform and Labor
Mg	Milligram (10 <sup>-3</sup> gram)
MIA	Minamata Initial Assessments
MJ	Ministry of Justice
MNECIC	Ministry of Foreign Affairs, International Cooperation and Communities
MRN	Ministry of Natural Resources
MSP	Ministry of Public Health
MT	Ministry of Transport
MW	MEGAWATT
NGO	Non-governmental organization
NLM	National Liberation Movement
Nm <sup>3</sup>	Normal meter cube
OECD	Organisation for Economic Co-operation and Development

PAIGC	Partido Africano da Independência da Guiné e Cabo Verde
PETROGUIN	National Company of Research and Petroliferous Exploration
PM	Particular Matter
POPs	Persistent Organic Pollutants
PPP	Purchasing power parity
PS	Particle Scrubber; equipment to reduce the emissions of particles in combustible gases
PU / PUR	Polyurethane
PVC	Polychlorite polyvinyl chloride
RH	Hospital Waste
RBM	Biomedical Waste
T	Ton 1000 kg
UN	The United Nations
UNDP	United Nations Development Programme
UN Environment	United Nations Environment Programme
UNITAR	United Nations Institute for Training and Research
UNSD	Statistics Division of the United Nations
USA/EUA	The United States of America
USD	United States Dollar
UV	Ultraviolet
VCM/CVM	Cloture of Monomer Vinyl
WHO	World Health Organization

# Introduction

## Mercury As An Issue

Commonly known as quicksilver, mercury is a chemical element with symbol Hg and atomic number 80. It is a dense, silver-white metal that is liquid at ordinary temperatures. It occurs in its elemental form in the earth's crust but is more commonly found in the form of cinnabar (a toxic mercury sulphide, HgS). It may occur with other non-ferrous sulphide minerals (zinc, lead, arsenic, gold) and in trace quantities or as an impurity in many other economically valuable materials including fossil fuels such as coal, gas, and oil. Mercury combines with most metals to form alloys called "amalgams" and these decompose on heating with volatilisation of the metallic mercury.

Liquid elemental mercury expands and contracts very precisely in response to changes in temperature and maintains its volume in response to change in atmospheric pressure. These unique properties have made it useful in devices designed to measure temperature and pressure.

Mercury is a persistent element in the environment. It is naturally released into the air as vapour during processes such as volcanic activity, weathering of rock, water body movement, forest fires, and biological processes. While natural releases continue, they do not account for the considerable increase in environmental mercury levels since the on-set of the industrial age. It is clear that significant mercury is released from a range of human activities. It is now estimated that: roughly 10 per cent of the emissions of mercury to the atmosphere are from natural emissions; a further 30 per cent is generated by current human activity; and the remaining 60 per cent is re-emissions (evaporation, for example) of mercury already in the environment,

mostly as a result of previous human activity (UN Environment, 2013a).

Anthropogenic activities contributing to mercury releases include the processing of some base metal ores, the burning of some coals and hydrocarbon fuels, the open use of mercury in industrial processes and in artisanal and small-scale gold mining, and the breakage and improper disposal of mercury-containing products.

Once in the atmosphere, mercury may travel globally before being deposited to land and water where it may be further transported, re-emitted to the atmosphere, or transformed by a variety of biological processes. This global transport of mercury means that even regions with no significant mercury releases, such as the Arctic, are known to be adversely affected by mercury.

There are three forms of mercury in the environment: elemental, inorganic, and organic mercury. Elemental mercury can combine with other elements to form inorganic mercury compounds (e.g. mercuric chloride, mercuric nitrate, mercuric oxide, and mercuric sulphide.). In addition, it may be subject to bio-transformation by aquatic microorganisms into the organic forms such as methyl mercury and ethyl mercury.

Mercury is now present in various environmental media and food (especially in fish and seafood) all over the globe. Mercury bio-accumulates in the food chain and this can result in concentrations in food resources at levels that adversely affect humans and wildlife. Furthermore, exposure to mercury may be magnified where current or past economic activities have resulted in landfills, mine tailings (by-products left over

from mining), factory sites, soils and sediments contaminated with mercury.

Mercury is considered by the World Health Organization (WHO) as one of the top ten chemicals or groups of chemicals of major public health concern. Elemental and methylmercury are toxic to the central and peripheral nervous systems. According to the WHO (2017), “the inhalation of mercury vapour can have harmful effects on the nervous, digestive and immune systems, lungs and kidneys, and may be fatal. The inorganic salts of mercury are corrosive to the skin, eyes and gastrointestinal tract, and may induce kidney toxicity if ingested”<sup>1</sup>. Moreover, after exposure to mercury, neurological and behavioural disorders can occur, including tremors, insomnia, memory loss, neuromuscular effects, headaches and cognitive and motor dysfunction, as well as kidney failure.

Ecological effects of mercury include harmful effects on microorganisms even at low concentrations, toxicity to aquatic organisms and birds, and physiological, reproductive and biochemical abnormalities in fish exposed to sub-lethal concentrations of mercury. According to Boening (2000), a wide variety of birds fed inorganic mercury show a reduction in food intake and subsequent poor growth. Moreover, other effects in avian receptors have been reported, such as increased enzyme production, decreased cardiovascular function, blood parameter changes, immune response, kidney function and structure, and behavioural changes<sup>2</sup>.

## The Minamata Convention on Mercury

In 2001, the United Nations Environment Programme (UN Environment) conducted a

global assessment on mercury and its compounds, which included several aspects, such as health and environmental impacts, mercury sources, long-range transportation and prevention and control technologies relating to mercury. This assessment provided sufficient evidence of global adverse impacts caused by mercury and its compounds and the need for global action to reduce the use of this metal and diminish the risks to human health and environment. Governments were encouraged to adopt national initiatives and goals to use environmentally-sound methods to manage the use of mercury and mercury compounds towards its reduction or elimination.

In 2009, the Governing Council of UN Environment agreed that voluntary actions to date had not been sufficient to address the concerns relating to mercury and decided on the need for further action, including the preparation of a global, legally-binding instrument. An Intergovernmental Negotiation Committee (INC) to prepare the treaty was established and began its work in 2010. The INC concluded its fifth session in Geneva, Switzerland in January 2013 by agreeing the text of the Minamata Convention. The Convention was adopted and opened for country signature later that year at a Diplomatic Conference (Conference of Plenipotentiaries), held in Kumamoto, Japan.

The overall objective of the Convention is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds (UN Environment 2013b).

<sup>1</sup> <http://www.who.int/news-room/fact-sheets/detail/mercury-and-health>

<sup>2</sup> <https://www.ncbi.nlm.nih.gov/pubmed/10789973>

It was adopted to promote the use of alternatives, best available techniques and best environmental practices across a wide range of products, processes and industries where mercury is used, released or emitted, and provides for the control and phasing out/ phasing down of mercury and mercury-added products (UNEP, 2013b).

As of 18 March 2019, 128 countries had signed the Minamata Convention on Mercury and 107 had ratified it to become Parties. Guinea-Bissau ratified the Convention on 22 October 2018.

## Summary of Key Provisions of the Minamata Convention

Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase-out and phase-down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the formalization or regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury and health issues.

## Minamata Initial Assessment

The Global Environment Facility (GEF) has allocated funding to strengthen national decision making towards ratification of the Convention and to support its implementation, including through the development of national Minamata Initial Assessments (MIAs). The MIAs assess existing national sources and uses of mercury, strengthen national decision-making towards ratification

of the Convention and build national awareness and capacity towards implementation of obligations.

## MIA Project in Guinea-Bissau

The project to develop the MIA was implemented by UNDP with technical support provided to Guinea Bissau by UNITAR.

The Project implementation began in 2016 with the identification of a project team, comprising a project coordinator and technical officers, and the establishment of a national project office for effective coordination throughout the project lifecycle. The following outputs were delivered during the project:

- **Output 1:** Project coordination mechanism and identification of institutional gaps;
- **Output 2:** Review of existing mercury-related regulations and identification of necessary policy reforms to prepare for implementation of the Minamata Convention;
- **Output 3:** Establishing a national mercury profile based on an initial inventory and key sectors identified for intervention and investment to reduce and, where possible, eliminate mercury use, release, and emissions;
- **Output 4:** Dissemination of information among relevant stakeholder groups (academia, public and private sectors, and civil society).

The MIA project activities were targeted towards understanding the national situation with regard to mercury, in particular, in relation to the relevant articles of the Minamata Convention on Mercury.

The steering committee was established on 23 April 2017, and is presented below:

**Table 1:** Steering Committee Membership

<b>Name</b>	<b>Function</b>
<b>Viriato Luís Soares Cassamá</b>	General Director of Environment
<b>Laurentino Rufino da Cunha</b>	Director of Service of Waste Centre and Chemical Products, Stockholm Convention Focal Point
<b>Quecuta Injai</b>	Minamata Focal Point
<b>João Raimundo Lopes</b>	GEF Focal Point
<b>Bernardo Vaz</b>	SAICM Focal Point
<b>Pedro Correia Landim</b>	Ministry of Agriculture, Forestry and Livestock
<b>Hodónio Rosa Dias</b>	Municipality of Bissau
<b>Nair Oriana Gomes</b>	General Direction of Customs
<b>Clara Sousa Melo Gomes</b>	Ministry of Trade
<b>Malam Bá Camara</b>	National Institute of Health
<b>Zacarias Djaló</b>	General Direction of Industry
<b>Maria Jesus Sousa</b>	Simão Mendes National Hospital

# CHAPTER 1

## National Background Information

### 1.1 - Geography and Population

The Republic of Guinea-Bissau is located in Western Africa (12° 00' N, 15° 00' W), between Cape Roxo (latitude 12° 20' N), the Cajete Ponta (latitude 10° 59' N) and the meridians 13° 38' and 16° 43' W bordering

the North Atlantic Ocean, between the Republic of Guinea and Senegal. It is relatively small in size (36,125 km<sup>2</sup> – Land 28,000 km<sup>2</sup>, Water 8,120 km<sup>2</sup>), with a low-lying land mass and an archipelago comprising a large number of islands. The country shares borders with Senegal (338 km) to the north and Guinea-Conakry (386 km) to the south and east (**Figure 1**).

Figure 1 - Geographic Location of Guinea-Bissau



Source: UN cartography section<sup>3</sup>

<sup>3</sup> <http://www.un.org/Depts/Cartographic/map/profile/guineabi.pdf>

Its territory is divided between mainland and islands, the latter including a chain of seven islands (Jeta islands, Pecixe, Sands, Caiar, How and Melo), including the Bijagós archipelago made up of 88 islands and islets of which only 21 are inhabited (NAPA, 2006<sup>4</sup>).

Administratively, the country is divided into eight regions: Bafata, Biombo, Bolama, Cacheu, Gabu, Oio, Quinara and Tombali and an autonomous sector of Bissau (SAB). Given the presence of the Bijagos archipelago, Guinea-Bissau is part of the group of Small Island Developing States (SIDS).

The majority of Guinea-Bissau lies below 50 metres of elevation. The northern coastal areas and the south are mostly lowlands. Thus, with high amplitude tides, often reaching 6 m height, large areas of the coastline are exposed. Plains cover a large part of the territory in the central and northeast regions. The south-eastern inner zone is the most rugged area of Guinea-Bissau. Even with the hills of Boe as the highest part of the territory, nowhere do they rise above 298 metres in altitude. The islands of the archipelago of Bijagos present a similar morphology to the mainland, with an indented coastline and low elevations.

The country lies in the humid tropics within the tropical zone, between the equator and the Tropic of Cancer, and between the Atlantic Ocean and the Sudanese-Sahelian continental block. There are two pronounced seasons in Guinea-Bissau: the hot, rainy season, which lasts from May to November, and the hot, dry season from December to April.

The climate of Guinea-Bissau is humid on the coastal central and southern territory (relative humidity between 62 and 87 per

cent) and drier in the rest of the territory (relative humidity between 58 and 68 per cent). The highest temperature ranges take place in the months of January and February when clear skies are frequent. The smallest diurnal variation occurs during the rainy season.

Local climatic features induce rainfall variations in relation to the country's geographical location (South: Tombali, Quinara e Bolama-Bijagós Region > 2000 mm/year Northwest Regions of Bissau, Biombo, Cacheu e Oio: 1400-1800 mm/year- Eastern regions of Bafatá and Gabú: 1300-1500 mm/year). On average, about 80 per cent of annual rainfall occurs during the months of July, August and September.

Guinea-Bissau's population is dominated by more than 20 ethnicities, including the Fulani 28.5%, Balanta 22.5%, Mandinga 14.7%, Papel 9.1%, Manjaco 8.3%, Beafada 3.5%, Mancanha 3.1%, Bijago 2.1%, Felupe 1.7%, Mansoanca 1.4%, Balanta Mane 1%, other 1.8%, none 2.2% (DENARP II, 2011<sup>5</sup>). Although there are some 20 languages and dialects, Portuguese is the country's official language and the formal language is Crioulo—a creole that emerged during the slave trade—that is spoken as the lingua franca and exerts a unifying influence in the rural areas.

The population of Guinea-Bissau has grown steadily in recent years: from 1,673,509 (2011) to an estimated 1,900,000 in 2017 (ADB, 2017). Currently, the population is 50.4 percent female, 49.6 per cent male. The population is expected to reach 2,068,362 in 2020.

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<sup>4</sup> <http://www.adaptation-undp.org/projects/guinea-bissau-national-adaptation-programme-action-napa>

<sup>5</sup> National Strategy for the Reduction of Poverty/FMI No. 11/353, December 2011.

(ADB, 2017). Currently, the population is 50.4 percent female, 49.6 per cent male. The population is expected to reach 2,068,362 in 2020.

The population of Guinea-Bissau was predominantly rural, but a considerable number of people are migrating to urban areas due to poor economic conditions and a lack of employment opportunities in villages and/or poor agricultural conditions and greater population pressure on land. As a result, it is estimated that about 49.3 per cent of Guinea-Bissau's population now lives in ur-

ban areas. Bissau, the capital, is the largest urban centre and had an estimated population of 492,000 in 2015 . Other major cities such as Gabú 43,556 (2009) and Bafatá 34,760 (2010) are also growing. In recent years, the population of urban areas has been growing at an estimated annual growth rate of 4.13 per cent (2010-2015 est.). This tests the capacity of urban centres to absorb the incoming population and offer livelihoods. Conversely, this contributes to a steady decline of agriculture productivity. A summary of country profile data for the Republic of Guinea-Bissau is given in **Table 3**.

**Table 2:** Summary of country profile data for the Republic of Guinea-Bissau

Capital	<b>Bissau</b>
<b>Area</b>	36,125 km <sup>2</sup>
<b>Land boundaries</b>	724 km (Senegal 338 km, Guinea 386 km)
<b>Coastline</b>	270 km
<b>Climate</b>	Humid on the coastal central and southern territory (relative humidity between 62 and 87%) and drier in the rest of the territory (relative humidity between 58 and 68%)
<b>Land Use</b>	Arable land: 33 %
<b>Natural hazards</b>	Extreme rainfall, floods, high temperature occurrence, droughts, heat wave, increasing aridity, strong winds
<b>Environmental Issues</b>	Soil degradation; deforestation; urban air pollution; desertification; waste pollution; loss of arable land; rapid urbanization; construction in wetland areas; loss of biodiversity; and climate change
<b>Geomorphology</b>	Present a vast coastal area when upwelling phenomena occur due to cold current of Canary and hot current of Guinea Gulf
<b>Population</b>	1,900,000 (2017)
<b>Administrative</b>	8 Administrative regions: Bafata, Biombo, Bolama, Cacheu, Gabu, Oio, Quinara and Tombali and an Autonomous Sector of Bissau (SAB)
<b>Age structure</b>	0-4 years: 17.20%, 5-14 years: 26.5; 15-64 years: 48.84%, 65 years and over: 2.06% (INE, 2017)
<b>Growth rate</b>	2.55 % (2011-2016)
<b>Infant mortality</b>	11.4 deaths/1,000 live births (INE, 2017)
<b>Life expectancy</b>	55.2 years - female: 52.3 years - male (INE, 2017)

<b>Fertility rate,</b>	4.78 children born/woman (INE, 2017)
<b>Ethnic groups</b>	More than 20 African ethnicities, including the Fulani 28.5%, Balanta 22.5%, Mandinga 14.7%, Papel 9.1%, Manjaco 8.3%, Beafada 3.5%, Mancanha 3.1%, Bijago 2.1%, Felupe 1.7%, Mansoanca 1.4%, Balanta Mane 1%, other 1.8%, none 2.2% (2008 est.)
<b>Religions</b>	Muslim, Christian and indigenous beliefs
<b>Languages</b>	Portuguese (official) and Crioulo
<b>Literacy</b>	For adult male population, 71.78%; adult female population, 48.28%; youth (ages between 15 and 24 years) literacy rates of 80.85% for males and 73.71% for females
<b>Independence</b>	24 September 1973 (from Portugal)
<b>Local Currency:</b>	CFA Franc
<b>GNI per capita:</b>	US \$ 1,369 (National Statistics Institute of Guinea-Bissau, 2017)
<b>Inflation rate:</b>	3.00% (AfDB, 2017)
<b>GDP growth rate:</b>	5.0% (AfDB, 2017)
<b>Human Development Index (rank / 188):</b>	178 (AfDB, 2017)
<b>Human development index (scale 0 to 1):</b>	0.424 (AfDB, 2017)

## 1.2 - Political Aspects and Socio-Economy

Since 1993, the country has operated a semi-presidential system, with a president, who is directly elected by the people, a prime minister, who is appointed by the president in accordance with the electoral result and after consulting with political parties represented at the People's National Assembly, and a cabinet, which is nominated by the president on the recommendation of the prime minister. The constitutional provisions confer near equal political powers on the sovereign organs of the state, namely the President of the Republic, the People's National Assembly, the government and courts, although the Constitution defines their relationship based on separation and independence, sovereignty and the subordination of all of them.

The President of the Republic is the Head of State, symbol of unity, guarantor of national independence and the Constitution, supreme commander of the Armed Forces and the representative of the Republic of Guinea-Bissau. The president has power to dissolve the National Assembly and dismiss the Government.

The People's National Assembly is the supreme legislative organ and political overseer, and representative of all citizens. It pronounces on fundamental issues of internal and external politics of the state.

In a similar manner, the Constitution states that the government, which is constituted by the Prime Minister, ministers and by secretaries of state, is the supreme executive and administrative organ of the country; it formulates policies for the country in dance

accordance with its programme, which is approved by the People's National Assembly. The Ministers and secretaries of state are nominated by the President of the Republic, on the proposal of the Prime Minister. As the head of the government, the Prime Minister has a duty to guide and coordinate its action and ensure the execution of the laws. The Prime Minister is also obliged by the Constitution, without prejudice to other attributions that are conferred on them by the Constitution and the law, to inform the President of the Republic on issues regarding the internal and external politics of the country.

The Human Development Index (HDI), which is a summary measure for assessing progress on three dimensions of human development (a long and healthy life, access to knowledge and a decent standard

of living), continues to be weak and precarious. A long and healthy life is measured by life expectancy at birth. Knowledge level is measured by years of education among the adult population, which is the average number of years of education received in a life-time by people aged 25 years and older; and access to learning and knowledge by expected years of schooling for children of school-entry age. The living standard is measured by Gross National Income (GNI) per capita of 2017 (Table 4). Guinea-Bissau has one of the lowest Human Development Index scores (0.420), ranking 178 out of 188 countries and territories in 2017 (AFDB, 2017). Between 2005 and 2017, Guinea-Bissau's HDI value increased from 0.388 to 0.424, an increase of 9.2 per cent.

**Table 3:** Guinea-Bissau's HDI trends based on consistent time series data (1990 - 2017 )

Year	Life expectancy at birth	Expected years of schooling	Mean years of Schooling	GNI per capita (2011 PPP\$)	HDI value
1990	49.1	3.7		1,309	
1995	50.6	5.2		1,322	
2000	51.5	6.7		1,277	
2005	52.4	8.3	2.3	1,266	0.388
2010	53.8	9.0	2.6	1,349	0.410
2011	54.2	9.1	2.7	1,415	0.416
2012	54.5	9.1	2.8	1,329	0.415
2013	54.9	9.2	2.8	1,342	0.419
2014	55.2	9.2	2.9	1,339	0.421
2017	55.5	9.2	2.9	1,369	0.424

Source : National Statistics Institute of Guinea-Bissau

The two factors that contributed to Guinea-Bissau's low HDI are: widespread poverty with very low monetary income and limited life expectancy (55.5 years old) resulting from the lack of income generating opportunities and access to quality health care. Between 1990 and 2015, Guinea-Bissau's life expectancy at birth increased by 6.4 years, mean years of schooling increased by 0.6 years and expected years of schooling increased by 5.5 years. Guinea-Bissau's GNI per capita increased by about 4.6 percent between 1990 and 2015.

In recent years, according to the African Development Bank Group (2018), the economic growth dipped slightly from 5.8% in 2016 to an estimated 5.5% in 2017 and is projected to be 5.2% in 2018. Due to this economic situation, the population of Guinea-Bissau had a life expectancy of only 48 years in 2012, increasing steadily alongside economic growth GDP to a more recent figure of 55.5 years (2014). Most recent statistical records in local currency (CFA Franc) are shown in **Table 5**.

**Table 4:** Indicators of National Accounts, 2010 - 2015

Indicators (million CFA Franc)	2010	2011	2012	2013	2014	2015
Nominal GDP	419,713	520,776	547,183	572,032	597,987	639,116
Real GDP (at the 2005 price)	363,464	396,764	387,903	391,394	402,551	421,428
Real GDP growth	4.4%	9.0%	-2.2%	0.9%	2.9%	4.7%
Nominal GDP per capita	283,392	344,042	353,706	359,822	382,771	400,998

**Source:** National Statistics Institute of Guinea-Bissau (December 2015, approximate USD: CFA exchange rate was US\$1 = CFA600, 1 EUR = CFA655.957)

Guinea-Bissau has been stuck in a situation that has hindered economic growth. Indeed, economic growth has stalled since 2000. Having spent a long period of recession in the early 2000s, followed by a slight recovery in 2007, Guinea-Bissau's economy entered a new growth phase from 2008.

The real growth rate between 2008 and 2009 averaged 3.1 per cent, a marked improvement compared to the results of 2006 and 2007 (1.2 per cent on average). Thereafter came a period of transition, marked by a slowing of the economy. However, the return

to constitutional order led to growth estimated at 2.9 per cent in 2014, against 0.9 per cent in 2013 and -2.2 per cent in 2012. Official figures for growth could surpass 4.7 per cent in 2016 and a notable increase in 2017, depending on the socio-political climate, the outcome of the push for food production, the promotion of cashew-nut farming, as well as improvements in economic and fiscal governance.

The primary, tertiary and secondary sectors represented respectively 49%, 38%, and 13% of the GDP in 2013. The contribution of the primary sector (agriculture, livestock, forestry and fisheries) to GDP in that year was very significant. Indeed, most of the period

of growth that has occurred has been largely propelled by agriculture (6.3% in 2009), including the chain of production and export of cashew nuts (DENARP II, 2011). The latest records on sectoral contribution of the economy to the GDP are shown in **Table 6**.

**Table 5:** Sectoral contribution of the economy to the GDP, 2009-2017

Sectoral contribution to GDP	2009	2010	2011	2013	2017
Primary	43.7	44.9	44.5	49	44.1
Secondary	12.8	12.7	12.7	13	12.9
Tertiary	40.0	38.3	38.7	38	43

**Source:** National Statistics Institute of Guinea-Bissau (December 2015, approximate USD: CFA exchange rate was US\$1 = CFA600, 1 EUR = CFA655.957)

The primary sector is the mainstay of the economy of Guinea-Bissau. The main exported products are rice, cashew nuts and fish, accounting for 87.7 per cent of total exports in 2013. This sector represents 80 per cent of jobs. The lack of infrastructure and poverty in rural areas are the main barriers to diversification of primary production.

Agriculture is the main economic activity of Guinea-Bissau. It contributes to more than 50 per cent of the GDP of the primary sector, employs 85 per cent of the labour force and provides more than 90 per cent of export earnings of the country. Fishing has an annual estimated potential of 275,000 tons, but its actual level of exploitation is around 60,000 tons, representing 5.3 per cent of GDP and contributing 40 per cent in the National Budget - OGE (through the sale of fishing licenses). Only 25,000 tons are consumed at the country level. The forestry sector has 2 million hectares of forest, i.e. a little more than 55 per cent of the national territory. The wood reserves were estimated at 48 million m<sup>3</sup>. These resources face an

accelerated destruction, estimated at 50,000 ha/year (PANA, 2006). Guinea-Bissau has a strong and suitable land for agriculture estimated at about 1,410,000 ha, representing approximately 30 per cent total surface of the country, of which 200,000 ha of continental low lands are under freshwater influence (rice paddies), 106,000 ha coastal lowlands under the influence of saline water (mangrove rice field) and 1,104,000 ha of plateau. There are 4 eco-geographical zones in Guinea-Bissau (zone1 – north; zone 2 – east; zone 3 – south and zone 4 – Bijagos archipelago).

The secondary sector is very weak because there is a low control for the products that comes from other countries. The government has been keen to give technical capacities to the employees at the airport in order to control imported products more effectively, including chemicals. It is also necessary to improve the legal system for controlling these products.

The private sector in the primary, secondary and tertiary sectors in Guinea-Bissau is weak and consists mainly of informal activities. In 2009, there were no more than 75 registered firms, mainly in the primary sector, more specifically for cashew nuts.

The country's history of political instability has led to policy discontinuity, which is a powerful deterrent to reforms. Nevertheless, the reforms undertaken in the last three years have produced some concrete results, particularly in terms of macroeconomic stabilization and improving public financial management. The newly established peaceful atmosphere has helped the economy to expand by 5.1 per cent in 2015, up from 2.9 per cent in 2014. However, the vulnerability of the economy is twofold. On the one hand, Guinea-Bissau's economy is mainly reliant on agriculture, in particular the cashew industry, which is the main source of export revenue and a significant share of government revenue. On the other hand, Guinea-Bissau's economic depression is largely the result of a long period of political instability with the African Development Bank Group estimating that unrest in 2012 resulted in a contraction of 1.5 per cent in the country's GDP.

### 1.3 - Guinea-Bissau's Natural Resources

Guinea-Bissau has unexploited natural resources, including minerals. There are considerable deposits of minerals including bauxite and phosphates. The oil potential is unclear, but current oil reserves are estimated at 1.1 billion barrels. Production of bauxite, phosphates and oil could double or triple Guinea-Bissau's foreign exchange and fiscal revenues. However, there are some drawbacks in this sector linked to risks to the environment, particularly in relation to mining projects, which may threaten rivers and the

fishing industry in the south. The Government has already put forward environment laws that cover issues ranging from the use of toxic substances to extraction in protected areas.

### 1.4 - Profile of Solid Mineral Deposits in Guinea-Bissau

#### Oil Resources

An Australian Company, Far Ltd, has announced the existence of significant oil resources, estimated at about one billion barrels off the coast of Guinea-Bissau, according to a study conducted by the company.

"The three blocks on which the geological tests were conducted contain at least a potential 954 million barrels," says Cath Norman, FAR's chief executive officer on the company's website, noting that the company will begin the drilling phase. Several discoveries were made from offshore oil exploration. However, commercial viability has not yet been proven.

#### Bauxite Boéts of Boé

In the years 1977 to 1980, the company Technoexport (ex - USSR) carried out the detailed research studies to evaluate the explorable geological resources in the first five plateaux, divided into 2 groups, with resources of 109.89 million tons, 44%  $Al_2O_3$  and 3,7%  $SiO_2$ .

#### Phosphate Deposit of Farim

The Farim Phosphate Deposit is located in the North of the Country, 4 km away from the city of Farim, on the Saliquenhe village, on the right side of the Farim/Cacheu River, with an area of approximately 4 x 8 km

(32 km<sup>2</sup>).

The French company BRGM and the General Directorate of Geology and Mines (DGGM) carried out the detailed geological research work and the Geological Exploitable (Measured) Resource of 94.6 Million tons of rich phosphate was found, with an average content of 29.0% of the P<sub>2</sub>O<sub>5</sub>.

### Varela Heavy Sands Deposit

In December 2010, the POTO SARL carried out complementary studies with the aim of reassessing the resource and the data of the

mines in Cacheu region, as well as carrying out studies on exploration, treatment of the mine and transport infrastructures of the heavy sand concentrate. The studies carried out by POTO SARL point to the existence of a geological / commercial reserve of 78,536 tons of heavy mineral concentrate (ilmenite + rutile / leucoxena + zirconium).

**Table 6:** Guinea-Bissau deposits, their reserves and resources, contents and location.

Reservoir	Reserve (t)	Contents	Location
Bauxite	109.890.000	44 % Al <sub>2</sub> O <sub>3</sub>	Boé
Phosphate	94.600.000	29 %, P <sub>2</sub> O <sub>5</sub>	Farim (Saliquenhe)
Heavy sands	78.536		Varela

All these large mineral deposits are currently in the economic feasibility phase for their exploitation, while the quarries for local building materials (sandstone, sand, gravel, crushed quartzite and clays for coarse ceramics) are exploited to meet the demands of the national and sub-regional market (for example demands from Casamansa at national level and from Senegal and Gambia at sub-regional level).

## 1.5 - Country Environmental Overview

Major environmental challenges facing the country are soil degradation, deforestation, urban air pollution, desertification, waste pollution, loss of arable land, rapid urbanization accompanied by unsustainable waste management, constructions in wetland areas, loss of biodiversity and climate change. The environmental issues in the key sectors are described below.

## • Forestry

The problems in this sector are related to deforestation, grazing, soil erosion, population increase in forest areas and the pressure on biodiversity. Research has indicated a loss of about 50,000 ha/year (PANA, 2006). The degradation of the forest ecosystem is more pronounced due to expansion of cashew monoculture.

## • Coastal zone and biodiversity

In recent years, pressure on forests has increased due to clandestine exploitation of timber, shifting agriculture and firewood for the smoking of fish and deforestation for rice farming. Intentional or incidental fishing of endangered species such as sharks and rays has its consequences on the balance of marine ecosystems. At present, vegetative cover along the coastline in the identified hotspots has been degraded for several climate and anthropogenic-driven reasons. In Guinea-Bissau, mangroves are exploited to smoke fish and have reduced mangrove cover that otherwise function as a natural protective barrier to coastline erosion and sustain fishing activity. These human actions weaken coastal protection against rising sea levels. It should be noted that according to the African Adaptation Gap report (2013), Guinea-Bissau was appointed as the second most vulnerable country in the world in the face of rising sea levels, with serious consequences for the loss of biodiversity, equipment, livelihoods in general and even human life.

## • The Waste Sector

Much of waste in Guinea-Bissau is made up of solid waste, waste water and sludge. The disposal system and recycling of solid waste is underdeveloped: the country has only one formal landfill. Waste Management is one

of the major problems facing the country, considering not only the environmental risks arising from inadequate disposal or recovery of waste, but also the need for the country to create acceptable conditions for the development of responsible tourism.

## • Territory planning

Spatial occupation in Guinea-Bissau is a severe environmental, social and economic problem. The lack of a policy on land-use, and lack of municipal and urban planning has brought serious problems for the country. Construction in wetlands has made it difficult to collect and filter rainwater, which exacerbates flooding in the rainy season.

## • Climate change

In Guinea-Bissau, data for the past 30 years shows that precipitation has been declining and is concentrated in only five months of the year (June to October), in contrast to prior years. This phenomenon has caused a decrease in agricultural production, a decrease in the flow of certain rivers and a weak recharge of aquifers, with notable consequences for food security. In addition, the high temperatures and precipitation, aligned with a weak sanitation system, have influenced the resurgence of several diseases in the country, including malaria, hepatitis and cholera.

## • Land Degradation

The threats of land degradation are increasingly felt at the country level due to the common border with Sahelian countries and climate variations resulting in particular from anthropogenic activities, such as deforestation and uncontrolled burning, logging, extensive monoculture, felling of trees for the production of charcoal and mangrove removal for the smoking of fish.

## Varela Heavy Sands Deposit

In order to confront various environmental issues, the country has become a Party to the following Multilateral Environmental Agreements (MEAs):

**Table 7:** List of Multilateral Environmental Agreements to which Guinea-Bissau is Party

N°	Title of Treaty or Convention	Type of Action	Date of Deposit
01	Convention on Long-range Transboundary Air Pollution, Geneva 13/11/1979	Accession	10/05/2010
02	Protocol to the 1979 long-range transboundary air pollution convention on long-term financing of the concerted program for the continuous monitoring and evaluation of long-distance transport of air pollutants in Europe (EMEP), Geneva, 28/09/1984.	Accession	19/05/2010
03	Vienna Convention for the Protection of the Ozone Layer, Vienna, 22/03/85.	Accession	12/11/2002
04	Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 16/09/1987	Accession	12/11/2002
05	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, 29/06/1990	Accession	12/11/2002
06	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, 25/11/1992	Accession	12/11/2002
07	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 17/09/1997	Accession	12/11/2002
08	Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, Beijing, 03/12/1999	Accession	12/11/2002
09	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Bâle, 22/03/1989	Accession	09/02/2005
10	Convention on Environmental Impact Assessment in a Transboundary Context, Espoo (Finland), 25/02/1991	Accession	19/05/2010

11	United Nations Framework Convention on Climate Change, New York 09/03/1992	Ratified	27/10/1995
12	Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto 11/12/1997	Accession	18/11/2005
13	Convention on Biological Diversity, Rio de Janeiro 06/05/1992	Ratified	27/10/1995
14	Cartagena Protocol on the Prevention of Biotechnological Hazards Relating to the Convention on Biological Diversity, Montreal, 29/01/2000	Accession	19/05/2010

## CHAPTER 2

# Mercury Inventory: Identification of inputs, emissions and releases in Guinea-Bissau

### Introduction

In response to the request of the Governing Council, UNEP established a Mercury Program to encourage all countries to adopt goals and to take measures, as appropriate, to identify the populations at risk and to reduce anthropogenic mercury releases. An important aspect of the programme is the development of guides and tools on a series of appropriate topics that can be useful to governments and other entities in their efforts to evaluate and reduce mercury pollution. A certain knowledge level is necessary to evaluate the risks caused by mercury and take the appropriate measures to reduce them. UN Environment's "Toolkit for identification and quantification of mercury releases" helps countries to develop the necessary baseline inventory that identifies mercury release sources in the country and to quantify the emissions.

Guinea-Bissau, through the governmental institution for the environment, has undertaken the Level 1 inventory where mainly the data of the last five years were used to quantify the inputs, emissions and releases of mercury and mercury compounds in the country.

### 2.1 - Methodology Adopted for the National Inventory

A two-day training workshop (41 participants) on the use of the toolkit was organized for the working group in order to build capacity on the toolkit and data-gathering techniques,

led by UNITAR in April 2017.

The level 1 inventory works with predetermined factors used in the calculation of mercury inputs to society, emissions and releases; these factors are called "default input factors" and "default output distribution factors". These factors were derived from mercury inputs, emissions and releases data in available literature and other relevant data sources.

The collection, compilation and verification of data for the inventory were completed after the mercury inventory training. The strategies applied include the following:

- Desk research and data gathering;
- Development of questionnaires and completion by relevant sectors/stakeholders;
- Collection of data and information from stakeholders and relevant sources;
- Compilation and verification of data/information received;
- Documentation of sources and validation of the accuracy of data/information to resolve inconsistencies;
- Identification of issues, problems or opportunities and, where necessary, site visits to gather additional information;
- Completion of data analyses and verification;
- Input of data to level 1 of the UNEP toolkit

for the identification and quantification of mercury releases;

- Interpretation of data and toolkit results; preparation of conclusions.

**Table 8:** Description of the types of results of the national inventory

Calculation result type	Description
<b>Estimated Hg input, Kg g/y</b>	The standard estimate of the amount of mercury entering this source category with input materials, for example calculated mercury amount in coal used annually in the country for combustion in large power plants.
<b>Air</b>	Mercury emissions to the atmosphere from point sources and diffuse sources from which mercury may be spread locally or over long distances with air masses; for example: <ul style="list-style-type: none"> <li>• Point sources such as coal fired power plants, metal smelter, waste incineration;</li> <li>• Diffuse sources such as small-scale gold mining, informal burning of waste with fluorescent lamps, batteries, thermometers.</li> </ul>
<b>Water</b>	Mercury releases to aquatic environments and to waste water systems; point sources and diffuse sources from which mercury will be spread to marine environments (oceans), and freshwaters (rivers, lakes, etc.). for example: <ul style="list-style-type: none"> <li>• Wet flue gas cleaning systems on coal fired power plants;</li> <li>• Industry, households to aquatic environments;</li> <li>• Surface run-off and leachate from mercury contaminated soil and waste dumps.</li> </ul>
<b>Land</b>	Mercury releases to the terrestrial environment: General soil and ground water. For example: <ul style="list-style-type: none"> <li>• Solid residues from flue gas cleaning on coal fired power plants used for gravel road construction;</li> <li>• Uncollected waste products dumped or buried informally;</li> <li>• Local unconfined releases from industry such as on-site hazardous waste storage/burial;</li> <li>• Spreading of sewage sludge with mercury content on agricultural land (sludge used as fertilizer);</li> <li>• Application on land, seeds or seedlings of pesticides with mercury compounds.</li> </ul>

<p><b>By-products and impurities</b></p>	<p>By-products that contain mercury, which are sent back into the market and cannot be directly allocated to environmental releases, for example:</p> <ul style="list-style-type: none"> <li>• Gypsum wallboard produced from solid residues from flue gas cleaning on coal fired power plants;</li> <li>• Sulphuric acid produced from desulphurization of flue gas (flue gas cleaning) in non-ferrous metal plants with mercury trace concentrations;</li> <li>• Chlorine and sodium hydroxide produced with mercury-based chlor-alkali technology; with mercury trace concentrations</li> <li>• Metal mercury or calomel as by-product from non-ferrous metal mining (high mercury concentrations).</li> </ul>
<p><b>General waste</b></p>	<p>General waste: Also considered as municipal waste in some countries. Typically, household and institutional waste where the waste may be subject to incineration, landfilling or informal dumping. The mercury sources in waste are consumer products with intentional mercury content (e.g. batteries, thermometers, fluorescent tubes) as well as high volume waste like printed paper and plastic, with small trace concentrations of mercury.</p>
<p><b>Sector specific waste treatment /disposal</b></p>	<p>Waste from industry and consumers which is collected and treated in separate systems, and in some cases recycled, for example:</p> <ul style="list-style-type: none"> <li>• Confined deposition of solid residues from flue gas cleaning on coal fired power plants on dedicated sites;</li> <li>• Hazardous industrial waste with high mercury content which is deposited in dedicated, safe sites;</li> <li>• Hazardous consumer waste with mercury content, mainly separately collected and safely treated: e.g. batteries, thermometers, mercury switches, lost teeth with amalgam fillings;</li> <li>• Confined deposition of tailings and high-volume rock/waste from extraction of non-ferrous metals.</li> </ul>

For all tables showing mercury inputs and mercury emissions and releases, it is important to note the following aspects for total calculations:

1. To avoid double counting of mercury inputs from waste and products in the input total, only 10% of the mercury input to waste incineration sources, waste deposition and informal dumping is included in the total for mercury inputs. This 10% represents approximately the mercury input to waste from materials, which are not quantified individually in inventory level 1 of the toolkit. See Appendix 1 to the Inventory Level 1 Guideline for more explanation<sup>7</sup>.

2. The estimated quantities include mercury in products, which has also been accounted for under each product category. To avoid double counting, the releases to land from informal dumping of general waste has been subtracted automatically in the totals.

3. The estimated input and release to water include mercury amounts, which have also been accounted for under each source category. To avoid double counting, input to, and releases to water from, wastewater system/treatment have been subtracted automatically in the totals.

4. To avoid double counting of mercury in products produced domestically and sold on the domestic market (including oil and gas), only the part of mercury inputs released from production are included in the input total.

5. To avoid double counting, fossil fuel mercury contributions to cement production was subtracted automatically in the totals.

## 2.2 - Sources of Mercury Inputs to Society in Guinea-Bissau

**Table 10** presents the different sources of mercury inputs found or assumed to be present (not officially identified) in Guinea Bissau. Only existing sources in the country were quantitatively and qualitatively assessed in this chapter.

Mercury inputs to society should be understood in the inventory as the total amounts of mercury potentially emitted and released in the environment. This includes mercury intentionally used in items such as thermometers, blood pressure monitors, compact fluorescent lamps, and others. It also considers mercury mobilized during the mining of ores that contain trace amounts of mercury.

However, it should be noted that some minor sources assumed to emit mercury (**Table 11**) have not been included in this inventory even if it is possible that these sources exist in some countries.

<sup>7</sup> <https://wedocs.unep.org/bitstream/handle/20.500.11822/14777/Hg-Toolkit-Guideline-IL1-January2017.pdf?sequence=1&isAllowed=y>

**Table 9:** Identification of mercury release sources in the country; Sources present (Y), and possible, but not identified positively (?)

Source category	Source present Y/ ?	Estimated mercury input (kg Hg/year)
<b>Energy Consumption</b>		
Other coal uses	Y	0
Combustion/use of petroleum coke and heavy oil	Y	0
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	1
Use of raw or pre-cleaned natural gas	Y	0
Use of pipeline gas (consumer quality)	Y	0
Biomass fired power and heat production	Y	63
Charcoal combustion	Y	0
<b>Use and Disposal of Products with Mercury Content</b>		
Dental amalgam fillings ("silver" fillings)	Y	7
Thermometers	Y	2
Electrical switches and relays with mercury	Y	124
Light sources with mercury	Y	17
Batteries with mercury	Y	141
Polyurethane (PU, PUR) produced with mercury catalyst	Y	27
Paints with mercury preservatives	?	?
Skin lightening creams and soaps with mercury chemicals	Y	30
Medical blood pressure gauges (mercury sphygmomanometers)	?	?
Other manometers and gauges with mercury	Y	4
Laboratory chemicals	Y	9
Other laboratory and medical equipment with mercury	Y	35

Production of Recycled of Metals		
Production of recycled ferrous metals (iron and steel)	Y	2
Waste Incineration		
Incineration and open burning of medical waste	Y	15
Open fire waste burning (on landfills and informally)	Y	1.380
Waste Deposition/Landfilling And Waste Water Treatment		
Controlled landfills/deposits	Y	686
Informal dumping of general waste	Y	234
Waste water system/treatment	Y	217
Waste Deposition/Landfilling And Waste Water Treatment		
Cemeteries	Y	79
<b>TOTAL of quantified inputs</b>		<b>770</b>

The subcategories of sources below are those that contribute most to mercury inputs into Bissau-Guinean society:

- Open fire waste burning (on landfills and informally)
- Controlled landfills/deposits
- Informal dumping of general waste
- Waste water system/treatment

- Batteries with mercury
- Electrical switches and relays with mercury

In addition, the categories of sources presented in the following table have not been the subject of a study in this inventory but have nevertheless been identified in the national territory.

**Table 10:** Several potential sources of mercury not included in the quantitative inventory; with preliminary indication of possible presence in the country.

Source category	Source present Y/N/?
Production of other recycled metals	Y
Polyurethane production with mercury catalysts	Y
Seed dressing with mercury chemicals	Y
Infra-red detection semiconductors	Y

Bougie tubes and Cantor tubes (medical)	Y
Gyroscopes with mercury	?
Vacuum pumps with mercury	?
Use of mercury as a refrigerant in certain cooling systems	?
Light houses (levelling bearings in marine navigation lights)	Y
Tanning	Y
Pigments	Y
Products for browning and etching steel	Y
Certain colour photograph paper types	Y
Recoil softeners in rifles	Y
Explosives (mercury-fulminate, and possibly other)	Y
Fireworks	Y
Executive toys	Y

## 2.3 - Summary of Mercury Emissions and Release Sources in Guinea-Bissau and Stockpiles, Supply and Trade

Mercury emissions and releases are the result of the use of mercury inputs in various anthropogenic activities. The main media into which mercury is released are the air (emissions), and water and soil (both releases). **Table 12** below summarizes mercury releases from all source categories and sub-categories present in Guinea-Bissau.

**Table 11:** Mercury emissions and releases in Guinea-Bissau

Source category	Source present?	Estimated Hg emissions and releases, standard estimates, Kg Hg/y					
	Y/N/?	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
<b>Energy consumption</b>							
Other coal uses	Y	0.0	0.0	0.0	0.0	0.0	0.0
Combustion/use of petroleum coke and heavy oil	Y	0.0	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene, LPG and other light to medium distillates	Y	0.6	0.0	0.0	0.0	0.0	0.0
Use of raw or pre-cleaned natural gas	Y	0.0	0.0	0.0	0.0	0.0	0.0
Use of pipeline gas (consumer quality)	Y	0.0	0.0	0.0	0.0	0.0	0.0
Biomass fired power and heat production	Y	62.8	0.0	0.0	0.0	0.0	0.0
Charcoal combustion	Y	0.0	0.0	0.0	0.0	0.0	0.0
<b>Use and disposal of products with mercury content</b>							
Dental amalgam fillings ("silver" fillings)	Y	0.1	3.0	0.5	0.4	1.3	1.3
Thermometers	Y	0.4	0.6	0.4	0.0	0.6	0.0
Electrical switches and relays with mercury	Y	37.1	0.0	49.5	0.0	37.1	0.0

**Source:** National mercury inventory in Guinea-Bissau, 2017

Source category	Source present?	Estimated Hg emissions and releases, standard estimates, Kg Hg/y					
	Y/N/?	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
<b>Energy consumption</b>							
Light sources with mercury	Y	5.2	0.0	5.2	0.0	6.9	0.0
Batteries with mercury	Y	35.3	0.0	35.3	0.0	70.6	0.0
Polyurethane (PU, PUR) produced with mercury catalyst	Y	5.3	2.7	10.6	0.0	8.0	0.0
Paints with mercury preservatives	?	?	?	?	?	?	?
Skin lightening creams and soaps with mercury chemicals	Y	0.0	28.5	1.5	0.0	0.0	0.0
Medical blood pressure gauges (mercury sphygmomanometers)	?	?	?	?	?	?	?
Other manometers and gauges with mercury	Y	0.9	1.3	0.9	0.0	1.3	0.0
<b>Production of recycled metals</b>							
Production of recycled ferrous metals (iron and steel)	Y	0.5	0.0	0.6	0.0	0.5	0.0
<b>Waste Incineration</b>							
Incineration and open burning of medical waste	Y	15.4	0.0	0.0	0.0	0.0	0.0
Open fire waste burning (on landfills and informally)	Y	1380.4	0.0	0.0	0.0	0.0	0.0
<b>Waste deposition/landfilling and waste water treatment</b>							
Controlled landfills/deposits	Y	6.9	0.1	0.0	-	-	-
Informal dumping of general waste	Y	23.4	23.4	187.3	-	-	-
Waste water system/treatment	Y	0.0	195.1	0.0	0.0	21.7	0.0
<b>Crematoria and cemeteries</b>							
Cemeteries	Y	0.0	0.0	79.4	-	0.0	0.0
<b>TOTAL of quantified releases</b>		1570.0	70.0	180.0	0.0	160.0	20.0

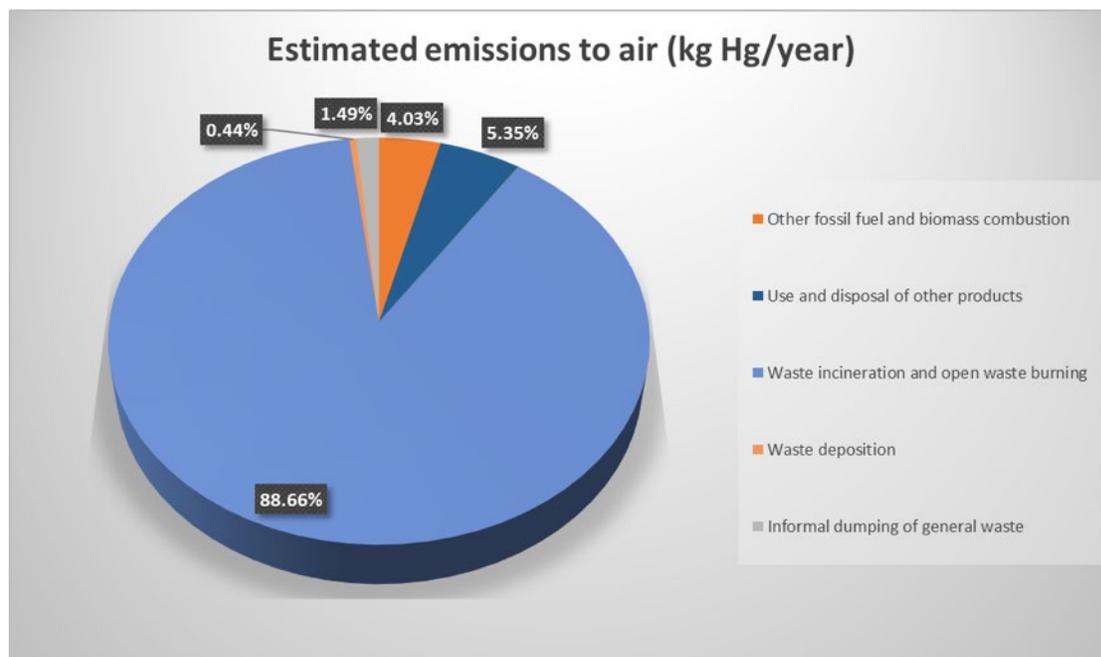
Mercury is emitted and released through the economic activities of the following sectors in Guinea-Bissau:

- **Energy consumption** with power and heat production from biomass;
- **Use and disposal of products with mercury content especially** electrical switches and relays with mercury, batteries with mercury;
- **Waste incineration and open burning of medical waste and general waste (on landfills and informally)**”
- **Waste deposition / landfilling and waste water treatment with** controlled landfills/ deposits, informal dumping of general waste and waste water system/treatment;
- **Cemeteries**

## 2.3.1 - Mercury Emissions To Air

Mercury emissions to air are shown in Figure 2; air emissions are any evaporation of mercury in the form of vapour. For instance, the aerosols that may result from heating.

Figure 2 - Estimated mercury emissions to air



Source: National mercury inventory in Guinea-Bissau, 2017

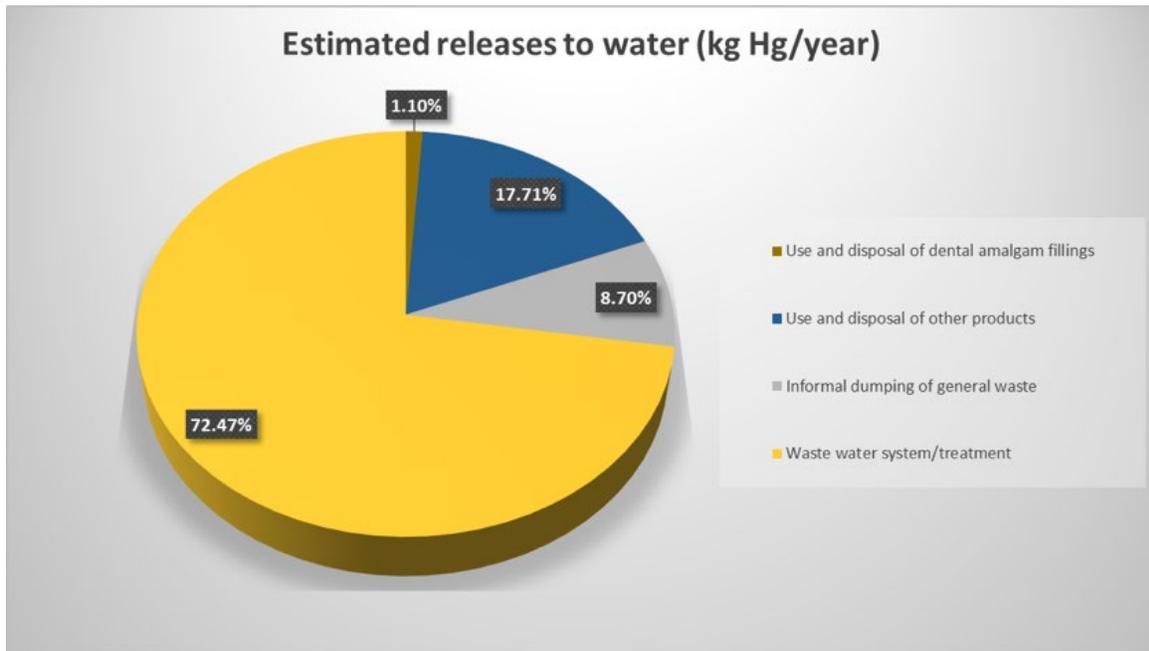
As shown above, the most important sources of emissions in Guinea-Bissau are:

- Open waste burning (may be overestimated due to Toolkit methodology)
- Use and disposal of products (batteries, switches, skin lightening creams and other products in the same category)
- Biomass combustion

### 2.3.2 - Mercury Releases To Water

The categories considered for the estimates of mercury releases to water are presented in **Figure 3**, which includes all releases to aquatic environments, surface waters, and wastewater systems. Sources of releases can be of two natures: sources located at a fixed point (for example, a factory) or diffuse sources (for example, dumped products) from which mercury can disperse and reach marine environments (oceans) and fresh waters (rivers and lakes).

**Figure 3** - Estimated Mercury Releases To Water



**Source:** National mercury inventory in Guinea-Bissau, 2017

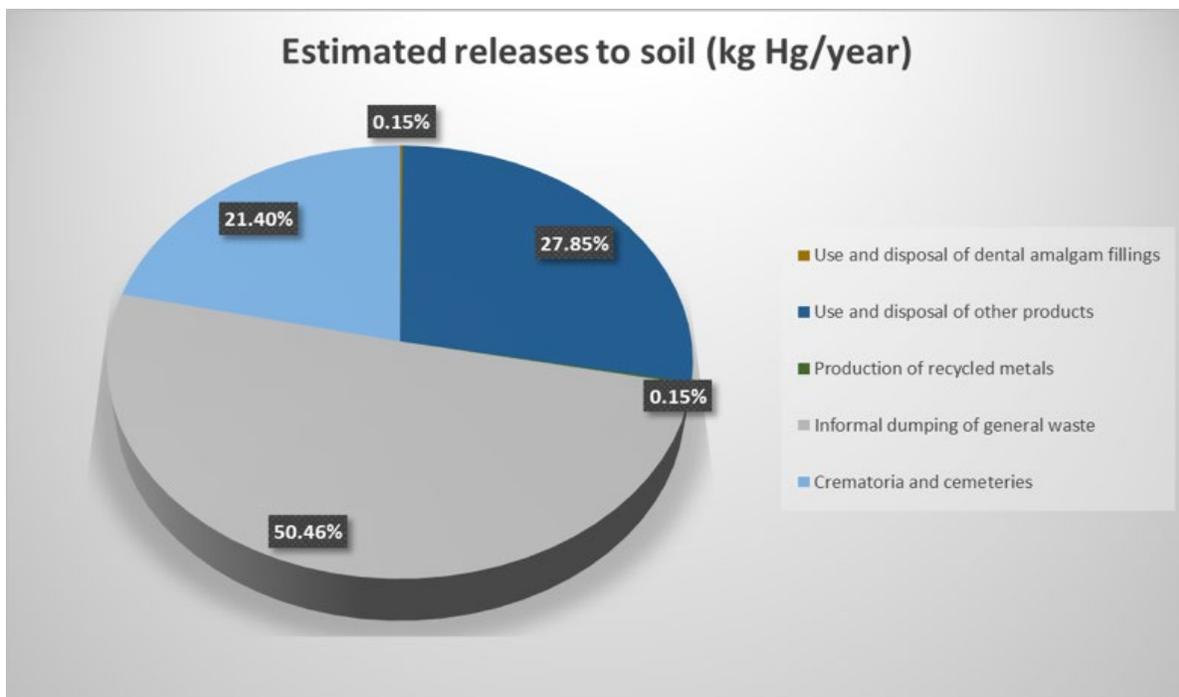
The main source categories that contribute to mercury releases to water are:

- Waste water discharge and treatment (may be overestimated due to Toolkit methodology)
- Use and disposal of other products (e.g. skin-lightening creams, laboratory uses)
- Informal dumping of general waste
- Application, use and disposal of dental amalgam fillings

### 2.3.3 - Mercury Releases To Soil

Estimates of mercury releases to soil and land are summarized in **Figure 4**. With respect to mercury in soils, all types of releases to soils are considered. Similar to water, sources of releases to land are of two natures: sources at a fixed point or diffuse sources from which mercury may disperse.

**Figure 4** - Estimated Mercury Releases To Water



**Source:** National mercury inventory in Guinea-Bissau, 2017

The main source categories that contribute to mercury releases to soil are:

- Informal dumping of general waste
- Use and disposal of other products
- Crematoria and cemeteries

## 2.4 - Data And Inventory: Energy Consumption

This section of the inventory presents the use of fossil fuels and biomass for the production of electricity and heat. Fossil fuels and biomass contain mercury concentrations that are liberated naturally when burned. Most of this mercury is liberated to the environment, but some are captured by the systems, if any, of purification of wash gas and they end up in waste. The mercury levels in the fuels vary according to the source and type of fuel.

As of 2017, coal-fired power in Guinea-Bissau was non-existent. A national oil and gas company (PETROGUIN) envisages the possibility to initiate activities, most likely in the long term (Actualitix, 2016).

### 2.4.1 - Other Uses Of Coal

In Guinea-Bissau, 2 tons of coal per year is dedicated to other uses, based on an average of five years. The principal products are: activated coal (HS 3802100000), lead electrodes or of coal, for electric uses (HS 8545190000) (INE, 2017). However, as those are not combustion uses of coal, they do not contribute to mercury releases. This explains the input of 0 kg Hg/year of the inventory.

### 2.4.2 - Combustion / use of petroleum coke and heavy oil

The inventory estimated that the input of this category is close to 0 kg Hg/year. However, in total, an average of 666 tons a year of coke of petroleum and of heavy oil is used. The confidence in this data is weak due to the fact that the products are not separated in specific categories. As such, the data are not focused. This happens, for example, because the customs sector does not categorize the products specifically. Consequently, the aggregate data was used for this inventory.

### 2.4.3 - Combustion / Diesel Use, Diesel Oil, Petroleum, Kerosene, Lpg And Other Light To Medium Distillates

This category contributes to 1kg Hg/year. About 104,659 tons a year of refined petroleum products are used in Guinea-Bissau (CIA, 2015). Microcrystal, lenhite oil, turf (HS 2712900000) are presented in kilograms (kg), then converted into tons (t) and added to the fuel subcategory cell using diesel, diesel, oil, kerosene, LPG and other distant light and medium distillates (INE, 2017). The figures presented are low due to the lack of control on the imports of products, so the real consumption is likely to be larger.

### 2.4.4 - Use Of Raw Or Pre-Cleaned Natural Gas

The available data about the use of pipeline gas (quality for consumers) is 48,976 Nm<sup>3</sup> / year (INE, 2017). The figures presented are low due to the lack of control on the imports of products (hence the estimates of 0 Kg Hg/year in the inventory): it is very likely that the real consumption is larger.

The data used are mainly of two types: Gas: Butanes, Butane liquefied (source: INE / Customs DG - 2016). There are also products

such as rechargeable gas pocket lighters that were not included in the inventory.

Data on the use of raw or pre-cleaned natural gas of 218 tonnes, contributing to 104,877 tonnes of refined petroliferous products used in the country. The gas data was derived from the import statistics as follows:

- Data on the use of crude or petroleum gases and other gaseous hydrocarbons: HS 2705000000
- Data on natural gas of liquefied petroleum gas: HS 2711110000
- Data on other petroleum gases and other hydrocarbon gases in the gaseous state: HS 2711290000
- Data on other petroleum gases and other liquefied petroleum gases: HS 2711190000
- Data on liquefied propane: HS 2711120000
- Data on liquefied butane: HS 2711130000
- Data on other paraffin, petroleum wax: HS (parent code) 2712

### **2.4.5 - Biomass Fired Power And Heat Production And Charcoal Combustion**

This category contributes to an input of 63 kg Hg/year. The data inserted in this inventory are 2,093,250 t/year of biomass combustion (FAO, 2015). These data include the biomass consumption for the production of charcoal. Both categories were put together because the data includes biomass production and charcoal combustion and it is not possible to separate them.

## **2.5 - Data And Inventory On National Production Of Metals And Raw Materials**

As of 2017, there was no production of cement. However, CIMAF a cement company, was planning to start its activities by the end of 2018. The company will be using and producing the following: limestone, Gypsum alumino-silicate materials and cement clinker. (More information on the description of national mercury subcategories sources can be found in the national inventory report and the details regarding the data can be consulted in the related spreadsheets.)

Guinea-Bissau is not a country with a mining tradition (extractive industries), except for the exploration (quarries) of construction materials (inert/aggregates). Two large mineral reserves (Bauxite of Boé and Phosphate of Farim) are still in the study phase to assess their economic viability for exploration, and exploration had already begun in the heavy sands of Varela, though it is currently closed.

There is speculation about the existence of artisanal and small-scale gold mining (ASGM), but according to the official data of the General Directorate of Geology and Mines and from field visits, this activity does not exist at the moment, but there is some evidence of gold resources in the country.

All metals consumed in the country are already imported in the form of transformed products (DGGM, Bauxite Angola, DGA), and the exploration for mercury is non-existent (USGS, 2006). However, future cement production is possible, and it is important to keep abreast of developments and include such information in future assessments.

## 2.6 - Data And Inventory Of Waste And Recycling

This category includes all the types of activities on waste treatment, informal dumping of waste in landfills, incineration, open air burning and recycling.

Detailed information on the categories and subcategories presented in the inventory can be found in the guidance document of the toolkit and the national inventory report.

### 2.6.1 - Production Of Recycled Ferrous Metals (Iron And Steel)

This category contributes to an input of 2 kg Hg/year. The recycling of vehicle parts is a profitable activity in several countries of the world: but is less prevalent in Guinea-Bissau. However, some blacksmiths perform some recycling of metals, converting them into other tools for local use.

The data for this subcategory are based on the numbers of vehicles imported over the last five years, giving an average of 1,486 vehicles/year (INE, 2017). Some of these cars are dismantled in Guinea-Bissau and mercury may be released during this process. The recycling is done in neighbouring countries, such as Senegal.

### 2.6.2 - Waste Incineration

This category contributes to an input of 15 kg Hg/year. This comes from the incineration and open burning of 641 t/year of medical and general waste. In this inventory, the input factors used for the biomedical waste (RBM) incinerated and not incinerated are

based on the biomedical waste report (Mbaye Mbengue FAYE, 2003) with additional information from Bissau City Hall (CMB) and the BLUFU Waste Company.

According to Wiedinmyer et al (2014) , 276,073 t/year of waste are burned outdoors in an informal way and in waste deposits in Guinea-Bissau. The mercury releases from the treatment of waste may be overestimated. However, the data on products containing mercury is incomplete and may, therefore, underestimate the mercury input in products (Wiedinmyer et al, 2014). In Bissau, a specialized company has been established for the collection of general waste, but not exclusively for biomedical waste.

### 2.6.3 - Landfill / Controlled Deposits Waste

This category contributes 686 kg Hg/year. According to Wiedinmyer et al (2014), 460,121 t of waste is generated per year (about 0.74 kg a day per person): subtracting the 322,905 t not collected, the waste deposited in controlled areas is approximately 137,216 t a year (Society, A. C. , 2014) (Wiedinmyer and W, 2014). While Bissau is the only city with controlled waste dumps, it also hosts many that are not controlled. Indeed, even those that are formal dumpsites (managed by the Bissau authorities) do not always conform to international standards and national waste policies.

### 2.6.4 - Open Air Burning Of Waste

This category contributes to an input of 276,073 t/y of burnt waste, resulting in 1,380 kg Hg / year. The burning of open-air waste (in landfills and informally), waste collection and waste management have been a major

problem for the Bissau-Guinean authorities.

Most of it is done by the general population itself and the most commonly used methodology is open incineration, even in Bissau where much of the collection is done by the Bissau City Council; the treatment is open-air incineration.

### 2.6.5 - Informal Deposits of General Waste

This category contributes 234 kg Hg/year. As above, an estimated quantity of 322,905 tons of waste are not collected. After subtracting the 276,073 of waste burned, the estimate of waste amounts dumped informally (and not burned) is 46,832 tons a year.

Waste collection and treatment throughout the country is a major problem; most of it is not collected, while the waste that is collected is eventually disposed of informally in an unsound manner.

The common element that stands out is the prevalence of residues called sieve remains, which are mostly sand. In addition, organic waste, including pruning, represents the second highest fraction. Studies of the collection points in the Municipality of Bissau show the composition of waste: Organic Waste 30%, Sieve Waste 26%, Glass 9%, Paper 8%, Pruning 7%, Other 5%, Plastic 4%, Ferrous Matter 4%, Inert waste > 2 cm 2% and Hazardous waste 1%. The neighbourhoods where it is collected the most are the following: Military 4.21%, Quelelé 6.32%, Míssira 5%, Bandim 6.32%, Square 9.47, Mindara 7.63%, Tchada 6.32% and Antula 5.26%.

In general, only 15% of the population of Bissau lives in urbanized or “pseudo-urbanized” areas; spaces that are organized

in a more systematic fashion (wide roads, houses in good conditions). Normally, collectors collect waste / materials that have market value, meaning glass, plastic and metals that can be reused and therefore sold, as well as processed for subsequent sale. In fact, it is evident that in the City Hall of Bissau’s (CMB) collection points, the presence of valuable materials (glass, metals and plastic) is higher than those found in families. This is due to two reasons: on one hand, these points are used for commercial activities, and therefore represent an important source of waste production; on the other hand, Bissau-Guinean families tend to keep plastic, glass and metal containers for reuse. This habit is very common in societies with low consumer power, which explains the lower presence of these materials in household waste.

The materials harvested by garbage collectors are: aluminium, iron, glass, plastic, copper, bronze, batteries, cardboard, organic and others. In a survey among waste collectors, 43% of respondents report collecting aluminium and iron cans, Tin 21.58%, Iron 21.58%, Glass 21.58%, Plastic 17.03%, Copper 11.49%, Cardboard 0.6%, Other 6%, Organic 0.2% (Miriam, 2016).

According to a maritime official, with regard to the hundreds of ships that fish in the Guinea-Bissau waters, no waste returns to land and most likely remains out at sea. Waste types would be food scraps, engine oil, cables, fishing nets, and bottles.

### 2.6.6 - System / Treatment Of Waste Waters

This category contributes 217 kg Hg/year. A system of waste water treatment does not exist; therefore, the calculation is based

mainly on the distribution of water. According to DGRH it is about 41,284,100 m<sup>3</sup> / year of waste water, using an estimated 25 m<sup>3</sup>/year estimated 25 m<sup>3</sup>/year per person for extrapolation to national level (DGRH, 2017). As of 2017, there was no sewage treatment system, and almost no sewage, with most of the population using roadsides or ditches, to remove wastewater.

The water comes from ground sources through electric pumps or wells, but in general it is not safe to drink given the numerous sources of pollution (wastewater infiltration). There is no treatment and disposal system for water reuse, recycling and recovery; currently most wastewater is released into the environment without adequate treatment.

According to DGRH, most human activities that use water produce wastewater, which can be sewage or polluted waters used by industries, which will be exacerbated by increasing global demand for water. As almost all of the wastewater in Guinea-Bissau is dumped directly into the environment without proper treatment, this has negative impacts on human health, economic productivity, freshwater quality and ecosystems.

### **2.6.7 - Test Of Waste And Wastewater Release Estimates**

In this inventory, default input factors were used for the estimate of the mercury releases from general treatment of waste and treatment of wastewaters. The factors were based on literature data from developed countries of the mercury contents in waste and residual waters. Local tests were performed to qualify the results for those sources.

The test for general waste compares the inputs calculated for the four subcategories of general waste with the sum of the estimated output of waste from intentional use of mercury in products and processes. The test shows that the mercury input to waste may be overestimated.

The test for wastewater compares the inputs calculated for the treatment of residual water with the sum of the outputs for the water of intentional use of mercury in products and processes. In Guinea-Bissau, a system of treatment of the residual waters does not exist, however, the calculations were based on the average consumption of water at the national level at a value of 25 m<sup>3</sup> per day per person, giving a value of 41,284,100 m<sup>3</sup> a year. The test indicates that the inputs of mercury in wastewater may also be overestimated.

## **2.8 - Data and Inventory on The General Consumption Of Mercury in Products, as Metallic Mercury and as Substances Containing Mercury**

This category includes the national consumption of a great variety of mercury-added products. The products are commercialized in the market, but they can also be imported. The national annual consumption is defined as follows:

$$\text{Consumption} = \text{production} + \text{import} - \text{export} \\ \text{(of the same year)}$$

In Guinea-Bissau, there is little or no production and export, so the consumption can be considered as the amounts imported.

The mercury subcategories included at this stage of the inventory are shown in **Table 11**.

The releases of products containing mercury are significant in many countries and, therefore, it is important to quantify them. Usually, most of the releases from the products happen during the disposal phase of the life cycle. Many of the products are used in great number by private consumers and they are dispersed across the whole country, they can deteriorate during use, and they can end up in the waste system or simply discarded. The government's solutions to reduce those releases are to restrict the commercialization of products, to collect waste (separating products that contain mercury) and to supply alternatives. To avoid the double counting of estimates of mercury release in the treatment of waste, these products are subtracted from the total releases.

### 2.8.1 - Dental Amalgams

This category contributes 7 kg Hg/year. The calculations are based on the population and information from the centre for dental medicine, as local data on amalgam use are not available.

Although the use of dental amalgam (composition of silver, tin, copper and zinc, mixed with mercury) as a restorative material has greatly diminished in Guinea-Bissau and to a large extent been replaced by other materials such as an adhesive system and composite resin, the practice is still present in the country, for example in the Stomatology Service of Hospital 3 de Agosto in Bissau.

### 2.8.2 - Thermometers

This category contributes 2 kg Hg/year. Two categories of thermometers have been

merged. The number of items of "Other glass Hg thermometers (such as air, laboratory, and dairy) is considered equally distributed between "Ambient air thermometers" and "other glass Hg thermometers".

Reports indicate that, in recent years, almost all health professionals have been using electronic thermometers. However, thermometers containing mercury are still in pharmacies and depots of healthcare materials.

### 2.8.3 - Electronic Switches and Mercury Relays

This category contributes 124 kg Hg/year. The default input factor is based on a medium value of 1.4 g Hg per inhabitant per year. To adjust approximately for the prevalence of "technical installations" in the country, the calculated mercury input is further reduced with the fraction of the population with access to electricity (electrification rate as derived by IEA, 2009; see the Toolkit Reference Report for more details).

There was no data introduced for this subcategory in the inventory, as the calculations were based on the number of the population and the rate of electrification already given in the Toolkit calculation spreadsheet.

### 2.8.4 - Light Sources with Mercury

This category contributes 17 kg Hg/year. Estimates of annual consumption are based on customs data in which code HS 853931 is considered to include all double-ended fluorescent tubes and code HS 853939 is considered to include all compact fluorescent lamps (CFLs).

Imports of fluorescent tubes (code HS 853931) amount to an average of 162,376 per year while 1,325,920 CFLs (code HS 853939) are imported (INE, 2017). In addition, customs data indicate imports of about 1,800 ultraviolet lamps registered under code HS 853941 (INE, 2017).

### 2.8.5 - Mercury Batteries

This category contributes 141 kg Hg/year. The three subcategories introduced in the inventory calculations are the following:

- Mercury Oxide (button cells and other sizes) also called zinc-mercury batteries: Average consumption in Guinea Bissau between 2012-2015 amounted to 133 kgs/year;
- Other button cell batteries (zinc-air, button cells of alkaline button, silver oxide): Consumption of batteries imported under customs codes HS 850640 and HS 850660 amounts to about 1.88 tons a year;
- Other mercury batteries (cylindrical alkaline battery, permanganate and others): Customs codes HS 85061011 and HS 85061090 indicates that imports of these batteries amounts to 342 tons/year (INE, 2017).

### 2.8.6 - Mercury Polyurethane Catalyst

This category contributes 27 kg Hg/year. The default input factor is based on current consumption in the European Union. As described in the Reference Report, the EU consumption of mercury polyurethane catalysts in 2008 was 20-35 tons, corresponding to 0.04-0.07 g Hg/inhabitant, though global estimates indicate a lower average. On this basis, a default value of 0.03 g Hg per inhabitant per year is applied as standard in the Toolkit.

To adjust approximately for the prevalence of “technical installations” in the country, the calculated mercury input is further reduced with the fraction of the population with access to electricity (electrification rate as derived by IEA, 2009). Polyurethane is not only used as part of technical installations, but electricity access is selected as an indirect indicator of technological development relevant for this material.

For polyurethane (PU, PUR) produced with mercury catalyst, it is not necessary to insert data, as the calculations on level 1 are automatically based on the population and the electrification data.

### 2.8.7 - Paints With Mercury Preservative

There is a significant amount of paint in the country, but no data is available on imported paints that might contain mercury (or mercury compounds) in their composition, thus it is not included in the inventory. As an example, from neighbouring countries, Guinea (Conakry) reported the existence of paint production plants on its territory and it contributes 130 kilograms of mercury per year.

### 2.8.8 - Skin-Lightening Creams And Soaps With Mercury Chemicals

There is no official available data for this category, but it is still a significant issue at the national level. For this reason, the inventory has automatically calculated the input of 30 kg Hg/year based on default data. The use of such creams in the country is increasing, with the influence of neighbouring countries. As an example, a study conducted for the WHO stated that Senegal and Togo registered 27% and 59% respectively of their

skin-lightning products. Regarding creams and soaps, the concentration of mercury identified in the products imported into these neighbouring countries range from 1% to 10% of mercury ammonium for creams and 1% to 3 % mercury iodide for soaps (WHO, 2011)<sup>9</sup>.

Consumption of these products in neighbouring countries can have an influence in Guinea-Bissau, and there is an indication that an increasing number prefer to use such products. Within the country, the main affected cities are Bafatá, Gabú and Bissau; however, it is difficult to determine the amount of the products used.

Researching data for this category would be one of the priorities for future inventories.

### 2.8.9 - Other Manometers and gauges with mercury

In 2012, an import of 4 kg was declared (INE, 2017). This equates to an estimated 1000 articles (using the conversion factors available in the Toolkit). In the Toolkit's Inventory Level 1, the mercury input to this sub-category is calculated automatically using population data in combination with the fraction of the population with access to electricity (the electrification rate) (AIE, 2009). The releases are considered distributed in the same way as with thermometers in medical practices.

### 2.8.10 - Chemical Products In Laboratories

This category contributes 9 kg Hg/year. As noted in the inventory, there is the presence of laboratory chemicals, though this is estimated to be very little due to the lack of presence of national laboratories and the

uses of these products. There are also other laboratories, such as veterinary laboratories, which deal with inspection of products of animal origin and recently a laboratory of hygiene, sanitary inspection and control of fish. These laboratories import reagents that are sometimes obsolete, and even those used lack appropriate treatments. It is therefore important to gain a greater understanding of what these are, how they are disposed of and what the potential mercury contents are.

### 2.8.11 - Other Laboratories' Medical Equipment That Contain Mercury

This category contributes 35 kg Hg/year and is based on default Toolkit calculations. Different medical laboratories in the country may perhaps contribute to this. They include clinical analysis and control of domestic cleaning products, Laboratory of the Cumura Pediatric Hospital (clinical analysis), Simão Mendes National Hospital Laboratory (biochemical analysis, immunology analysis, parasitological analysis) and above all, the dental amalgam laboratory from Hospital August 3, were identified as the most related to mercury and mercury compounds according to their activities.

These laboratories, although they are increasingly modernized, such as through the various activities of the Instituto Ricardo Jorge, still have a strong possibility of holding stocks of old materials that contain mercury.

## 2.9 Data and Inventory of Crematoriums and Cemeteries

This step includes releases of mercury arising from the incineration and burial of dead bodies. However, as Guinea-Bissau

<sup>9</sup> WHO: « Preventing disease through healthy environments: mercury in skin lightning products », Public Health and Environment branch, [http://www.who.int/ipcs/assessment/public\\_health/mercury\\_flyer.pdf](http://www.who.int/ipcs/assessment/public_health/mercury_flyer.pdf), consulted on 23 August 2018

category. Cemeteries contribute to an input of 79 kg Hg/year. The calculations indicate 31,779 burials per year, based on the annual mortality rate (INE, 2016). The main mercury source is dental amalgam, present in the fillings of the remaining teeth and also in the body tissues, in reduced concentrations. During incineration, the mercury is liberated with the combustion gases. Following burial, the mercury is released in to the ground of the cemetery and its immediate surroundings.

## 2.10 - Contaminate Sites

A contaminated site is any type of soil, air, water, sediment or a combination of two or more of these elements that may contain mercury, mercury compounds or mercury waste. First, it should be noted that mercury contamination can be associated with a wide range of other chemical pollutants and, therefore, can be complex to analyze. Mercury, when released into the atmosphere, can travel long distances and settle in remote areas far from the original emission site. Similarly, mercury released to land and water can be released over large areas beyond the original area of spread.

The Level 1 inventory does not address the issue of contaminated sites in detail. Nonetheless, this problem remains, as contaminated sites are the direct result of human activities involving mercury or mercury compounds and therefore emissions and releases into the environment. However, the results of the inventory can be used as a basis. The Guinea-Bissau mercury inventory has shown that the sites that might be contaminated in the country are mainly sites where products containing mercury and mercury compounds are disposed of and burned.

## 2.11 - Impacts of Mercury on Human Health and the Environment

### 2.11.1 - Impacts of Mercury on Human Health

A WHO study<sup>10</sup> on mercury exposure identifies the following effects on human health:

- Elemental mercury and methylmercury are toxic to the central and peripheral nervous systems. Inhalation of mercury vapour can cause adverse effects on the nervous, digestive and immune systems, lungs and kidneys, and can be fatal. Inorganic mercury salts are corrosive to the skin, eyes and gastrointestinal tract and can induce kidney toxicity if ingested.
- Neurological and behavioural disorders may be observed after inhalation, ingestion or dermal application of different mercury compounds. Symptoms include tremors, insomnia, memory loss, neuromuscular dysfunction, headache, cognitive and motor dysfunction. Mild signs of central nervous system toxicity may be observed in workers exposed to an elemental mercury concentration in air equivalent to or greater than 20µg/m<sup>3</sup> for several years. According to the WHO report, there is no conclusive evidence linking mercury exposure to cancer in humans.
- Communities can be directly exposed by eating contaminated fish and seafood. Methylmercury bioaccumulated in fish and consumed, especially by pregnant women, can cause neurological problems in the developing fetus. Exposure of the placenta is the most dangerous because the fetal brain is very sensitive at this stage. Neurological

<sup>10</sup> <http://www.who.int/phe/news/Mercury-flyer.pdf>

symptoms include mental retardation, convulsions, vision and hearing loss, developmental delay, language disorders and memory loss. In children, it has been reported that a syndrome characterized by red and painful extremities called acrodynia results from chronic exposure to mercury.

- Determining the concentration of mercury from a biological point of view, for example in hair and blood, allows exposure to be quantified and linked to possible health effects. It also makes it possible to estimate the burden of disease. WHO applies this approach, which uses morbidity rates to better quantify health.

### 2.11.2 - Impacts Of Mercury On The Environment

Mercury used in human activities is released into the environment; air (atmosphere), soil, water and sediment. Mercury, even present at low concentrations, is toxic and ecotoxic to all known living species. Inhalation of mercury vapour can have harmful effects on the nervous system, digestive system, immune system, lungs and kidneys (WHO, 2007).

Elemental mercury, also known as metallic mercury, is the most volatile form of mercury likely to be released into the atmosphere and most likely to remain there the longest. Once mercury is released into the environment, it persists in the environment while migrating between its various media and living organisms. In the atmosphere, it is airborne as vapour or absorbed by particles. This air pollution can last from a few days to more than a year and is constantly fed by degassing and evaporation from the soil and water. However, it can be oxidized to a water-soluble form ( $\text{Hg}^{2+}$ ) from which it can return to the soil and water. On the other

hand, when activities involving mercury are carried out in closed areas, evaporated mercury remains on site in the ambient air breathed.

In water, mercury is present in organic and inorganic forms,  $\text{Hg}$  and  $\text{Hg}^{2+}$ . It binds quickly to suspended matter. Reduction and methylation are in competition in this environment. Reduction reactions (to elemental mercury) promote its atmospheric recycling and methylation reactions are the basis for its bioaccumulation, because organic mercury compounds bind stronger to fatty tissues. In aquatic systems, one of these  $\text{Hg}^{2+}$  reactions will therefore influence its behaviour and modify its mobility, bioavailability and toxicity to the species present. In aquatic systems, mercury has a very high bioaccumulation potential, mainly in the form of organic mercury (particularly methylated mercury).

In soil, mercury is rapidly bound by iron oxides, aluminium, manganese and organic matter. The main factors influencing speciation and behaviour of mercury in soil are: pH, organic matter concentration, redox potential, cation exchange capacity, chloride concentration, aeration, soil mineralogical composition and texture.

Therefore, when mercury enters the soil and water, its contamination potentially extends to all living organisms (plants and animals) that feed on products from affected environments and moves up the entire food chain. Because of its toxic and persistent nature and its ability to accumulate and concentrate in living organisms, mercury particularly affects certain populations or groups of people who are more exposed and/or vulnerable to its effects.

Although in some cases useful in medicine, mercury is considered by the WHO (2007)

to be one of the ten chemicals or groups of chemicals of very high concern to public health. Aspects to consider when defining exposure levels include:

- The type of mercury involved;
- The dose;
- The age or developmental stage of the exposed person (the foetus is more sensitive);
- The duration of the exposition;
- The route of exposure (inhalation, ingestion or skin contact).

The release of mercury has a major impact on the environment causing great concern for the country's public health; an estimated 1570 kg Hg / year is released in the air, 70 kg Hg / year in the water and 180 kg Hg / year in the soil. These figures show the clear impact of this highly dangerous substance in our environment.

## Data Gaps And Recommendations

It should be noted that, for some categories of mercury sources, only some data were available to develop the input factors; therefore, there is a high uncertainty.

Each category section in this report describes the limitations and gaps of the data. The Level 1 inventory lists the main factors that can influence the amounts of input and real output, including case examples.

The main gaps or causes of gaps in data were the following:

- Lack of information and data;
- Low data production;
- Reliance on unofficial sources;
- No existing registrations of the activities;
- Undeclared imports of products;
- Second hand items with unknown origin or

information;

- Data lacking detail;
- Unavailable bibliographies;
- No existence of ministry sites with data;
- Aggregated data (that include certain products together that could be separated).
- Lack of local data for mercury concentration in waste. Several sources were found with significant gaps for which it will be necessary to initiate an in-depth study, as priorities for future inventories.

The main priorities for further evaluation and information gathering:

- Thermometers;
- Paints containing mercury compounds;
- Medical blood pressure gauges;
- Skin-lightening creams and soaps;
- Import data via land;
- Register of activities concerning the activities of biomedical waste.

## Implications of the Inventory Results For Guinea-Bissau as a Party to the Minamata Convention

It is clear from the results of the inventory set out above that Guinea-Bissau, in becoming a Party to the Minamata Convention, will need to consider actions to meet its obligations under a number of the articles of that treaty.

With regard to Article 3 on Mercury supply sources and trade, while there is no primary mining of mercury and none currently planned, Guinea Bissau may need to change existing mining legislation to prohibit such mining. It will also be necessary to ensure that any imports and exports of mercury are conducted in compliance with the prior informed consent arrangements set out in the Convention.

With regard to Article 4 on Mercury-added products, the inventory highlights the significant contribution of mercury-added products to total mercury emissions and releases in Guinea-Bissau. That is, Guinea-Bissau will need to consider what measures it will need to take to meet the obligation in paragraph 1 of this Article 4 with regard to prohibition of manufacture, import and export of mercury-added products listed in Annex A Part I.

A number of the products listed in Annex A Part I, and identified as important in the inventory results, are destined for use in the health sector: as such, changes in procurement policies may be required.

Furthermore, given the reported prevalence of amalgam use in dental restorations, a health sector strategy with regard to its phase-down will be needed to meet obligations in paragraph 3 and Annex A Part II.

With regard to Article 5 on Manufacturing processes in which mercury or mercury compounds are used, none of the processes listed in either Part I or Part II of Annex B have been identified in Guinea-Bissau during the inventory work. In meeting the obligation set out in paragraph 6, Guinea-Bissau may need to consider measures to ensure that no new facilities using the manufacturing processes listed in Annex B are established.

With regard to Article 8 on emissions, the inventory has identified a new cement production facility potentially as the main infrastructure responsible for the emissions to the atmosphere. Guinea-Bissau needs to take the necessary steps to comply with the Convention's obligations. Open waste burning, the key mercury emitting source of Guinea Bissau, is not currently covered by Article 8, but Guinea-Bissau may consider working for its inclusion in Annex D, should

this be desired.

With regard to Article 9 on Releases, Guinea-Bissau will need to consider whether any of the inventory categories identified as giving rise to significant releases to land and water need to be addressed under this article.

With regard to Article 10 on Environmentally-sound interim storage of mercury other than waste mercury, Guinea-Bissau may not need to consider measures, as no stocks of mercury are known and are unlikely to arise given the lack of current activities using mercury.

With regard to Article 11 on Mercury wastes, the inventory highlights the significance to the total mercury emissions and releases in Guinea-Bissau of the disposal of mercury-containing products, including products imported at or near end-of-life. It follows that Guinea-Bissau, as a Party also to the Basel and Bamako Conventions, will need to consider appropriate measure to meet obligations set out in paragraph 3 of the article.

With regard to Article 12 on Contaminated sites, only a very preliminary consideration of sites likely to be contaminated has been possible during this work. Nevertheless, a number of sectors likely to give rise to sites contaminated by mercury are recognized. Further work to develop an appropriate strategy for identifying and assessing such sites will be required to meet obligations set out in paragraphs 1 and 2.

With regard to Articles 16 on Health aspects, and Article 18 on public information, awareness and education, the inventory highlights the potential exposure to mercury of a number of population groups. The health and communication needs of these groups are considered in more detail in chapters 4



and 5 below.

In order to meet the obligations of these and other Articles of the Convention, Guinea-Bissau will need to establish legal, regulatory and institutional frameworks to manage its actions as a Party to the convention and to identify financial resources to take up actions. These aspects are dealt with in the following chapters.

## CHAPTER 3

# Policy, regulatory and institutional framework assessment

### 3.1- Political And Legal Assessment

Guinea-Bissau does not have a specific legal instrument for the management of all chemical products, except for some general references, namely in the Environmental Law and in the Environmental Assessment Law. Nevertheless, Guinea-Bissau has officially ratified the Minamata Convention, doing so on 22 October 2018. In addition, there are legal instruments that regulate other activities and/or chemicals that may be relevant to the domestic implementation of the Minamata Convention.

Furthermore, Guinea-Bissau, as a member of community organizations, including ECOWAS (Economic Community of West African States), UEMOA (West African Economic and Monetary Union) and CILSS (Sahelian Committee to Combat Drought), will apply all legal instruments created and approved by the competent bodies of these organizations, as referenced below.

Additionally, Guinea-Bissau is a Party to the Basel, Rotterdam and Stockholm Conventions, with the National Implementation Plan (NIP) for the implementation of the Stockholm Convention drawn up in December 2012 and revised in February 2013.

In the analysis of several national legal instruments in force, with an emphasis on those of the environmental sector and others whose activities impact the environment and human health, references to the

management of chemicals including mercury are to be found. Such legal instruments and the corresponding articles are as follows:

#### Environmental Law No. 1/2011 of 2 March 2011

The Environmental Law, adopted on 2 March 2011 provides the national environmental legal framework as well as the definition of control mechanisms for the manufacture, marketing, use and disposal of chemical compounds, including the measures to control any kind of pollution to the environment.

Some of the main sections of the Environmental Law related to chemicals management are described below as follows:

#### • Article 22: Chemicals

This article has two main components on chemical products, which can support the management of mercury, as well as broader chemicals and waste management:

1. Combating pollution from the use of chemicals shall be by:
  - a. Application of clean technologies;
  - b. Systematic assessment of the potential effects of chemical compounds on human health and the environment;
  - c. Control of the manufacture, marketing, use and disposal of chemical compounds;

d. Application of preventive techniques focused on the recycling and reuse of raw materials and products;

e. Implementation of fiscal, financial and other instruments to encourage the recycling and use of waste;

f. Public engagement.

2. Special legislation shall regulate:

a. The biodegradability of detergents;

b. The conditioning and labelling of pesticides, solvents, paints, varnishes and other potentially toxic products;

c. The use of chlorofluorocarbons and other components used in aerosols which have a serious “impact” on the environment and on human health;

d. The establishment of an information system on new chemical substances, requiring manufacturers and importers to update and assess the potential risks of products before they are placed on the market;

e. The maximum permissible concentrations in respect of pollution by asbestos, lead, mercury, cadmium and other chemicals;

f. Promoting and supporting standardization of energy, metals, glass, plastic, cloth and paper recycling;

g. the promotion and use of waste for the use of energy;

h. the promotion and support of alternative energies

#### • Article 25: Prohibition To Pollute

This expressly prohibits any form of pollution and / or the dumping of objects or products

containing substances or micro-organisms that may cause damage to the environment, relegating to the special legislation the definition of admissible limits.

#### • Article 24: Food Products

This Article refers to the right of persons to have access to food free from chemical pollution and the duty of the competent public authority to ensure and / or prohibit their processing, packaging, transport, storage, sale or consumption.

#### • Article 26: Elements of Ecological Offense

This article brings in a comprehensive list of activities considered polluting or that provoke ecological offenses. However, for the purpose of this assessment it is only highlighted the issue of chemical pollution and industrial pollution. Although this article has been somewhat displaced, the Guinean legislature has always sought to demonstrate its concern about pollution from chemicals.

#### • Article 27: Prohibition On Import Of Hazardous Liquid Or Wastes

This article includes the express prohibition of importing all types of waste and hazardous waste. Further to this, the country has also agreed to certain international conventions, such as the Basel, Rotterdam and Stockholm Conventions that also relate to restrictions on imports.

### **Water Code - Decree-Law no. 5-A / 92 of 17 September 1992**

This law defines the chemical parameters of drinking water as well as the procedures for carrying out the sanitary and quality controls.

#### **• Article 34: Water Quality Control**

The Ministries responsible for water and public health shall establish the following:

- o (b) the bacteriological, physical and chemical parameters of drinking water and the methods of carrying out the sanitary controls or analyses as well as the methods and products used for the treatment and improvement of water.

### **Basic Law on Civil Protection - Law no. 9/2011 of 15 June 2011**

This Law is relevant to mercury management due to the importance of this public body which not only acts as a preventive measure, but also has the responsibility to evaluate and monitor the risks of accidents that may evolve from dangerous substances with impact on the environment and human health, which also includes chemicals (such as mercury).

### **Law on Environmental Assessment - Law no. 10/2010 of 24 September 2010**

This law defines the need to evaluate any anthropogenic activity that may impact on the environment and human health and the mechanisms of assessment before, during and after, as well as competent environmental management structures. The is concerned with the anthropogenic activities involving the use of chemicals, taking into account the damage and / or negative impacts they may cause to the environment and human health. This includes (a list as Annex I):

- 6. Integrated chemical installations.

- 10. Waste disposal facilities: incineration, chemical treatment or landfill of toxic and hazardous waste.

- 16. Large storage facilities for petroleum, petrochemical and chemical products.

This provides a clear link between the environmental impact assessment and the use of chemicals, given the risks posed to both the environment and human health.

### **Decree-Law no. 7/2000 of 28 August 2000**

This legislation defines the System of Plant Protection Products. The public institutions of the State of Guinea-Bissau such as the Ministry of Agriculture, Forestry and Hunting, and the Secretariat of State for Trade and Craft, sub-regional organizations such as CILSS, and FAO and WHO, among others are entitled to work on the compliance of such legislation.

Article 7 of this Decree indicates that the National Commission for Pesticide Management, through the Directorate General of Agriculture, will be in charge of defining the mechanisms of the management of plant protection products at the country level. This legislation is relevant to this analysis since it addresses chemicals with an impact on human health and the environment.

### **Environmental Fund Created through Law 1/2011 of 02/03/2011 and regulated by Decree 06/2017 of 28 July 2017**

This regulation clearly defines the public entity with competence to receive appeals from fees, fines, donations, assistance or subsidies from bilateral and multilateral organizations and / or partners working in the field of environmental management and applies them in order to prevent or

repair damage to the environment, thereby helping to ensure the desired sustainable development outcomes. It is important for the management process of mercury / chemicals in case of need to finance any related activity.

### **National Institute of Public Health (INASA) - Decree Law no. 12/2010 of 26 August 2010**

This law creates and defines the competencies of INASA as the scientific institution that plans and executes the National Policy on Health and National Policy on Health Education. The INASA is charged with improving the quality of life in Guinea-Bissau through scientific and technological knowledge in health. Therefore, since its intervention is in the technical, scientific and educational domains of the health sector, together with the fact that the chemical products used in the various processes and / or activities of the health sector, this institute is very relevant for the implementation of the Minamata Convention.

### **National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants**

For Guinea-Bissau, the National Implementation Plan (NIP) of the Stockholm Convention has provided an opportunity to conduct in-depth studies on the inventory of persistent organic pollutants to identify and prioritize training needs, policy and regulatory reforms, and investments. This provides significant supplementary information on the chemicals and waste management system in Guinea-Bissau, lessons-learned on the management of specific substances, and experience in engaging across sectors and stakeholders.

## **Regulations**

- Regulations 04/2009/CM/WAEMU Concerning the harmonization of the rules governing the approval, marketing and control of pesticides within the WAEMU.
- Regulation C/Reg.3/2008 concerning the harmonization of Regulations Governing the Registration of Pesticides in the ECOWAS area (2008); defines the conditions for import, export, packaging, transport and storage of pesticides in the Member States.
- Regulations Common to the CILSS States on the Registration of Pesticides (1999); defines the conditions for import, export, packaging, transport and storage of pesticides in the Member States. It should be noted that these regulate the same subject matter and all of its articles are relevant to the Minamata Convention implementation process.

## **3.2 - Relevant Institutions In The Process Of Management Of Chemicals And Waste (Including Mercury) In Guinea-Bissau And Their Respective Mandates**

The following national Institutions have a relevant role in the sound management of chemicals and waste:

### **• State Secretariat of Environment (SEA)**

The mission of SEA is to define, implement and coordinate environmental policies within sustainable development.

Thus, in the pursuit of its mission, the following are the duties of the SEA:

a) Promote programmes, projects, measures and actions aimed at ensuring the preservation of the natural heritage, the good state and functioning of ecosystems, the maintenance and promotion of biodiversity and the conservation of nature;

b) Ensure an effective monitoring and evaluation system and ensure the public dissemination of information on the state of the environment;

c) Promote national involvement in solving environmental problems of international concern and ensure the implementation of conventions and other international agreements, as well as the legislation and policies of the African Union and other sub-regional and regional organizations;

d) To represent Guinea-Bissau in international bodies and committees and to promote international technical cooperation in protected areas;

e) To promote a sustainable policy for the management of wastes and other chemical products through the support, dynamism and monitoring of solutions for prevention, reuse and, where feasible, recovery of soils and contaminated sites in coordination with other entities with competence in this field;

f) Promote and coordinate the development of greenhouse gas control and reduction policies, programmes and actions, and encourage national involvement in the carbon market and development of climate change mechanisms;

g) to promote a policy for air quality management, design and implement noise prevention and control measures, with a

view to protecting public health and quality of life;

h) To promote the improvement of the environmental performance of economic agents and to promote actions for the prevention, identification and systematic evaluation of the impacts of human activity on the environment, of the natural and induced risks of anthropogenic activities, as well as to ensure the prevention and integrated control of pollution and promote environmental education as a strategic vehicle for training and raising awareness among citizens;

i) Ensure the adequate application of laws and other environmental policy instruments, namely through environmental audits, control and inspection;

j) Define the strategy of Integrated Management of the National Coastal Zone and guarantee its execution and evaluation;

k) Define the implementation strategy and collaborate in the management of national funds related to environmental policies;

l) Through the competent structures and in synergy with other public, private and other stakeholder departments to deal with the management and monitoring of the implementation of the Minamata Convention.

Under the terms of the SEA Organic Law, the Chemical and Waste Centre (CRPQ) is the body under direct State administration that deals with the environmental challenges caused by waste and chemical products.

In addition, it is responsible for providing adequate responses to the implementation of international conventions on waste and chemicals, in which Guinea-Bissau is a signatory or is in the process of accession or ratification.

#### • **Ministry of Public Health (MSP)**

The MSP is responsible for formulating, coordinating and executing government policies in the area of health, and among other duties, for overseeing the application of pharmaceutical legislation. Its main functions are: authorization, registration, import and export, marketing, advertising and dispensing medicines and related products to the public; controlling the procurement of pharmaceuticals, food and laboratory reagents; design and coordinate information, education and communication activities; to carry out the activities of preventive and curative medicine; support for traditional medicine; health surveillance; training and research in health. This is one of the departments that controls the use of chemicals such as mercury in healthcare products and in hospitals, including dental amalgam. This Institution deals mainly with the short and long-term effects of chemicals in public health, through several directorates under their authority, including the National Institute of Public Health (INASA).

Guinea-Bissau has mainly public hospitals, with some including dental services. In addition, there are five private clinics in Bissau, with some of them providing dental services. The MSP is responsible for buying medicines from private enterprises since there is no national production.

#### • **National Institute of Public Health (INASA)**

INASA is one of several public institutes

in the health sector and, in particular, its mission is to carry out the planning and execution of the national policy on health and health education. It is also responsible for promoting research, teaching, technological development and technical cooperation activities aimed at preserving nature. This department is also responsible for the management of the National Public Health Laboratory (LNSP).

#### • **Ministry of Agriculture, Forestry and Livestock (MAFP)**

This Ministry formulates, coordinates and executes government policy in the area of rural development, agriculture, forestry, livestock, hunting and food security, among other tasks, promoting agricultural and forestry training and research, through the control of import and use of fertilizers and pesticides. In addition, it prepares and ensures compliance with legal and regulatory texts on the management of pesticides for agricultural use. These activities are carried out through various internal organs under its tutelage, of which the National Commission for Pesticide Management (CNGP) stands out.

#### • **National Commission for Pesticide Management (CNGP)**

The National Commission for the Management of Pesticides (CNGP) was established in October 2016 through a joint dispatch between the Ministers responsible for agriculture, finance and trade. The Commission includes representatives of various public and private institutions and NGOs. Its mission focuses on the management activity of agricultural pesticides. It is the responsibility of this body to define the overall policy on pesticides for agricultural use, as well as to formulate solutions to relevant problems.

### • **Ministry of Commerce (MC)**

The Ministry of Commerce is responsible for coordinating and executing the government's policy for the promotion and development of trade. It is responsible, among other things, for legislating and ensuring compliance with legal texts and regulations related to importing and exporting goods and licensing and supervising activities. However, their competence is generic in what concerns the definition of the commercial policy of products entering and / or leaving the national territory, with the exception of medicines, as is stated in Decree No. 11/2010 of 26 August 2010, which regulates the pharmaceutical activity in the country.

### • **Ministry of Economy and Finance (MEF)**

The Ministry of Economy and Finance is responsible for formulating, coordinating and implementing government policy in the economic, financial and budgetary spheres. It is responsible for controlling the import and export of goods, in order to ensure the appropriate entry and exit. In addition, the General Directorate of the Plan that is under the supervision of the Ministry of Economy and Finance is the entity that deals with the economic planning of the State. This department defines the needs and assists the various public departments technically and financially in activities such as the creation of industries, ways to obtain chemical and agricultural products, among others.

### • **Ministry of Foreign Affairs, International Cooperation and Communities (MNECIC)**

It is responsible for drawing up, proposing, coordinating and implementing the State's foreign policy, strengthening cooperation relations with countries, international organizations and partners. It is of paramount importance in this process as

it is given the power to coordinate foreign affairs and international issues with regard to the country's participation or integration in international environmental agreements, which includes the management of chemicals and waste.

### • **Ministry of Justice (MJ)**

It is the responsibility of this body to formulate, coordinate and implement government policies on justice, the promotion of citizenship and human rights. In this regard, this Ministry, in partnership with the Ministry of Environment and Sustainable Development, through its legislative services, can formulate concrete proposals for legislation in the fields of chemicals and waste, access to information and legal guidance.

### • **Ministry of Public Administration, Administrative Reform and Labour (MFPRAT)**

It is responsible for formulating, coordinating and implementing government policies on modernization and management of public administration, employment, vocational training, work and social security. In addition, it addresses health and safety issues related to the use and handling of chemicals in workplaces.

### • **Ministry of Education and Higher Education (MEES)**

This institution is responsible for formulating, coordinating and implementing the national policy on education, higher education and vocational training, science and scientific research. It plays a relevant role in the research and definition of measures to be taken in the field of scientific research on chemicals including mercury, and promotion of possible new concepts, such as sustainable chemistry.

### • Ministry of Transport (MT)

It is responsible for formulating, coordinating and implementing the Government's policy on land, sea and air transportation. Thus, they are implicated in the safe transport and storage of substances and chemicals.

### • Ministry of Social Communication (MCS)

Regarding communications and dissemination of laws, regulations and other official documents, it is important to refer to the National Press (INACEP), an entity under the Ministry of Social Communication, that is responsible for issuing official bulletins, magazines and leaflets. The Ministry still has the power to create programmes and debates on national radio and on public television related to the management of chemicals and thereby plays a crucial role in the process of raising public awareness.

### • Ministry of Energy and Industry (MEI)

The Ministry of Energy and Industry is the government department responsible for formulating, proposing, coordinating and implementing the Government's energy policy, ensuring sustainable management, as well as promoting the country's industrialization through its internal organs, of which the Electricity and Waters of Guinea-Bissau company is included. The Ministry is the regulatory authority of the Fuels Sector, Oil and Natural Gas Derivatives (ARSECO) and the Guinean Foundation for Business and Industrial Development (FUNDEI). The industrial sector linked to this Ministry also deals with issues related to the production and uses of substances, including chemicals (for example, mercury), and the introduction of new (cleaner) production techniques. The industries should apply for the process to receive the licence first from the SEA. For receiving that license the industry must carry

out an environmental impact assessment. If it is approved by the SEA, the industry can request a working licence from the MEI.

### • Ministry of Internal Affairs (MAI)

The Ministry of Internal Affairs, part of the State Department of Public Order, is responsible for formulating, proposing, coordinating and implementing internal security, civil protection, fire, rescue and road safety policies.

Among the bodies under the supervision of this Ministry is the National Civil Protection Service (SNPC), whose competence is, among other things, to prevent, survey, and evaluate risks arising from major accidents and catastrophes, and to coordinate interventions. In addition, this Ministry is responsible for the ongoing analysis of the vulnerabilities of the country, as well as the development of strategies to cope with the effects of the continued use of mercury in coordination with other public entities.

### • Ministry of Natural Resources (MRN)

The Ministry of Natural Resources is the government department responsible for formulating, proposing, coordinating, and implementing policy in the areas of water, mines and oil. In addition, it leads the applied technological research through the General Directorate of Water Resources, Geology and Mines, the public company Petroleo da Guiné (PETROGUIN) and the National Institute of Research and Applied Technology (INITA), responsible for managing sustainable use of natural resources.

This last entity brings together diverse organizations and points of view that make up the vast social and cultural fabric of the country, namely, NGOs, non-profit community-based organizations, business



organizations, farmers, consumers, and others. Therefore, considering the role it plays in the process of socio-economic development, it is vitally important to include it in the management process of waste and chemicals, including mercury.

### **3.3 - Administrative And Regulatory Frameworks For Mercury Management In Guinea-Bissau**

Based on the assessments of the legal and institutional frameworks above, the tables presented in this section link existing national instruments with the provisions of each Article of the Minamata Convention relevant to Guinea-Bissau. For each article, the laws and their relevant content for the article, the key institutions with their functions considered relevant to the Article and the aspects that need to be improved to meet the Article's requirements are presented.

<b>Article 4-Mercury-added products</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Not allow the manufacture, import, and export of products listed in Part I of Annex A not otherwise excluded following the phase out date listed in the Annex</li> <li>• Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A</li> <li>• Take measures to prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products</li> <li>• Discourage the manufacture and distribution of new mercury product types</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Basic Law of the Environment - Law n° 1/2011 of 02/03/2011	It provides for the definition of control mechanisms for the manufacture, marketing, use and disposal of chemical compounds
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
<p>In order to achieve the provisions of this article, Guinea-Bissau will address three phases of action described below:</p> <ul style="list-style-type: none"> <li>• Permanent exclusion of the marketing of products containing mercury</li> <li>• National plan for alternatives to replace products containing mercury, e.g. hospital thermometers</li> <li>• Adopt legal measures prohibiting the marketing, manufacture and use of mercury-containing products and develop a plan to gradually eliminate the amalgam in the terms listed in Annexes A parts I and II. ‘</li> <li>• Adoption of a more favourable taxation policy for the import of non-mercury-containing equipment</li> </ul>	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define policies and legal instruments to control the marketing of mercury-containing products in the terms defined in the Annexes to the Convention</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical cadres available to help meet the needs of controlling the entry and exit of mercury and its compounds.</li> </ul>
Ministry of Public Health	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Defines the procurement policies for healthcare products containing mercury</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical cadres trained to address the need to prohibit the use of dental amalgams</li> </ul>

**Table 12:** Analysis of the political, regulatory and institutional frameworks with regards to Article 4 of the Minamata Convention

<b>Article 5 – Manufacturing Processes</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• For facilities with processes listed in Annex B, identify and obtain information on mercury or mercury compound use; and control mercury emissions to air, and releases to land and water</li> <li>• Discourage new uses of mercury in industrial processes</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Basic Law of the Environment - Law n° 1/2011 of 02/03/2011	<p>It provides for the definition of mechanisms to control the manufacture, marketing, use and disposal of chemical compounds;</p> <p>It provides for measures to control any type of pollution to environmental components</p>
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
Adopt legal measures prohibiting the use of mercury and its compounds in various processes, their release to water and soil as defined in the Convention and / or in Annexes B part I and II.	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define legal policies and instruments to control the marketing of mercury and mercury-containing products as defined in the Annexes to the Convention, as well as to prohibit any polluting activity</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to define legal policies that prohibit the use of mercury and mercury-containing products as well as their manufacture and use in production activities.</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the Ministry of Environment (General Environmental Inspectorate, Chemicals and Waste Centre), Ministry of Energy and Industry, Ministry of Commerce to ensure the gradual replacement of mercury by other alternative routes up to its total elimination.</li> <li>• Adoption of legal instruments with the objective of dealing with the use of mercury and its compounds as well as the control of productive activities.</li> </ul>	

**Table 13:** Analysis of the political, regulatory and institutional frameworks with regards to Article 5 of the Minamata Convention

<b>Article 8 – Air Emissions</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Require best available techniques/best environmental practices (BAT/BEP) or associated emission limit values (ELVs) for new (as defined in Article 8.2(c)) sources listed in Annex D (coal-fired power plants, coal-fired industrial boilers, non-ferrous metal smelting and roasting processes, waste incineration, and cement production)</li> <li>• Require one or more measures identified in Article 8.5 to control/reduce mercury emissions from existing sources listed in Annex D, which shall be operational at the source within 10 years</li> <li>• Require monitoring/reporting and otherwise establish a mercury emissions inventory for sources listed in Annex D</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Basic Law of the Environment - Law n° 1/2011 of 02/03/2011	It provides for mechanisms to control pollution through chemical compounds, which are likely to cause damage to the environment
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention’s provisions (only in relation to binding provisions):</b>	
Adopt specific political and legal measures that control the emission of chemical compounds into the atmosphere	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define policies and legal instruments to control pollution from the chemical compounds that may damage the environment.</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to define policies and legal texts that prohibit the emission of chemicals to the atmosphere.</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the Ministry of the Environment</li> <li>• Adoption of specific legal instruments concerning the emission of chemical compounds into the atmosphere.</li> </ul>	

**Table 14:** Analysis of the political, regulatory and institutional frameworks with regards to Article 8 of the Minamata Convention

<b>Article 9 – Releases to Land and Water</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Require reporting or otherwise obtain information as needed to identify significant sources of mercury/mercury compound releases to land or water, and to maintain an inventory of releases from the sources identified</li> <li>• Take one or more measures specified in Article 9.5 to control/reduce mercury and mercury compound releases to land and water from significant sources it identifies</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Basic Law of the Environment - Law n° 1/2011 of 02/03/2011	Provides mechanisms to control the emission to soil and water of any product that could jeopardize the quality of the environmental.
Law on Environmental Assessment - Law n° 10/2010 of 09/24/2011	It establishes the need to conduct environmental and social impact studies for activities that may have a negative impact on the environment.
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions (only in relation to binding provisions):</b>	
Adopt specific legal measures prohibiting the release to soil and water of any chemical product, with particular emphasis on mercury	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define policies and legal instruments to control pollution from the chemical compounds that may damage the environment.</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to define policies and legal texts that prohibit the emission of chemicals to the atmosphere.</li> </ul>
Ministry of Agriculture, Forestry and Livestock	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Defines the best agricultural and / or land-use techniques</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical staff trained to meet the needs of defining the types of products needed to cope with agricultural production</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the government institution responsible for the environment</li> <li>• Adoption of specific legal instruments concerning the releases of chemical compounds into water and soil.</li> </ul>	

**Table 15:** Analysis of the political, regulatory and institutional frameworks with regards to Article 9 of the Minamata Convention

<b>Article 11 – Mercury Waste Management</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Use a definition of mercury waste consistent with Article 11.2</li> <li>• Take measures to manage mercury wastes in an environmentally-sound manner, taking into account guidelines developed under the Basel Convention and in accordance with COP requirements (to be developed).</li> <li>• Take measures to restrict mercury derived from the treatment or re-use of mercury waste to allowed uses under the Convention or environmentally sound disposal</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Basic Law of the Environment - Law n° 1/2011 of 02/03/2011	It foresees the need to adopt measures aimed at treating all waste in an environmentally sound way.
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention’s provisions (only in relation to binding provisions):</b>	
Adopt specific policy and legal measures that allow the management of mercury waste in an environmentally sound manner	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define policies and legal instruments for waste management of all types</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to develop policies and legal instruments that define the management mechanisms of mercury waste</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the Ministry of the Environment</li> <li>• Adoption of specific legal instruments on the management of mercury waste</li> </ul>	

**Table 16:** Analysis of the political, regulatory and institutional frameworks with regards to Article 11 of the Minamata Convention

<b>Article 12 – Contaminated Sites</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Develop strategies for identifying and assessing mercury/mercury compound contaminated sites</li> <li>• If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
State Secretariat for the Environment	It foresees the need to promote a sustainable policy for the management of wastes and other chemical products through the support, dynamism, monitoring and monitoring of solutions for prevention, reuse and, in the alternative, recovery and recovery of soils and contaminated sites in conjunction with other entities with competence in this area
Law on Environmental Assessment - Law n° 10/2010 of 09/24/2011	It provides for evaluation mechanisms before and after any activity that could jeopardize the environment, as well as define the environmental management framework before, during and after activities.
Basic Law on Civil Protection - Law no. 9/2011 of 06/15/2011	It provides for the possibility of the civil protection authority to provide for, prevent, monitor, and assess collective risks arising from major accidents, disasters and ongoing analysis of the country's vulnerabilities, as well as develop strategies to address pollution, in synergy with other public bodies with jurisdiction in these areas.
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
Adopt concerted political and legal measures between the actors / institutions involved in the fields in question	
<b>Relevant national stakeholders/institutions</b>	
State Secretariat for the Environment	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Define policies and legal instruments for the management of polluting activities</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to define policies and legal texts that prohibit the emission of chemicals to the atmosphere.</li> </ul>
Ministry of Internal Affairs	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• It is responsible for formulating, proposing, coordinating and implementing internal security, civil protection policies.</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical framework available for other public institutions to adopt mechanisms to deal with the problem related to contamination of any kind</li> </ul>



<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>
<ul style="list-style-type: none"><li>• Strengthening the capacities of the technical staff of the Ministry of Environment and Civil Protection Services</li><li>• Adoption of standardized legal instruments to facilitate the management of environmental damage caused by the use of mercury</li></ul>

**Table 17:** Analysis of the political, regulatory and institutional frameworks with regards to Article 12 of the Minamata Convention

<b>Article 13 – Financial Resources</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Access domestic resources as may be needed to implement Convention obligations</li> <li>• Access financial resources available under the Convention’s financial mechanism and other resources available from multilateral, regional, and bilateral funding sources</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
Ministry of Economy and Finance (General Directorate of the Plan)	It defines the mechanisms for accessing financial assistance by the State with a view to addressing the social and economic development of the country.
Environmental Fund Created through Law 1/2011 of 02/03/2011 and regulated by Decree 06/2017 of 07/28/2017	Receive donations, assistance or grants from bilateral and multilateral environmental agencies and / or partners to address environmental management issues
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention’s provisions:</b>	
Take concerted action among competent public bodies on the issue of access to financial resources to meet the obligations and achieve the goals set out in the Minamata Convention.	
<b>Relevant national stakeholders/institutions</b>	
<b>Ministry of Economy and Finance (General Directorate of the Plan)</b>	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• It deals with the economic planning of the State in the short, medium and long term, usually deals with donations or technical and financial assistance with partners for the country’s development</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical frameworks to better define how to access financial assistance to the country</li> </ul>
<b>State Secretariat for the Environment (Environmental Fund)</b>	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Receive and manage financial resources from international organizations as well as bilateral and multilateral partners to address environmental management issues</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical and financial mechanism set up to provide access to available financing with the objective of investing in the environmental management process</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Reinforcement of the capacities of the technical staff of the Ministry of Environment (Environmental Fund) and Ministry of Economy and Finance (General Direction of the Plan) through training and fundraising for small and short-term projects with the objective of meeting the goals set by the Minamata. <ul style="list-style-type: none"> <li>• Articulate international partnerships to finance national projects aiming to replace the use of mercury products.</li> </ul> </li> <li>• Establish international cooperation with other countries or international organizations to eliminate the use of mercury in Guinea-Bissau.</li> </ul>	

**Table 18:** Analysis of the political, regulatory and institutional frameworks with regards to Article 13 of the Minamata Convention

<b>Article 13 – Capacity-building, technical assistance and technology transfer</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Cooperate to provide/receive capacity-building and technical assistance</li> <li>• Promotion and facilitation of environmentally sound alternatives</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
<b>State Secretariat for the Environment</b>	<p>It promotes national involvement in solving environmental problems of international concern and ensures the implementation of conventions and other international agreements;</p> <p>Represents the State in international organizations and committees and promotes international technical cooperation in the areas covered;</p> <p>It promotes the improvement of the environmental performance of economic agents and promotes actions for the prevention, identification and systematic evaluation of the impacts of human activity on the environment, of the natural and induced risks by anthropogenic activities and promotes environmental education as a strategic vehicle for the formation and awareness of citizens;</p>
<b>Ministry of Education and Higher Education</b>	<p>It coordinates and implements the national policy on education, higher education and vocational education, science and scientific research.</p> <p>It promotes activities of research, teaching, technological development and technical cooperation focused on the preservation of nature.</p>
<b>National Institute of Public Health</b>	<p>Provides technical and scientific training in the health sector;</p> <p>Encourages multi-disciplinary and multi-sectoral research activities, as well as the promotion and strengthening of national capacity for research in health sciences;</p> <p>Proposes communication strategies for health in collaboration with other health-promoting institutions</p>
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
Adopt concerted measures between public and private bodies as well as other stakeholders implicated in the activities referred to in Article 14 of the Convention in order to take advantage of their application	

<b>Relevant national stakeholders/institutions</b>	
<b>State Secretariat for the Environment</b>	<p><b>Role with respect to the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• Ensures the effective implementation of the provisions of Article 14 of the Convention and promote international technical cooperation in the areas under its authority;</li> <li>• Promote synergies among various stakeholders in capacity building, technical assistance and transfer of technologies to address the problems that the use of mercury and its compounds cause;</li> <li>• Promote education and awareness of all anthropogenic activities that may cause harm to the environment and human health.</li> </ul>
	<p><b>Relevant institutional capacity in place to comply with the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• Technical staff available to receive the necessary training to implement this Convention effectively</li> </ul>
<b>Ministry of Education and Higher Education</b>	<p><b>Role with respect to the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• It coordinates and implements the national policy on education, higher education and vocational education, science and scientific research.</li> </ul>
	<p><b>Relevant institutional capacity in place to comply with the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• Technical mechanisms available to facilitate cooperation in higher and vocational education with a view to effective implementation of this Convention</li> </ul>
<b>Instituto Nacional de Saúde Pública / National Institute of Public Health</b>	<p><b>Role with respect to the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• Promote technical and scientific training in the area under its tutelage;</li> <li>• Promote multi-disciplinary and multi-sectoral research activities related to the area under its tutelage;</li> <li>• Promotes educational activities, technological development and technical cooperation focused on the preservation of nature;</li> <li>• Proposes communication strategies for health in collaboration with other health-promoting institutions</li> </ul>
	<p><b>Relevant institutional capacity in place to comply with the above-listed provisions:</b></p> <ul style="list-style-type: none"> <li>• Technical staff available to receive the necessary training to effectively implement this Convention</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening of capacities and technical assistance to the technical staff of the Ministry of Environment and Sustainable Development (Chemicals and Waste Centre), Ministry of National Education, Ministry of Public Health (National Health Institute) and NGOs operating in the environment and related sectors through training in inventory development, issues related to mercury governance as well as the implementation of best practices for mercury management.</li> <li>• Articulate international partnerships to benefit from transfer of environmentally friendly technologies with the aim of replacing the use of mercury products.</li> <li>• Establish international cooperation with other countries or international organizations to eliminate the use of mercury in Guinea-Bissau.</li> </ul>	

**Table 19:** Analysis of the political, regulatory and institutional frameworks with regards to Article 14 of the Minamata Convention

<b>Article 16 -Public Health</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines</li> <li>• Promote occupational exposure educational and prevention programs</li> <li>• Promote prevention, treatment, and care services for affected populations</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
<b>Decree Law no. 12/2010 of 26/08/2010 - Creation of the National Institute of Public Health (INASA)</b>	Creates the scientific institution with competence to plan and execute the National Policy on Health and National Policy on Health Education
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
Strengthen the professional and institutional capacity of the health sector to address risks related to the exposure of mercury and other chemicals	
<b>Relevant national stakeholders/institutions</b>	
<b>Ministry of Public Health - National Institute of Public Health (INASA)</b>	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Coordinates and defines policies and strategies related to prevention, scientific research and education in the area of public health</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical and material conditions available to address the issue in question</li> </ul>
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the Ministries of Public Health - National Institute of Public Health (INASA)</li> <li>• Empower health professionals to better diagnose and medicate patients with diseases related to the harmful effects of mercury use more effectively</li> <li>• Promote national campaign of prevention to the effects of the use of mercury for health as well as activities of health education in public schools to raise awareness on the subject.</li> </ul>	

**Table 20:** Analysis of the political, regulatory and institutional frameworks with regards to Article 16 of the Minamata Convention

<b>Article 17-21 Information Exchange/ Awareness-Raising</b>	
<b>Description of Article</b>	
<ul style="list-style-type: none"> <li>• Collect and disseminate information on annual quantities of mercury and mercury compounds emitted, released, or disposed; and other information specified in Article 18</li> <li>• Share information on the health and safety of humans and the environment as non-confidential, in accordance with Article 17.5</li> <li>• Report to the COP on progress in implementing Convention obligations under Article 21</li> </ul>	
<b>Policy and regulatory measures in place that enable the country to comply with the above-listed provisions:</b>	
<b>State Secretariat for the Environment</b>	<p>It provides for the Chemicals and Waste Centre to be responsible for defining chemicals-related policies (except pesticides for agricultural use) as well as the implementation of international environmental conventions for the chemicals sector to which Guinea Bissau is a signatory or in the process of accession or ratification.</p> <p>It also provides an Information, Documentation and Environmental Education (GIDEA) office which, among other activities, informs the public through programmes, debates, and lectures, and also provides information in digital format and paper to any interested party.</p>
Decree-Law No 7/2000 of 28/08/2000 establishing the National Pesticide Management Commission, governed by the Joint Order of Ministers of Economy and Finance, Trade and Agriculture and Rural Development of 17/10/2016	It defines the mechanisms for the management of pesticides for agricultural use, which includes the collection and dissemination of information as well as its availability to any interested party
Ministry of Social Communication	It deals with the dissemination of environmental information of the technical and legal domain
Ministry of Education and Higher Education	It provides under its tutelage the National Institute for the Development of Education (INDE), which, through its internal structures, transmits environmental information through bulletins issued to the public.
<b>Outstanding regulatory or policy aspects that would need to be addressed/developed to ensure compliance with the Convention's provisions:</b>	
Give sole competence to one institution with regard to the management of all chemicals, in particular mercury, in order to avoid dispersion of powers and / or decision-making centers, while maintaining a commitment to broad engagement.	
<b>Relevant national stakeholders/institutions</b>	
<b>State Secretariat for the Environment</b>	<b>Role with respect to the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Collection and transmission of information and public awareness on chemicals.</li> </ul>
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> <ul style="list-style-type: none"> <li>• Technical boards to collect and transmit information to the public and to any interested party</li> </ul>

<b>Ministry of Agriculture, Forestry and Livestock</b>	<b>Role with respect to the above-listed provisions:</b> • Through the National Commission of Management of Pesticides (CNGP), it deals with the management of agricultural pesticides
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> • Technical and administrative structure set up to collect, transmit through awareness-raising activities and programmes
<b>Ministry of Social Communication</b>	<b>Role with respect to the above-listed provisions:</b> • Through the National Commission of Management of Pesticides (CNGP), it deals with the management of agricultural pesticides
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> • Technical and administrative structures set up to disseminate information related to the management of chemicals
<b>Ministry of Education and Higher Education</b>	<b>Role with respect to the above-listed provisions:</b> • Transmit and disseminate information related to environmental management through periodic bulletins
	<b>Relevant institutional capacity in place to comply with the above-listed provisions:</b> • Technical and administrative structures set up to transmit information related to environmental management
<b>Remaining Capacity Gaps at National Level that need to be addressed before provisions can be met:</b>	
<ul style="list-style-type: none"> <li>• Strengthening the capacities of the technical staff of the Ministries of Public Health - National Institute of Public Health (INASA)</li> <li>• Empower health professionals to better diagnose and medicate patients with diseases related to the harmful effects of mercury use more effectively</li> <li>• Promote national campaign of prevention to the effects of the use of mercury for health as well as activities of health education in public schools to raise awareness on the subject.</li> </ul>	

**Table 21:** Analysis of the political, regulatory and institutional frameworks with regards to Articles 17 to 21 of the Minamata Convention

### 3.4 - Other Relevant Actors

The below tables outline other relevant actors that should be engaged as part of the process for the management of mercury, with specific competencies and skills.

#### National Actors

Nature of the organization	List of organizations concerned
Professional and trade union organizations	<ul style="list-style-type: none"> <li>• Guinea-Bissau Goldsmith Association</li> <li>• Order of Doctors of Guinea-Bissau</li> <li>• Order of Nurses of Guinea-Bissau</li> </ul>
Industries	<ul style="list-style-type: none"> <li>• CIMAF</li> <li>• Empresa Alfredo Miranda</li> </ul>
Waste collection companies	<ul style="list-style-type: none"> <li>• BLUFO Company</li> </ul>
Research institutes, university faculties and academic laboratories with equipment for chemical analysis	<ul style="list-style-type: none"> <li>• Biosecurity laboratories situated in 3 de Agosto National Hospital</li> <li>• Jean Piaget University</li> <li>• National Institute of Meteorology</li> </ul>
Consumer or environmental associations/NGOs	<ul style="list-style-type: none"> <li>• ACOBES (Consumer Association of Goods and Services of Guinea-Bissau)</li> <li>• ASPAP-Bafata region</li> <li>• AD (Action for development)</li> <li>• TINIGUENA</li> </ul>

## International Actors

Nature of the organization	List of organizations concerned
<p><b>United Nations Institute for Training and Research (UNITAR)</b></p>	<p>UNITAR has as its mission to develop the individual, institutional and organizational capacities of countries and other UN stakeholders through high-quality learning solutions and related knowledge products and services to enhance decision-making and to support country-level action for overcoming global challenges. UNITAR 's Chemicals and Waste Management Programme has provided technical assistance in various areas such as: (i) training on the toolkit for the national mercury inventory, (ii) support on the development and revision of the various individual reports that compose the MIA report as well as support for writing and revising the final MIA report. UNITAR can also play a key role in the further implementation of the Minamata Convention.</p>
<p><b>United Nations Development Programme (UNDP)</b></p>	<p>UNDP is one of the leading organizations in terms of development, equality, poverty reduction, and inclusion. It supports states in policy development, institutional and leadership capacity building and the promotion of relevant partnerships. In support of the Minamata Convention and the MIA projects, UNDP oversees coordination between other agencies executing activities, national agencies and institutions. UNDP continues to play a key role in the further implementation of the Minamata Convention.</p>
<p><b>United Nations Environment Programme (UN Environment)</b></p>	<p>UN Environment is the United Nations agency specializing in the field of the environment and aims to: (i) Coordinate United Nations activities in the field of the environment; (ii) Assist countries in the implementation of environmental policies and (iii) Encourage sustainable development. Through its mercury programme, UN Environment plays a significant role in the management of mercury, and provides several tools to support this. Guinea-Bissau used the inventory toolkit to carry out the national mercury inventory. For the continuation of activities under the Minamata Convention, it will be important to involve UN Environment in aspects related to environmental protection and the management of chemicals, including mercury, and waste.</p>
<p><b>World Health Organization (WHO)</b></p>	<p>WHO works worldwide to promote health, keep the world safe, and serve the vulnerable. Their goal is to ensure that a billion more people have universal health coverage, to protect a billion more people from health emergencies, and provide a further billion people with better health and well-being. For the management of mercury, WHO has a leading role in assessing health impacts of mercury and supporting work in the healthcare sector to reduce the use of mercury-containing products and improve procurement and waste management.</p>
<p><b>African Development Bank (ADB) and the World Bank</b></p>	<p>The African Development Bank is a leading institution in Africa. It is involved in and finances numerous projects in the fields of poverty reduction, nutrition and food security, civil society protection, and environmental and social issues. The World Bank is the vital funding body for various projects around the world. With the main objectives of reducing poverty and promoting prosperity by increasing income for each country and sharing innovative information, the World Bank has been working for several years on a wide range of issues. It also attaches particular importance to sustainable development and environmental issues, such as the pollution of ecosystems by chemicals and access to drinking water throughout the world. For this reason, both the ADB and the World Bank could be important in the potential future implementation process of the Minamata Convention in Guinea-Bissau.</p>

## CHAPTER 4

# Identification of Populations at Risks and Gender Dimensions

### 4.1- Workers In Cement Production Plants

As mentioned in the mercury inventory, a cement plant has just been built and staff are being trained to start production activities. If cement clinker is produced in this cement plant, workers involved in handling processes and, especially, if working without safety equipment, will be directly exposed to vapour containing mercury. Machinery used in cement plants emit large quantities of mercury and the finished product also contains mercury. As a result, this mercury pollutes the immediate environment of populations since cement is used as a building material in buildings and houses. Mercury also pollutes water reservoirs (where it can transform into its most toxic form, methylmercury, as a result of bacterial activity) and soils.

### 4.2- Groups Engaging In Waste Management Activities

These groups include a significant proportion of women and children that are likely to be at risk because they are directly exposed to mercury and mercury compounds that is contained in the waste. Uncontrolled scavenging, informal recycling of discarded mercury-containing products and open burning of wastes at solid waste dump sites are likely to put women, men and children at particular risk. Despite the risks on women and young families' health, communication to these groups about the health risks they

face, including from mercury exposure, often ends up in the hands of male heads of households, and may not reach those at particular risk. Even where it does, families may have few options to mitigate such risks or avoid the activities giving rise to exposure. It follows that communications will need to consider mercury exposure within wider aspects of the socio-economic situations of these groups and not target mercury exposure risk alone.

### 4.3. Women Exposed To Mercury

Mercury is also used in a variety of devices and measuring instruments in the healthcare sector. Healthcare workers may be exposed to mercury through the breakage of equipment. Improper disposal of the residues from a spill from broken devices containing mercury results in the contamination of solid waste streams and further environmental contamination. Furthermore, mercury is also used widely for dental amalgam so dental workers may become contaminated through the preparation of amalgam. Amalgam waste, either remaining from preparation or removed from patients, is mostly discarded into solid waste or enters waste water systems, potentially contaminating waste disposal and water treatment facilities and posing risks to workers further downstream.

Through the MIA development process, an assessment was done on the prominence of women in the healthcare sector, and noted that a significant number of women work in

this area; an area of elevated exposure to mercury given the historic and current use of mercury in products.

#### **4.3.1 - Female Pharmacy Workers**

The operation of the pharmaceutical area is governed by Decree no. 11/2010, published in Official Bulletin no. 34/10, of 28 August 2010, article 120, point 1. In public pharmacies in the country's capital and in the interior, 24 women work, while in the private sector (Bissau and regions) there are 38 women (around 40 per cent of the workers).

In the case of Guinea-Bissau, many pharmacies also operate as a doctor's office and, therefore, old mercury-containing thermometers are also used. There are still very few cases of mercury exposure in Simão Mendes national Hospital public pharmacy where, on a very small scale, there is work done in the manufacture of cough syrup, and ointments for skin diseases such as ringworm, though it is understood that nowadays this practice is no longer observed. It should be noted that this practice is being banned due to the activities of the Centre for Essential Medicines (CECOME).

#### **4.3.2 - Female Workers From The National Soil Laboratory**

Under the tutelage of the Ministry of Agriculture and Rural Development, this Laboratory was destroyed during the political-military conflict of June 1998, exposing chemicals without knowing the details of the products and the danger that they represent. At this moment, only one woman works in this service.

#### **4.3.4. The Role of Women in Clinical Analysis Laboratories**

In the framework of human resources capacity in all national laboratories, 70 per cent of the professionals trained are female.

Given the nature of this work, many of the workers are exposed to mercury hazards due to the use of mercury-containing materials, such as thermometers.

Regarding the actions of the National Health Service, the possible secondary social role of women may place them in a situation that is disadvantaged in relation to men, while, conversely, health programmes have always had intervention priorities of: prenatal consultation, and free training in breast-feeding.

**Table 22:** Number of women working in laboratories in Bissau

Laboratories	Role and number of women	Total (41)
National Public Health Laboratory	<ul style="list-style-type: none"><li>• Clinical analysis: 18 women</li><li>• Cleaning: 6 women</li></ul>	24
National Laboratory of Simão Mendes Hospital	<ul style="list-style-type: none"><li>• Biochemical analysis: 1 woman</li><li>• Analysis of Immunology: 1 woman</li><li>• Parasitology Analysis: 1 woman</li><li>• Emergency Services: 7 women</li><li>• Cleaning: 3 women</li></ul>	13
Laboratory of the Cumura Children's Hospital	<ul style="list-style-type: none"><li>• Clinical analysis</li></ul>	4
Veterinary Laboratory	<ul style="list-style-type: none"><li>• Inspection of products of animal origin</li></ul>	2
Laboratory of Hygiene and Sanitary Inspection and Fish Control	<ul style="list-style-type: none"><li>• Inspection of marine products</li></ul>	4

**Sources:** CIPA, DG Pecuária, LNSP, Hospital Nacional Simão Mendes

#### 4.4 - Civil Society In General

A large number of households and most inhabitants in Guinea-Bissau use natural gas, diesel, petroleum, and kerosene for energy consumption, particularly cooking, heating or other domestic activities, which involves the evaporation of mercury-containing vapours directly into the ambient air. In addition, private consumers use mercury-containing-products, including thermometers, light sources and batteries, that, if broken, may spill mercury and have direct harmful impacts on health. It should also be noted that cosmetic products used by private consumers may contain mercury, although the inventory was not able to collect data concerning this category. All these aspects should therefore be taken into account when identifying populations at risk.

#### 4.5. - Women And Children

Among the routes of contamination for women and children, this report indicates the consumption of foodstuffs likely to be contaminated by mercury and the use of cosmetic products containing added mercury. Account must also be taken of the use of charcoal in households where women are most often in charge of cooking. In pregnant women, fetuses are also vulnerable because mercury can seriously harm a baby's brain development and nervous system. They are exposed through the passage of methylmercury into the placenta. High foetal exposure is the result of high maternal exposure, usually from occupational exposure or consumption of fish and crustaceans.

According to information provided by the NGO Nantinyan (2000), a number of people were found to be unaware of the origin of the

fish, with others reporting that the capture is done in the south of the country, on the Cacine River near the industrial bauxite production plant in Kamsar (neighbouring Republic of Guinea). The contamination of the Cacine River results from the disorderly disposal of waste washed away by the river. Species such as tainhas (mugilidae), catfish (ariidae), corcor / snorers (haemulidae), sareas / xaréus (carangidae), djafal (ethmalosa fimbriata), capasseca (clupeidae) constitute more than half of fish offered for sale and are purchased more frequently.

A survey of women selling fish (fresh and frozen) in the Tursi Mon Market in Plubá, one of the outlying districts of Bissau, indicated that this fish comes from Kamsar zone (Republic of Guinea) where there is phosphate exploitation, which raises great concerns.

Within this analysis, nine women were randomly selected (in the small Tursi Mon Market) in Plubá, one of the districts of the periphery of Bissau. Based on the information collected, they carry on this economic activity as intermediaries, meaning, they receive fish from another person for resale. This activity provides them with a minimum salary to support their family, payment of the educational expenses of the children, and medical assistance.

The survey showed that women are obliged to opt for fish conservation methods, including wrapping fish in materials, such as used containers of cement and which are harmful to human health, and may contain mercury.

In order to maintain this business, which is the sole source of income, women are forced to use old refrigerators (many of which have previously been used in laboratories) that are often in a degraded state. Many of the items

used for wrapping contain mercury and also pose a direct risk to them as consumers, since they also consume some of the fish.

Another group that should be highlighted in this work can be found in the Sanitation Services of the City Hall of Bissau which, according to information gathered from this building, workers carry out daily the removal of about 350 tons of waste that are not subject to any sorting, as well as possibilities for mercury exposure by many people, especially women and children, who collect glass containers for reuse. At the moment, this amount of waste is removed and deposited on an open dump on the outskirts of Bissau.

While there are several examples of where and how women are more vulnerable to mercury, despite the often-privileged social status of males, it is recognized that men also have vulnerabilities. These are associated with biological factors, lifestyles, occupational risks and lower use of health services, which are reflected in the higher mortality rates for males, at all life stages.

In defining one of the objectives of PNDS II as “guaranteeing universal access to quality care for all”, health authorities place all Bissau-Guinean citizens on an equal footing regardless of their gender, residence or other social category (in PNDSII 2008 - 2017).

### **4.3.2 - Indicators Of Vulnerability Of The Women’s Group Of The Tursi Mon Market**

#### **Schooling Level**

This group is characterized by a low rate of schooling; only two out of the nine women interviewed have completed the fifth year of schooling (approximately age 12 to 13), while

the rest have no academic qualifications. This makes the management of problems related to work difficult, in addition to a very low income and poor working conditions.

### Family Situation

From the social point of view, the Tursi Mon Market group is extremely vulnerable; poor, without access to education and drinking water, and living on less than US\$1 per day. The group was composed of four married women, four widows and a single mother.

The sample of those working in the market consists of individuals ranging in age from 30 to 60 years old; each woman interviewed in this study is financially responsible for at least five people.

### Income

Most of them have been engaged in this work at the market privately for more than five years. Their main activity is the sale of the fish, depending on the size (small, medium and large), receiving and reselling at various prices.

From the social point of view, the nine women interviewed in the Tursi Mon market are extremely vulnerable, due to the severe economic and social circumstances around them. They have under their responsibility between five and six minors who rely on their income for sustenance, education and health.

A 15kg box of frozen fish (mackerel / medium size) pays a maximum of 12,000 CFA francs (approximately USD21), while other species will vary, with some reaching 18,000 CFA francs (about USD32 / month). The women sell on average a 15 kg box of fish a day, with the daily profit from that sale being lower than the national minimum wage. The group

indicated that the profit margin for the resale of a 15 kg box is always minimal and ranges from 1,500 to 2,000 CFA francs (US\$2.60 to US\$3.50).

Such a low income does not allow the women of the Tursi Mon Market to buy basic hygiene products in supermarkets where the quality may be more reliable and opt to buy at outlets located in the market, exposing them to unorthodox packaging materials and unreliable products that may contain mercury.

## **4.7- Household Materials**

According to the report of the survey on families living in poverty and vulnerability in Bambadinca-DIVUTEC (2012), the battery-powered bulbs, which contain mercury, appear as the most common forms of lighting in homes (in 89 per cent of dwellings) in Bambadinca.

Similarly, other domestic mercury-containing products are present in Guinea-Bissau. The table below shows the existence of some

**Table 23:** Number of households with materials containing mercury in the village of Bambadinca

	Bairro 1	Bairro 2	Bairro 3	Total
Radio	128	723	207	1,058
TVs	46	181	62	289
Cell-phones	235	1,632	567	2,434

**Source:** Report of the Survey on families living in poverty and vulnerability in Bambadinca-DIVUTEC (2012)

domestic materials in which mercury is used as a manufacturing element.

#### 4.8- Alternatives To The Use Of Mercury In The Health Sector

According to the National Health Development Plan-PNDS II, traditional medicine continues to occupy a prominent place in health care options. This is due to care not always being available through the National Health Service and levels of poverty in the country. For these reasons, the country's health authorities have expressed a willingness to develop programmes and activities capable of leading to an enhanced relationship with this sector.

Up to now, there is no case of registration in the hospital units stating mercury contamination as a cause of illness.

The Ministry of Health has been working towards the progressive elimination of this heavy metal in professional activities in

the clinical analysis laboratories through the use of modern digital thermometers. The introduction of modern thermometers has a positive impact on gender equality, since the overwhelming majority of employees in the laboratories are women, who will consequently be less exposed to mercury. Health authorities outline the effectiveness of alternatives to the use of mercury-containing products, referring to increased workplace safety in hospitals and laboratories, avoiding contamination and reducing the potential need for medical treatment abroad.

Following this analysis and bearing in mind the gains resulting from the implementation of the Minamata Convention, it is essential for Guinea-Bissau not to use tools containing heavy metals, where possible.

Currently, alternative products are a plausible and lasting solution, with support available from international partners in pursuit of sustainable consumption and production patterns.

## 4.9 - Gender Dimension

In Guinea-Bissau, the gender dimension has been defined as one of the ways of gradually establishing a balance in the possibilities and opportunities available to men and women, thus avoiding the great inequalities that persist in traditional societies.

The gender dimension refers to the influence of socio-cultural factors on the distribution of roles and tasks between men and women in the professional sectors (formal and informal economies) and in households.

Indeed, this aspect is essential because the distribution of roles has an impact on the exposure and contamination of individuals. Gender differentiation depends on criteria such as:

- Physiological characteristics;
- Professional occupation;
- The daily use of mercury-containing products.

The gender dimension appears in the format proposed for the preparation of this report. We believe that it is relevant to assert that women form a very significant part of people who are exposed to mercury in the exercise of their professional activities.

## CHAPTER 5

# Awareness and understanding of workers and the public

Guinea-Bissau, as a (recent) Party to the Minamata Convention, has carried out activities in compliance with the Convention to show its full and effective commitment to reduce cases of contamination from mercury and its compounds. The Minamata Convention on Mercury is a global treaty for the protection of human health and the environment with respect to the release of mercury and its compounds. The Convention was adopted on 10 October 2013 at a Conference held in Kumamoto, Japan.

The Convention draws attention to a metal, which although of natural origin, has broad uses in everyday objects such as batteries, lamps and thermometers, and is released into the atmosphere, soil and water from various sources. Controlling mercury emissions through its life cycle is an obligation under the Convention. The major highlights of the Minamata Convention include the ban on new mercury mines, the progressive elimination and reduction of the use of mercury in various products and processes, emission control measures for atmosphere, soil and water and the requirement for the development of policies to control artisanal and small-scale gold mining.

The main awareness-raising campaign goal is to inform policy-makers, populations at risk and other relevant social groups that are directly or indirectly exposed to mercury about the health and environmental impacts caused by this exposure.

### 5.1 - Information Materials

For this campaign, some information materials were produced and distributed such as:

- T-shirts and caps with calls for non-use of mercury and its compounds;
- Posters with messages and images that draw attention to the hazards of mercury in human health and the environment;
- Leaflets illustrating the hazards that mercury and its compounds pose to our health as well as to the environment, including some serious health problems that may be caused by the exposure to mercury;
- Radio spots to discuss mercury as an issue;
- A song about the consequences of mercury and its compounds on health and the environment (air, water and soil) that has been played on the different radios of the country. The song was produced and recorded by two national musicians (Iva and Iche) as a way to help raise public awareness on the danger of mercury;
- The production of a video film about the mercury issue is under way;
- Two articles on mercury were published by the Ministry of Environment and Sustainable Development.

## 5.2 - National Awareness-Raising Campaign For Key Sectors

The awareness-raising campaigns targeted key sectors and the general public. The activities raised awareness on the potential risks associated with mercury exposure and its uses and contributed to the compliance with article 18 of the Minamata Convention on Mercury (Public information, awareness and education). In December 2017, an awareness-raising session was held with the Council of Ministers, where the Ministers and State Secretaries responsible for the priority sectors, such as economy, health, the environment and finance participated. During this meeting, promotional materials such as posters, brochures, t-shirts, caps and a pen drive containing the song on mercury were distributed to all participants. This initiative was carried out in order to improve the understanding of major decision makers on the relevant provisions of the Minamata Convention, as well as triggering political and institutional mechanisms for the elimination of mercury and their compounds in Guinea-Bissau. Furthermore, this campaign highlighted the importance of prohibiting the import, commercialization and use of products containing mercury and its derivatives.

At the national level, more than 500 health professionals such as dentists, nurses and doctors had been informed about the health risks of mercury through the improper handling of products containing mercury or its compounds during dedicated information sessions. It also addressed the need to reduce gradually the use of mercury in the preparation of dental amalgams, in favour of replacements. It should be noted that 2,055 promotional materials were produced such as 125 posters, 130 flyers, 900 t-shirts and

900 caps. All of them were distributed and posted at strategic locations in 10 hospitals located in the cities of Bissau, Bafata, Gabu and Bolama Bijagós. Furthermore, folders and other promotional materials were also distributed to goldsmiths in the regions of Bafata, Gabu and Bissau.

In addition, approximately 2,200 students at the elementary education level in key regions of the country such as, Bolama, Bafatá, Gabú, the Autonomous Sector of Bissau and the southern region were alerted to the harmful effects that this heavy metal and its compounds can cause on health. For this campaign, the promotional materials were also distributed.



**Figure 5** - During the awareness-raising session for students

Traders and street vendors have received information about the dangers that some of their cosmetic products containing mercury can cause to human health. Professionals of cement plants were also informed about toxic mercury emissions. Finally, media professionals benefited from the awareness-raising activities and received relevant information and knowledge on the hazards of mercury and its compounds. The objective was to provide journalists and members of the media knowledge so that they can exchange information through radio, television channels and social networks.

For the general public, the awareness-raising campaign was developed through radio spots, since it is the most accessible and most popular means of communication in Guinea-Bissau. Moreover, a song was produced to raise awareness about the dangers of using mercury and its compounds by a renowned, national duo; the musicians Iva & Iche. The song referred to the Minamata disaster in Japan and the origins of the Minamata Convention. For the same purpose, the country's national television was also used for the dissemination of awareness-raising messages through video film screening which illustrates the consequences of mercury on human health and the environment, and appropriate precautionary measures. It should also be noted that awareness campaigns were carried out in areas bordering neighbouring countries where artisanal mining activities may take place.



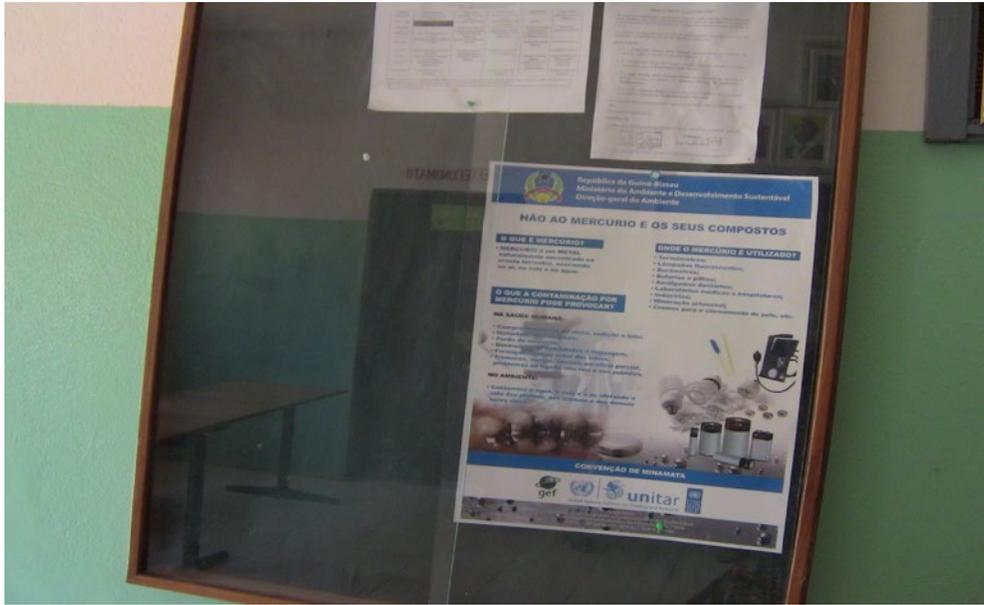
**Figure 6** - During the awareness-raising session at the Council of Ministers



**Figure 7** - His Excellency, General Umaro Sissoco Embaló, Prime Minister (left), and Dr. António Serifo Embaló (right), Minister of the Environment



**Figure 8** - Health professionals, during an awareness-raising session, at the Simão Mendes National Hospital, the largest hospital in the country



**Figure 9** - Poster at one of the hospitals in Bissau

All awareness-raising initiatives for key sectors and the general public had the purpose of helping to change the behaviour of people involved in the import and use of products containing mercury and its compounds, as well as reducing risks with regard to human health and environmental degradation. Grassroots associations, non-governmental organizations, opinion leaders in regions and local communities have been involved in awareness-raising activities, which will greatly assist in the effective implementation of project objectives and compliance with the Minamata Convention.

## CHAPTER 6

# Implementation plans and priorities for action

### Introduction

To fulfil its obligations under the Convention, it is essential that Guinea-Bissau identifies its priority areas and a set of respective action plans that need to be undertaken to address the many aspects of the anthropogenic use of mercury in Guinea-Bissau. According to the various assessments conducted in the previous chapters, the following priority areas and actions plans were identified and proposed:

1. Capacity building and strengthening/adaptation of the political, legal, institutional and administrative frameworks to align with the Minamata Convention
2. Progressive elimination of mercury-containing products, including dental amalgams, and encouraging consumers to adopt mercury-free alternatives
3. Sound management of waste, especially mercury-containing wastes and emissions from the industrial sector.

These activities will include activities in collaboration with the private sector and investors to ensure that a cross-section of stakeholders is aware of mercury issues and involved in the activities.

### Summary Of Anticipated Budget

The indicative budget proposed in this chapter will be subject to further economic assessment before the implementation of such activities.

### 6.1 - Priority Area And Intervention Plan 1: Capacity Building And Strengthening/Adaptation Of The Political, Legal Institutional And Administrative Frameworks To Align With The Minamata Convention

#### Analysis of the National Situation:

The Bissau-Guinean national legal instrument does not contain any specifics on the use of mercury and mercury compounds. In order to comply with the Articles of the Minamata Convention, it would be important to adapt the national legal, political and institutional frameworks where needed.

Also, subsequent actions arise where the inventory identified anthropogenic mercury releases that Guinea-Bissau is required to take action on under the Convention. Priorities are defined in the order of articles of the convention. By agreeing how best to take such actions forward, stakeholders can set short, medium and long-term outcomes that would change according to the order established here.

Intervention Plan	Expenses (US dollars)	Source of funding
Capacity building and strengthening/ adaptation of the political, legal, institutional and administrative frameworks to align with the Minamata Convention	185,000	GEF, Minamata Secretariat (Specific International Programme), other relevant funding agencies/institutions/ programmes
Progressive elimination of mercury-containing products, including dental amalgams, and encouraging consumers to adopt mercury-free alternatives	500,000	GEF, Minamata Secretariat (Specific International Programme), other relevant funding agencies/institutions/ programmes, private companies
Sound management of waste, especially mercury-containing wastes and emissions from the industrial sector	1,500,000	GEF, Minamata Secretariat (Specific International Programme), other relevant funding agencies/institutions/ programmes, private companies
<b>TOTAL</b>	<b>2,185,000</b>	

**Table 24** - Summary of the Indicative Budget for the Action Plan

**Objective:**

The objective of this action plan is to adopt appropriate political, legal and institutional frameworks for the effective implementation of the Minamata Convention on Mercury in Guinea-Bissau.

**Outputs:**

1. National mercury management policy

developed;

2. Legal and regulatory frameworks to implement the Articles and obligations of the Minamata Convention established;

3. Administrative responsibilities are defined;

4. Sustainable mechanisms for the continuous development of mercury inventories defined.

Intervention Plan 1: Capacity building and strengthening/adaptation of the political, legal, institutional and administrative frameworks according to the Minamata Convention			
Relevant SDGs of the 2030 Agenda for Sustainable Development: 12, 16, 17			
Relevant Articles of the Minamata Convention: all the Articles			
Key Institutions: Governmental Institutions respectively responsible for the following: Environment, Public Health, Agriculture, Forestry and Livestock, Justice, Natural Resources, Trade, Economy and Finance			
Potential international partners: UNDP, UN Environment, UNIDO, WHO, UNITAR, Minamata Secretariat, ILO			
Anticipated budget: 180,000 USD			
Risks: Political instability, lack of financial resources and technical capacities, absence of interests of the stakeholders			
Proposed activities	Description /aspects to consider	Relevant institutions	Time frame
1.a Develop a national policy that addresses the management of mercury throughout its life cycle under the terms of the Minamata Convention and establish short, medium and long-term priorities for actions as agreed by stakeholders.	<p>a) Develop a more comprehensive base of information of the impacts of mercury on human health and the environment at the national level;</p> <p>b) Consider the implications of interactions between mercury policy and other sustainable development policies including broader chemical and waste; energy and security policies; industrial development and private sector investment; public health; rural livelihoods; urbanization and waste management; environmental degradation, biodiversity and contamination;</p>	<p>Governmental Institutions responsible for the following:</p> <ul style="list-style-type: none"> <li>• Environment</li> <li>• Public Health</li> <li>• Agriculture, Forestry and Livestock</li> <li>• Justice</li> <li>• Natural Resources</li> <li>• Trade</li> <li>• Economy and Finance</li> </ul>	2019-2022

<p>1.b. New legal measures necessary to implement the Minamata Convention and the obligations established in its articles should be developed, namely:</p>	<p>a) Prohibit the use of mercury according to Article 3 - mainly the primary extraction of mercury and industrial minerals;</p> <p>b) Prohibit or restrict the production, trade and use of products containing mercury in accordance with Articles 4 and 6;</p> <p>c) Prohibit manufacturing processes in which mercury compounds are used in accordance with Article 5;</p> <p>d) Control emissions and releases of mercury and its compounds in accordance with Article 8;</p> <p>e) Ensure that mercury wastes are managed in an environmentally sound manner in accordance with Article 11;</p> <p>f) Review existing legal texts in order to eliminate any potential conflicts of competence between institutions and / or bodies with a view to avoiding ineffective implementation;</p> <p>g) Transpose other MEAs related to chemicals and provisions to complement the implementation of the Minamata Convention, including the Basel Convention on the transboundary movement control of hazardous wastes and their disposal, and the Stockholm Convention on Persistent Organic Pollutants;</p> <p>h) Provide authority to the Ministry of Environment and Sustainable Development regarding the domestic management of the Rotterdam Convention;</p> <p>i) Formalize the National Competent Authority in the management of chemicals, clarifying its mandate, its coordination and its different stakeholders;</p>		<p>2019-2022</p>
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	<p>j) Support the country to develop compatible regulations and administrative rules to implement the Minamata Convention at national and local levels;</p>		
<p>2. Assignment of administrative responsibilities</p>	<p>a) Develop national policy and implementation plans in collaboration with stakeholders;</p> <p>b) Ensure continuous and effective coordination, sharing information among stakeholders, through the effective functioning of the National Centre of Management of Chemicals Products (CNGPQ);</p> <p>c) Coordinate with other departments on the sound management of mercury and the adoption of measures aiming to achieve sustainable development;</p> <p>d) Develop methodologies and guidelines on mercury management to meet Guinea-Bissau's obligations to the Convention;</p> <p>e) To prepare reports on the progress and effectiveness of the measures taken in Guinea-Bissau to implement the provisions of the Convention and to present it to the Conference of the Parties;</p> <p>f) Implement, in collaboration with other stakeholders, detailed action plans to implement the Convention in Guinea-Bissau;</p> <p>g) Develop and implement, as part of these Action Plans, campaigns to raise awareness among stakeholders and the general public of the risks posed by the exposure to chemicals, specifically to mercury;</p>	<p>Governmental Institutions responsible for the following:</p> <ul style="list-style-type: none"> <li>• Environment</li> <li>• Public Health</li> <li>• Agriculture, Forestry and Livestock</li> <li>• Justice</li> <li>• Natural Resources <ul style="list-style-type: none"> <li>• Trade</li> </ul> </li> <li>• Economy and Finance</li> </ul>	<p>2019-2022</p>

	<p>h) Promote and require the use of cost-effective alternatives to products containing mercury;</p> <p>i) Strengthen the capacity of national technicians to manage mercury and other chemicals;</p> <p>j) Strengthen analytical capacity in existing laboratories and promote their participation in international partnerships and networks to develop technical capacity and carry out national monitoring;</p> <p>k) Strengthen ties with development partners, including United Nations agencies and bilateral donors, to provide expert and financial support for the implementation of the Convention.</p>		
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**Table 25** - Intervention Plan 1: Capacity building and strengthening/adaptation of the political, legal, institutional and administrative frameworks to align with the Minamata Convention

## 6.2- Priority Area And Intervention Plan 2: Progressive Elimination Of Mercury-Containing Products, Including Dental Amalgams, And Encouraging Consumers To Adopt Mercury-Free Alternatives

### Analysis Of The National Situation

In Guinea-Bissau, one of the most significant source categories is the use and disposal of mercury-containing products. The products

that are most used in the country are the following:

- Batteries
- Electrical switches and relays
- Laboratory and medical equipment, and laboratory chemicals
- Skin lightening creams and soaps
- Polyurethane with mercury catalysts
- Lights sources
- Dental amalgams
- Thermometers

The Minamata Convention states the phase-out date of mercury-containing products, stating that manufacture, import and export is not allowed after 2020 (Article 4 and Annex A, Parts I and II). Furthermore, regarding

the dental amalgams, each country has to take relevant measures to eliminate the use of dental amalgams progressively, taking into account the national situation and international guidance.

### Objective

The objective of this action plan is progressively to eliminate or/and phase-down all mercury-containing products (including dental amalgams) used at the national level and encourage consumers to adopt mercury-free alternatives.

### Outputs

a) The import and subsequent use of batteries, electrical switches and relays and light sources is progressively eliminated; research undertaken to identify efficient and relevant alternatives; the use of alternatives is promoted;

b) The import and use of laboratory and

medical equipment and laboratory chemicals and thermometers that contain mercury is progressively eliminated; these instruments are replaced by appropriate alternatives;

c) Polyurethane with mercury catalysts is less used in the country and alternatives are promoted;

d) Awareness-raising campaigns are conducted regarding the use of skin-lightening creams and soaps; the import and use of these products is progressively eliminated and mercury-free cosmetics are commercialized;

e) Improved dentistry systems; mercury dental amalgams are progressively eliminated; increased and improved use of alternatives for dental restoration; specific and adapted alternatives for vulnerable patients; dental professionals trained and encouraged to use alternatives to mercury amalgams; reduced releases of clinical dental amalgam waste.

## Intervention Plan 2: Progressive elimination of mercury-containing products, and encouraging consumers to adopt mercury-free alternatives

**Relevant SDGs:** 3, 9, 12, 14, 15, 17

**Relevant Articles of the Minamata Convention:** 4, 16, 18 and 19

**Key Institutions:** Governmental Institutions responsible for the following: Environment, Public Health, Agriculture, Forestry and Livestock, Justice, Trade, Economy and Finance

**Potential international partners:** UNDP, UN Environment, UNIDO, WHO, UNITAR, Minamata Secretariat, ILO

**Anticipated budget:** 500,000 USD

**Risks:** Political instability, of financial resources and technical capacities, absence of interests from the stakeholders

Proposed activities	Description /aspects to consider	Relevant institutions	Time frame
1. Improve the knowledge of the flows of mercury-containing products in the country	<ul style="list-style-type: none"> <li>Identify the imports and quantities (inventories) of all mercury-containing products in collaboration with the customs and all relevant institutions (if and where possible)</li> </ul>	<p>Governmental Institutions responsible for the following:</p> <ul style="list-style-type: none"> <li>Environment</li> <li>Public Health</li> <li>Agriculture, Forestry and Livestock</li> <li>Justice</li> <li>Trade</li> <li>Economy and Finance</li> </ul>	2019 - 2021
2. Define national guidelines on the sound management of the flows of mercury-containing products (in the national legal and political instruments on mercury management: action plan 1)	<ul style="list-style-type: none"> <li>Propose guidelines to regulate the flows of all the mercury-containing products, meaning reducing the import of batteries, electrical switches, cosmetics, light sources and polyurethane</li> <li>Propose guidelines to restrict and discourage the use of dental amalgams in its current form that contains mercury</li> </ul>		

	<ul style="list-style-type: none"> <li>• Promote the use of cost-effective and clinically-effective (where necessary) alternatives, taking into account national circumstances</li> </ul>		
3. Awareness-raising campaigns dedicated to the information on the adverse effects of mercury and the use of mercury-containing products	<ul style="list-style-type: none"> <li>• Identify the imports and quantities (inventories) of all mercury-containing products in collaboration with the customs and all relevant institutions (if and where possible)</li> </ul>		Repeated continuously
4. identify and promote the use of alternatives to mercury containing-products; Develop a monitoring system	<ul style="list-style-type: none"> <li>• Promote better management practices in dental clinics in the use of dental amalgam and in the disposal of amalgam waste</li> <li>• Promote research and development of superior approaches for the introduction of materials for dental restoration and continue to prohibit the use of amalgams containing mercury in Guinea-Bissau</li> <li>• Include cost-effective, durable and readily-available alternatives in the list of free treatments available under the National Health Insurance Plan and in health centres by discouraging insurance policies and programmes that favour the use of mercury in dental amalgams</li> <li>• Dental restoration without mercury;</li> <li>• Encouraging professional organizations and dental schools to educate and train dental professionals and students in the use of dental restoration techniques without mercury;</li> <li>• Monitor the progress for effectiveness and challenges</li> </ul>	<p>Governmental Institutions respectively responsible for the following:</p> <ul style="list-style-type: none"> <li>• Environment</li> <li>• Public Health</li> <li>• Agriculture, Forestry and Livestock</li> <li>• Justice</li> <li>• Trade</li> <li>• Economy and Finance</li> </ul>	2019 – 2021

**Table 26** - Progressive elimination of mercury-containing products, including dental amalgams, and encouraging consumers to adopt mercury-free alternatives

## 6.3- Priority Area And Intervention Plan 3: Sound Management Of Waste, Especially Mercury-Containing Wastes

### Analysis of the national situation

Informal dumping and open air burning of waste are the most significant sources of emissions and releases of mercury in air and soil. Therefore, the sound management of waste represents one of the essential priorities that require an effective action plan. Industrial emissions has also been identified as a key issue in the country. Also, there will be a need to distinguish the mercury waste from all general waste in order to apply appropriate methods for their treatment.

The development of actions will have to be addressed in coordination with all stakeholders (mentioned in the table below) throughout the national territory within a broader context of improving waste disposal practices and services in Guinea-Bissau.

### Objective

The objective of this action plan is to achieve the sound management of waste, especially mercury-containing wastes at national level and emissions from the industrial sector.

### Outputs

a) A system of environmentally sound management of waste, especially waste containing mercury, is developed prior to disposal under the Basel Convention. This system includes the following:

- A system dedicated to the collection of waste is developed;
- A storage site is identified and upgraded in order to receive the collected waste and store it safely. On this storage site, mercury wastes are separated from other general wastes;
- Waste treatment methods are available and used (with recycling, reutilisation and other relevant practices available, and per waste type, where relevant);

• The medical waste incineration system is improved, strengthened and extended to all the regions of the country (at least in the regions where it is considered sufficiently necessary);

b) The activities proposed by the leading institution (the State Secretariat of Environment) are developed and implemented in a coordinated manner with all relevant institutions (such as Ministry of Health);

c) The industrial sector is engaged to establish systems to measure and reduce emissions.

### Intervention Plan 3: Storage and sound management of waste, especially mercury-containing wastes and emissions from the industrial sector

**Relevant SDGs:** 3, 9, 12, 14, 15, 17

**Relevant Articles of the Minamata Convention:** 11, 12, 16, 17, 18, 19

**Key Institutions:** Governmental Institutions respectively responsible for the following: Environment, Public Health, private sector partners

**Potential international partners:** UNDP, UN Environment, UNIDO, WHO, UNITAR, Minamata Secretariat, ILO

**Anticipated budget:** 1,500,000 USD

**Risks:** Political instability, lack of financial resources and technical capacities, absence of interests of the stakeholders

Proposed activities	Description /aspects to consider	Relevant institutions	Time frame
1. Identify and propose an inventory of all the waste sites	<ul style="list-style-type: none"> <li>Information on waste sites and informal dumping sites where open burning is practised made available by the city council</li> </ul>	<p>Governmental Institutions responsible for the following:</p> <ul style="list-style-type: none"> <li>Environment</li> <li>Public Health</li> <li>Agriculture, Forestry and Livestock                             <ul style="list-style-type: none"> <li>Justice</li> <li>Trade</li> </ul> </li> <li>Economy and Finance</li> <li>Local councils</li> </ul>	2019 - 2023
2. Identify and propose an inventory of all the sites where medical devices and other products that contain mercury are stored and/or eliminated	<p>Necessary to identify and conduct an inventory in all medical institutions, the meteorology institution, the civil aviation and other relevant structures that store and incinerate devices and products that contain mercury. The following can be considered:</p> <ul style="list-style-type: none"> <li>All different types of thermometers containing mercury</li> <li>Medical blood pressure gauges (sphygmomanometers)</li> <li>Other laboratory and medical equipment that contain mercury</li> </ul>	<p>Private companies specialized in waste management Industrial companies with emissions</p>	

		NGOs involved in environmental stewardship	
3. Define national guidelines on the sound management of waste, specifically mercury-containing wastes (and medical waste containing mercury)	These national guidelines should be developed to help in the practical management of wastes and should be developed in accordance with the political, legal and institutional frameworks elaborated in the action plan 1, in collaboration with experts.		
4. Develop an appropriate collection and storage system for waste, including mercury-containing waste	<p>It is important to consider the following:</p> <ul style="list-style-type: none"> <li>• Separation of mercury-containing products from other general waste</li> <li>• In medical and meteorological institutions and civil aviation, devices and other products containing mercury should be separated from other waste</li> </ul>	<p>Governmental Institutions responsible for the following:</p> <ul style="list-style-type: none"> <li>• Environment</li> <li>• Public Health</li> <li>• Agriculture, Forestry and Livestock</li> <li>• Justice</li> <li>• Trade</li> <li>• Economy and Finance</li> <li>• Aviation</li> <li>• Meteorology</li> </ul> <p>Private companies specialized in waste management</p> <p>NGOs involved in environmental stewardship</p>	2019 – 2021
5. Develop an appropriate treatment and disposal system for waste, including mercury-containing waste and develop and maintain an inventory of emissions from relevant sources	<ul style="list-style-type: none"> <li>• Treatment methods and techniques should be specific to the type of waste and distinction should be made between mercury-containing products and other general waste (where and if possible)</li> <li>• Medical and special devices containing mercury should be disposed in an environmentally sound manner</li> </ul>		

		NGOs involved in environmental stewardship	
6. Identification and application of efficient practices and systems (use of BAT/ BEP) that minimize or prevent the emissions and releases of mercury in the environment	Enhanced study of emissions sources, notably from industrial sources, and development of management/ reduction plans The methods used in these systems should be environmentally friendly, meaning relevant to reduce and prevent emissions and releases of mercury in the environment	Industrial companies with emissions  Governmental Institutions responsible for the following: <ul style="list-style-type: none"> <li>• Environment</li> <li>• Public Health</li> <li>• Agriculture, Forestry and Livestock</li> <li>• Justice</li> <li>• Trade</li> <li>• Economy and Finance</li> <li>• Aviation</li> <li>• Meteorology</li> </ul>	2019 – 2023
7. Awareness-raising campaigns dedicated to providing information on the adverse effects of unsound management of waste (including mercury-containing waste) on health and the environment	Relevant stakeholders (including decision-makers) and civil society should be informed on the adverse effects of inappropriate dumping of waste on health and the environment, and informal collection of waste. Also, the adoption of environmentally sound practices should be promoted.	NGOs and involved in environmental stewardship and other CBOs	Repeated continuously

**Table 27-** Intervention Plan 3: Storage and sound management of waste, especially mercury-containing wastes and emissions from the industrial sector

## Relationship Of The Action Plans Proposed Under The Minamata Convention With The Sustainable Development Goals (Sdgs) And The Common Strategic Framework For Inclusive Growth And Sustainable Development (Agenda 2063<sup>11</sup>)

In order to comply with the Minamata Convention, Guinea-Bissau has defined priorities. Nevertheless, these priorities and action plans, given the cross-cutting and fundamental nature of the use of chemicals, also contribute to the achievement of the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development and the seven aspirations of the Common strategic framework for inclusive growth and sustainable development (Agenda 2063 of the African Union).

The first priority, ratification of the Convention and its integration into domestic law, requires multi-sectoral partnerships to mobilize and share knowledge, expertise, technology and financial resources to support the achievement of the goals and priorities of the 2063 Agenda. In addition, it would be necessary to train national technicians in order to be in a position to develop and effectively implement national sustainable development plans, thus complying with SDG17. Furthermore, since it is necessary to strengthen the institutions, SDG16 (efficient, responsible and transparent institutions at all levels; increase and strengthen countries' participation in the development of global governance) will also be relevant for this.

As regards to the second priority, regarding measures to phase down progressively and/or eliminate mercury-containing products (including dental amalgams), it is also necessary to define legal measures as well as other policy instruments such as a national strategy for the sustainable management

of mercury-containing products in order to reduce their effects on human health and the environment. This action plan also requires multi-sectoral partnerships for collaboration and knowledge sharing, expertise, technology and financial resources to support the development of the above instruments and to strengthen the capacity of national technical experts as foreseen in SDG17 and in the first objective of Agenda 2063 Aspiration 7. Since this action plan intends to reduce the use of mercury-containing products in order to prevent the adverse effects on health and the environment, it can be linked to the SDGs 3, 9, 12, 14 and 15. Moreover, the use of mercury-free alternatives would contribute to SDG12 on responsible consumption and production, and SDG9 to encourage innovative industry. Additionally, considering the harm that mercury causes to human health and the environment, it can be related to the Agenda 2063 first Aspiration in its 2nd and 7th goals.

For the priority of the sound management of waste, it will be necessary to define, either legally or through another political instrument, the sustainable and environmentally sound management of waste, including mercury-containing waste and industrial emissions. This action plan can also be directly linked with SDG17 as its implementation requires cross-cutting aspects, meaning that multi-sectoral partnerships are essential. Sound waste management will contribute to reducing substantially the number of deaths and diseases due to hazardous chemicals, contamination and air, water and soil pollution, thus complying with SDGs 3, 9, and 12. This is in addition to improving water quality by reducing pollution, eliminating dumping and minimizing the release of hazardous chemicals and materials, reducing the proportion of untreated wastewater by half and substantially increasing recycling and reuse globally, as envisaged in SDG6.

<sup>11</sup> <http://www.un.org/en/africa/osaa/pdf/au/agenda2063-aspirations.pdf>

This action plan can also be directly linked to the first objective of the 7th Aspiration, since its effective implementation also requires transversal aspects, which means that multisector partnerships are essential. The clear outline through law or other policy instruments will address the concerns expressed in the 2063 agenda in order to substantially reduce the number of diseases and deaths, thus fulfilling the 1st Aspiration in its 1st and 7th goals.

### Relevant Articles Of The Minamata Convention For Guinea-Bissau

Relevant Article	Description of Article	Relevance to Guinea-Bissau	Relevance for the intervention plans
<p><b>Article 4</b>  <b>Mercury-added products</b>  <b>(Annex A, Parts I and II)</b></p>	<p>Provisions            Prohibit the manufacture, import and export of mercury-added products.</p> <p>Part I: To be phased out by the end of 2020 (Batteries, Switches and relays, Compact fluorescent lamps (CFLs), High pressure mercury vapour lamps (HPMV), Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL), Cosmetics including skin lightening soaps and creams; Pesticides, biocides and topical antiseptics; non-electronic measuring devices such as barometers; hygrometers; manometers; thermometers; sphygmomanometers.</p> <p>Part II: Phase Down the use of Dental Amalgam by implementing 2 or more of 9 proposed measures</p>	<p>This Article is relevant to Guinea-Bissau, as the country imports mercury-containing products and has identified the use and disposal of such products as one of the main categories responsible for mercury inputs, emissions and releases.</p> <p>These products include batteries, electrical switches and relays, light sources, skin-lightning products and dental amalgams.</p>	<p>It is important to consider an action plan capable of progressively eliminating and phasing-down the products containing mercury present in the country.</p> <p>The action Plan 2 includes various activities, starting from the identification and quantification of the fluxes of mercury-containing products at the national level through to the organization of awareness-raising campaigns to inform the population of the adverse effects of these products. This action plan also contains an activity dedicated to the research and adoption of mercury-free alternatives.</p>

<p><b>Article 8 Emissions</b></p>	<p>Provisions: A Party with relevant sources shall take measures to control releases and may prepare a national plan setting out such measures and their expected targets, goals and outcomes. Implement 1 or more of 5 measures as soon as practicable but no more than 10 years after entry into force. Require the use of BAT/BEP for any new sources, no later than 5 years after entry into force. Develop and maintain an inventory of emissions from relevant sources.</p> <p>Point sources are defined in Annex D of the Convention as: Coal-fired power plants; coal-fired industrial boilers; Smelting and roasting processes used in the production of non-ferrous metals (lead, zinc, copper, industrial gold); Waste incineration facilities; Cement clinker production facilities.</p>	<p>This Article is relevant as Guinea-Bissau has identified several point sources of emissions of mercury compounds to the atmosphere such as waste incineration (especially for medical waste) facilities and the newly-constructed cement clinker production facility (Annex D).</p>	<p>This Article can be linked to the intervention plan 3 on the sound management of waste, especially mercury-containing waste. This intervention aims to put in place adapted techniques and systems for the collection, storage, treatment and/or disposal of the waste in environmentally friendly manners to minimize or prevent emissions to air. The private sector will also need to be engaged to ensure that industrial emissions are appropriately managed and reduced.</p>
<p><b>Article 9 Releases</b></p>	<p>Provisions: Controlling and, where feasible, reducing releases of mercury and mercury compounds to land and water from the relevant point sources not addressed in other provisions of the Convention. Parties to identify the relevant point source categories and may prepare a national plan setting out measures, as listed in paragraph 5, to be taken to control releases and its expected targets, goals and outcomes. Plan to be submitted to the COP within 4 years of entry into force.</p>	<p>The informal waste deposition and open air burning on landfills constitutes the most significant source of releases, notably to soils and water. Therefore, this Article is relevant, given the needs to set adapted measures to reduce, and where (if) feasible, eliminate mercury and mercury compounds releases to these ecosystems.</p>	<p>As previously, this Article can be linked to the intervention plan 3 on sound management of wastes.</p>

<p align="center"><b>Article 11 Mercury wastes</b></p>	<p>Provisions: Each Party shall take appropriate measures so that mercury waste is:</p> <ul style="list-style-type: none"> <li>• Managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention and in accordance with requirements of the Conference of the Parties to the Minamata Convention</li> <li>• Only recovered, recycled, reclaimed or directly re-used for a use allowed to a Party under this Convention or for environmentally sound disposal pursuant to paragraph 3 (a);</li> <li>• For Parties to the Basel Convention, not transported across international boundaries except for the purpose of environmentally sound disposal in conformity with this Article and with that Convention</li> </ul>	<p>This Article is relevant for Guinea-Bissau due to the various mercury-containing products in the country and therefore will be informally disposed of in landfills as wastes.</p>	<p>This Article represents the main source of regulations for the third intervention plan on the sound management of wastes.</p>
<p align="center"><b>Article 12 Contaminated sites</b></p>	<p>Provisions: Each party shall endeavour to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds.</p>	<p>This Article is relevant to Guinea-Bissau with regards to the potentially contaminated sites related to previous and current mining and industrial activities, but also considering the informal waste disposal at national level.</p>	<p>This Article can be linked to the intervention plan 3 on sound management of wastes.</p>

<p align="center"><b>Article 16</b> <b>Health aspects</b></p>	<p>Provisions: Parties encouraged to</p> <ul style="list-style-type: none"> <li>• Promote the development and implementation of strategies and programmes to identify and protect populations at risks;</li> <li>• Develop and implement science-based educational and preventive programmes on occupational exposure;</li> <li>• Promote appropriate health-care services for prevention, treatment and care;</li> <li>• Strengthen institutional and health professional capacities for prevention, diagnosis, treatment and monitoring</li> </ul>	<p>Relevant given the known and other potential health impacts of all activities and/or practices that involve mercury and mercury compounds, including the use of mercury containing-products and waste management and disposal.</p>	<p>This Article can be linked to all action plans, given the need for promoting strategies and programmes, and strengthening institutional capacities, as well as the phase-down of mercury-containing products and developing the sound management of waste.</p>
<p align="center"><b>Article 17</b> <b>Information exchange</b></p>	<p>Provisions: Each Party shall facilitate the exchange of:</p> <ul style="list-style-type: none"> <li>• Scientific, technical, economic and legal information concerning mercury compounds, including toxicological, ecotoxicological and safety information</li> <li>• Information on the reduction or elimination of the production, use, trade, emissions and releases of mercury and mercury compounds</li> <li>• Information on technically and economically viable alternatives to: (i) mercury-added products; (ii) manufacturing processes in which mercury or mercury compounds are used and (iii) activities and processes that emit or release mercury or mercury compounds</li> <li>• Epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds, in close cooperation with WHO and other relevant organizations, as appropriated</li> </ul>	<p>Relevant given the several category sources responsible for mercury and mercury compounds inputs, emissions and releases. These sources show adverse effects on health and the environment. Therefore, measures should be undertaken to reduce and/or eliminate (where and if feasible) the import and use of the latter. In order to achieve this objective, information exchange is key.</p>	<p>This Article can be linked to all the intervention plans.</p>

<p align="center"><b>Article 18 Public information, awareness and education</b></p>	<p>Provisions: Each Party to promote and facilitate:</p> <ul style="list-style-type: none"> <li>• Provision to the public of available information relating to the use, substitution, release sources, health and environmental effects of mercury and mercury compounds, alternatives to them;</li> <li>• Education, training and public awareness related to the effects of exposure to mercury and mercury compounds;</li> <li>• To consider use of existing mechanisms or developing mechanisms, such as pollutant release and transfer registers (PRTR) for the collection and dissemination of information on estimates of emissions, releases and disposals.</li> </ul>	<p>This Article is relevant for Guinea-Bissau as a country interested in working to reduce and, where possible, eliminate the use of mercury and improve the management behaviour of materials and wastes containing or contaminated by mercury. Moreover, Guinea-Bissau is making several efforts to conduct awareness-raising campaigns at regular intervals in order to inform and involve all stakeholders, including civil society.</p>	<p>This Article can be linked to the intervention plans 2 and 3 on mercury-containing products and sound management of wastes.</p>
<p align="center"><b>Article 19: Research, development and monitoring</b></p>	<p>Provisions: Parties to cooperate to develop and improve</p> <ul style="list-style-type: none"> <li>• Inventories of use, consumption and anthropogenic emissions and releases</li> <li>• Modelling and geographically representative monitoring of mercury in human and environmental media</li> <li>• Assessment of impacts</li> <li>• Harmonised methodologies</li> <li>• Information on the environmental cycle, transport, transformation and fate of mercury</li> </ul>	<p>This Article is relevant given the need to build technical capacities and scientific research and establish monitoring systems to measure the efficiency and progress of activities/measures undertaken.</p>	<p>This Article can be linked to the intervention plans 2 and 3 but can also be included in the national frameworks (intervention plan 1).</p>

**Table 28** - Articles of the Minamata Convention relevant for Guinea-Bissau

## CHAPTER 7

# Mercury mainstreaming in national priorities in Guinea-Bissau

## Introduction

The integration of systems to manage mercury into national development plans is essential to achieving sustainable development. This Initial Assessment has identified several activities and sources of mercury, all of which can only be resolved in tandem with a cross-section of stakeholders and understanding of the links to broader working areas. For example, the removal of mercury from dental amalgam is not a simple case of removing mercury from the procurement system: it needs a comprehensive training and awareness-raising package to ensure dentists and future-dentists learn how to use modern techniques and materials. A successful intervention would contribute to compliance with the Minamata Convention, but also SDG3 on good health and well-being, SDG8 on decent work, and SDG9 on innovation, to name a few.

It is clear from the MIA that there are myriad opportunities to introduce the issue of mercury management into national priorities, and vice-versa, with sound management of mercury amplifying the effects of other interventions. Below are some key national development processes that offer clear opportunities for mainstreaming.

### 7.1. Mercury In National Priorities

The Government of Guinea-Bissau undertook to adhere to and implement the Minamata Convention on Mercury (through signature)

in 2014, a task entrusted to the Ministry of the Environment through the Directorate General of the Environment, which held an inception workshop to raise awareness of the domestic needs and benefits.

The introduction of mercury into national priorities (mainstreaming) has seen some progress and to illustrate this, in the health sector, significant steps have been taken with the gradual replacement of mercury-containing thermometers with other modern (electronic) devices. Being an emerging issue, the country is still trying to extend such actions to other sectors, including education, industry and transportation.

Work to ensure that the management of mercury is ongoing will need the involvement of decision makers from a broad group of stakeholders and sectors, to ensure appropriate actions are taken. This initial assessment is a sound starting point, and agencies responsible for the Minamata Convention, the Basel, Rotterdam and Stockholm Conventions and the Strategic Approach to International Chemicals Management can all have a significant role to play. Furthermore, key stakeholders such as ministries of environment, health, agriculture, labour, finance, trade and mining, as well as private sector and civil society actors will need to be integrally involved.

#### A. – National Planning To Implement The 2030 Agenda For Sustainable Development

The sound management of chemicals and

waste is integral into the 2030 Agenda for Sustainable Development Goals, 2063 Agenda for African Union and SAMOA Pathway and the “Terra Ranka” Strategic and Operational plan. There are several links to the 2030 Agenda, with almost all of the Goals having a justifiable link to the sound management of chemicals. This offers Guinea-Bissau, the country’s main

focal points and all relevant stakeholders significant opportunities to mainstream their activities into the development plans and contribute to the achievement of the Agenda.



IOMC brochure- Chemicals and Waste Management: Essential to achieving the Sustainable Development Goals, 2017

It is important for those involved in the implementation of the Minamata Convention to ensure activities on mercury are mainstreamed into the related development plans. The 2030 Agenda is the flagship policy framework for the world, with sustainable development interventions tied (directly and indirectly) to it, and significant financing opportunities relying on these links. By ensuring successful mainstreaming

in national activities, sound management of mercury can contribute significantly to the Agenda and benefit from funding.

## **B. - National Planning To Implement Agenda 2063**

In 2018 Guinea Bissau started to develop a national plan to implement and achieve Agenda 2063. To achieve the African Union Vision of “An integrated, prosperous and peaceful Africa, driven by its own citizens and representing a dynamic force in international arena”, Guinea-Bissau will need to act on mercury.

“The Minamata Convention is our chance to break that cycle of misery. It represents an opportunity to not only improve the health of people around the world, but to accelerate the transition to a fairer, greener economy. People can benefit from technology that offers safer, more effective alternatives for communities to build a more stable, sustainable future.” António Guterres, Secretary-General of the United Nations, Minamata Convention on Mercury text, 2017

The Seven Aspirations are key to the success of the Agenda. Aspiration 1 (especially Goal 7) notably relates to inclusive growth and sustainable development, and Aspiration 6 (Goals 17 and 18) references a development that is people-driven, relying on the potential of African people, especially its women and youth, and caring for children. These rely on the sound management of chemicals; benefiting from the positive aspects of chemicals to support sustainable growth, and managing the negative impacts, so that unsound practices are not encouraged.

As for the SDGs, it will be important for those involved in the implementation of the Minamata Convention to ensure activities on mercury are mainstreamed into this development plan. Likewise, the Agenda 2063 is a flagship policy framework for the region and offers significant financing opportunities. By ensuring successful

mainstreaming, activities on mercury management can contribute significantly to the Agenda and benefit from funding.

## **C. - The National Health Development Plan Iii (Pnds Iii)**

This third plan is already approved by the Ministry of Health and is awaiting approval by the Council of Ministers (as of March 2019), with mercury management mainstreamed within the new plan.

One benefit of the recent plans was the creation of a scientific research agency in the field of health, in order to provide science-based suggestions on health problems and their origins, and to propose to the Ministry of Health measures for the prevention and control of certain diseases, among others. Through this agency it may be possible to increase the understanding of health problems in the country related to mercury and establish appropriate programmes to manage them.

Furthermore, the National Health Institute works on mercury management in the health system, and their efforts can contribute to the overall implementation of the Convention.

## **7.4 - Strengthening Of Human, Animal And Environmental Health Project (Redisse)**

This project has the financial support of the World Bank for the period of 2017-2021 and is part of Human, Animal and Environmental Health Enhancement, under the One Health approach, taking a comprehensive approach to national health. One of the main expected results of this projects is the elimination of hospital products containing mercury.

Among the main activities are the elimination of mercury in working utensils, such as thermometers, and the elimination of open discharge of waste and without protection.

#### **7.4.1. Support For The Creation Of The National Laboratory Network**

The INASA is charged with formalizing the National Laboratory Network which aims to unify the activities of all laboratories, as well as eliminating all the products containing mercury. This Network intends to include not only public clinics but also private laboratories in Guinea-Bissau. The National Public Health Laboratory ensures the execution of the Global Safety Project, which includes capacity building on the management of mercury, the provision of modern thermometers and the collection of devices that still contain this harmful metal. This project has the financial support of the US government through SDS Atlanta.

Among the several initiatives still underway is support for the creation of the future National Network of Laboratories. The aim of this network is to ensure the health of laboratory professionals and to include activities to eliminate the harmful effects of mercury.

#### **7.4.2. Medication Purchase Centre (CECOME)**

The REDISSE aims at strengthening the role of CECOME. Bilateral partners such as the French Government and other donors (World Bank, including the International Development Association, and the European Union) have opted to provide substantial support for the purchase of drugs with no mercury content, especially those used to combat widespread diseases, such as malaria and diarrhoea. Headquartered in Bissau, this service also extends its activities

to the 11 regions in Guinea-Bissau. Ensuring the desires to reduce or eliminate mercury use is mainstreamed in procurement systems is an important step that the government has been able to take.

#### **7.5. Role Of The National Public Health Laboratory For The Inclusion Of Mercury In The National Priorities**

The National Public Health Laboratory promotes awareness-raising on mercury management, especially on the need for the immediate withdrawal of any old thermometer which shows obvious signs of damage. To this end, there is a gradual replacement of mercury-containing thermometers by electronic devices, and in the course of 2018, it should be possible to reach a large part of these existing services in other hospitals and health centres in the country. This project has the financial support of the US government through SDS Atlanta.



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## Annexes

### ANNEX 1 - RELEVANT STAKEHOLDERS

First and last names	Function	Institution
Cesário	Technician	
Engo Nelson Menezes d'Alva	Director	Bauxite Angola S.A.
João Intchama	Director of Sanitation	
Tcherno Luís Mendes	Civil servant, National Meteorology Institute	
Olívia F.B. Almeida	Deputy General Director of Customs	
Aladje Mamadú M. Djalo	Administrador	
Batem Biage	Technician	
Abdalaha U. Candé	Director of Technical Service Operations	
Dr. Hélio Ernesto Dias	Director of clinical service replacing clinical director	
Mohamed Mustafá Seide	Logistics / Hospital hygiene	
José Da Silva Júnior	Administrador	
Maria da Conceção Soares da Gama	Nurse	
Laurentino Rufino Cunha	Director of the Center for Waste and Chemicals	
Djarga Aladje Mamadú Candé	Chief of the Village Tabanca	
Paulo Biré Loqué	Section Coordinator	
Marciano V. Vaz	Director	
Bula Eliza Baiba	Warehouse responsible	
Nati Có	Fish seller	
Verónica Félix Costa de Barros	Fish seller	
Fatu Fayenke	Fish seller	
Utelinda Bampoque	Fish seller	
Intchoba Félix Costa Barros	Fish seller	
N'pi Cá	Fish seller	
Badjudessa Có	Fish seller	
Sábado Cá	Fish seller	
Satam Fayenke	Fish seller	
Plácido M. Cardoso	Executive Director	
Hélder Lopes	Director of Services	
Zeferina Gomes	Pharmaceutical Inspector	
Serifo Monteiro	Director	
José Gomes	Laboratory technician	
Filomeno Neto	Director	
Marcelino Mutna	Laboratory technician	
Lilica Sá	Assistant	
Duarte Mansa	Permanent Secretary	

## ANNEX 2 - SPREADSHEETS OF THE TOOLKIT

### Country General Information

BACKGROUND DATA NEEDED FOR DEFAULT CALCULATIONS AND RANGE TEST			
Compulsory: Click cell below and select country from list	Population in 2010 (or as recent as available data allow; UNSD, 2012)	Dental personnel per 1000 inhabitants	Electrification rate, % of population with access to electricity
Guinea-Bissau*6	1,558,090	0.017	54

## Energy Consumption and Fuel Production

Source category	Source present?	Activity rate	Unit	Include Hg controls in estimation ? (y/n)	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y								
						Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatm. / disposal			
Energy consumption	Y/N/?	Annual consumption /population			Standard estimate									
Coal combustion in large power plants	N		Coal combusted, t/y		-	-	-	-	-	-	-	-	-	-
Coal combustion in coal fired industrial boilers	N		Coal combusted, t/y		-	-	-	-	-	-	-	-	-	-
Other coal uses	Y	0	Coal used, t/y		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combustion/use of petroleum coke and heavy oil	Y	666	Oil product combusted, t/y		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Combustion/use of diesel, gasoline, petroleum, kerosene, LPG and other light to medium distillates	Y	104,877	Oil product combusted, t/y		1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Use of raw or pre-cleaned natural gas	Y		Gas used, Nm <sup>3</sup> /y		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Use of pipeline gas (consumer quality)	Y	47,976	Gas used, Nm <sup>3</sup> /y		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Biomass fired power and heat production	Y	2,093,250	Biomass combusted, t/y		63	62.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Fuel production</b>													
Oil extraction	N		Crude oil produced, t/y		-	-	-	-	-	-	-	-	-
Oil refining	N		Crude oil refined, t/y		-	-	-	-	-	-	-	-	-
Extraction and processing of natural gas	N		Gas produced, Nm <sup>3</sup> /y		-	-	-	-	-	-	-	-	-

**Domestic production of metals and raw materials  
(next page)**

Source category	Source present?	Activity rate	Unit	Include Hg controls in estimation ? (y/n)	Estimated Hg releases, standard estimates, Kg Hg/y								
					Estimated Hg input, Kg Hg/y	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatm./ disposal		
<b>Primary metal production</b>													
Mercury (primary) extraction and initial processing	N		Mercury produced, t/y		-	-	-	-	-	-	-	-	-
Production of zinc from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	-	-
Production of copper from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	-	-
Production of lead from concentrates	N		Concentrate used, t/y		-	-	-	-	-	-	-	-	-
Gold extraction by methods other than mercury amalgamation	N		Gold ore used, t/y		-	-	-	-	-	-	-	-	-
Alumina production from bauxite (aluminium production)	N		Bauxit processed, t/y		-	-	-	-	-	-	-	-	-

Primary ferrous metal production (pig iron production)	N		Pig iron produced, t/y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from whole ore	N		Gold produced, kg/y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gold extraction with mercury amalgamation - from concentrate	N		Gold produced, kg/y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Other materials production</b>																			
Cement production	N		Cement produced, t/y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pulp and paper production	N		Biomass used for production, t/y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

### Domestic production and processing with intentional mercury use

Source category	Source present? Y/N/?	Activity rate Annual consumption /production	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y						
						Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal	Sector specific waste treat-ment / disposal
Chlor-alkali production with mercury-cells	N		Cl <sub>2</sub> produced, t/y	-	-	-	-	-	-	-	-	-
VCM production with mercury catalyst	N		VCM produced, t/y	-	-	-	-	-	-	-	-	-
Acetaldehyde production with mercury catalyst	N		Acetaldehyde produced, t/y	-	-	-	-	-	-	-	-	-
Production of products with mercury content												
Hg thermometers (medical, air, lab, industrial etc.)	N		Mercury used for production, kg/y	-	-	-	-	-	-	-	-	-
Electrical switches and relays with mercury	N		Mercury used for production, kg/y	-	-	-	-	-	-	-	-	-



### General waste management set-up in the country

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y							
						Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment / disposal	Sector specific waste treatm. / disposal	
Production of recycled mercury ("secondary production")	N		Mercury produced, kg/y		-	-	-	-	-	-	-	-	-
Production of recycled ferrous metals (iron and steel)	Y	1,486	Number of vehicles recycled/y		2	0.5	0.0	0.6	0.0	0.0	0.5	0.0	0.0
Waste incineration													
Incineration of municipal/general waste	N		Waste incinerated, t/y		-	-	-	-	-	-	-	-	-
Incineration of hazardous waste	N		Waste incinerated, t/y		-	-	-	-	-	-	-	-	-
Incineration / burning of medical waste	Y	641	Waste incinerated, t/y		15	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sewage sludge incineration	N		Waste incinerated, t/y		-	-	-	-	-	-	-	-	-

Open fire waste burning (on landfills and informally)	Y	276,073	Waste burned, t/y		1,380	1,380.4	0.0	0.0	0.0	0.0	0.0	0.0
<b>Waste deposition/landfilling and waste water treatment</b>												
Controlled landfills/deposits	Y	137,216	Waste landfilled, t/y		686	6.9	0.1	0.0	-	-	-	-
Informal dumping of general waste <sup>*1</sup>	Y	46,832	Waste dumped, t/y		234	23.4	23.4	187.3	-	-	-	-
Waste water system/treatment	Y	41,284,100	Waste water, m <sup>3</sup> /y		217	0.0	195.1	0.0	0.0	21.7	0.0	0.0

## General consumption of mercury in products, as metal mercury and as mercury containing substances

Source category	Source present?	Activity rate	Unit	Include Hg controls in estimation? (y/n)	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
						Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment /disposal
<b>Use and disposal of products with mercury content</b>						Less than 2/3 (two thirds; 67%) of the general waste is collected and deposited on lined landfills or incinerated with pollution abatement					
					NOTE: Selection regarding waste management	Less than 1/3 (one third = 33%) of the mercury-added products waste is safely collected and treated separately					
Dental amalgam fillings ("silver" fillings)	Y				7	0.1	3.0	0.5	0.4	1.3	1.3
Preparations of fillings at dentist clinics		1,651,364	Number of inhabitants			0.1	0.9	0.0	0.0	0.8	0.8
Use - from fillings already in the mouth		1,651,364	Number of inhabitants			0.0	0.1	0.0	0.0	0.0	0.0
Disposal (excavations, lost and extracted teeth)		1,651,364	Number of inhabitants			0.0	1.9	0.5	0.4	0.5	0.5
		0.017	Number of dental personnel per 1000 inhab.								

Thermometers	Y	1,010			2	0.4	0.6	0.4	0.0	0.6	0.0
Medical Hg thermometers	Y	1,000	Items sold/y		1						
Other glass Hg thermometers (air, laboratory, dairy, etc.)	?		Items sold/y		?						
Engine control Hg thermometers and other large industrial/specialty Hg thermometers	Y	10	Items sold/y		1						
Electrical switches and relays with mercury	Y	1,651,364	Number of inhabitants		124	37.1	0.0	49.5	0.0	37.1	0.0
		54	electricification rate, %								
Light sources with mercury	Y	1,490,096	Items sold/y		17	5.2	0.0	5.2	0.0	6.9	0.0
Fluorescent tubes (double end)	Y	162,376	Items sold/y		4						
Compact fluorescent lamp (CFL single end)	Y	1,325,920	Items sold/y		13						
Other Hg containing light sources (see guideline)	Y	1,800	Items sold/y		0						

Batteries with mercury	Y	344	t batteries sold/y	141	35.3	0.0	35.3	0.0	70.6	0.0
Mercury oxide (button cells and other sizes); also called mercury-zinc cells	Y	0	Batteries sold, t/y	43						
Other button cells (zinc-air, alkaline button cells, silver-oxide)	Y	2	Batteries sold, t/y	13						
Other batteries with mercury (plain cylindrical alkaline, permanganate, etc., see guideline)	Y	342	Batteries sold, t/y	86						
Polyurethane (PU, PUR) produced with mercury catalyst	Y	1,651,364	Number of inhabitants	27	5.3	2.7	10.6	0.0	8.0	0.0
		54	Electricification rate, %							
Laboratory chemicals	Y	1,651,364	Number of inhabitants	9	0.0	2.9	0.0	0.0	2.9	3.0
		54	Electricification rate, %							
Other laboratory and medical equipment with mercury	Y	1,651,364	Number of inhabitants	35	0.0	11.7	0.0	0.0	11.7	12.0
		54	Electricification rate, %							

## Crematoria and cemeteries

Source category	Source present?	Activity rate	Unit	Estimated Hg input, Kg Hg/y	Estimated Hg releases, standard estimates, Kg Hg/y					
					Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatm. / disposal
Crematoria	N		Corpses cremated/y	-	-	-	-	-	-	-
Cemeteries	Y	31,779	Corpses buried/y	79	0.0	79.4	-	0.0	0.0	0.0

## ANNEX 3: ASPIRATIONS, GOALS AND PRIORITY AREAS OF THE AGENDA 2063<sup>12</sup>

### Overview of aspirations, goals and priority areas of Agenda 2063

Aspiration	Goals	Priority Areas
<b>A prosperous Africa, based on inclusive growth and sustainable development</b>	A high standang of living, quality of life and wellbeings for all citizens	<ul style="list-style-type: none"> <li>▪ Incomes, jobs and decent work</li> <li>▪ Poverty, inequality and hunger</li> <li>▪ Social security and protection, including persons with disabilities</li> <li>▪ Modern, affordable and liveable habitats and quality basic services</li> </ul>
	Well educated citizens and skills revolution underpinned by science, technology and innovation	<ul style="list-style-type: none"> <li>▪ Education and STI driven skills revolution</li> </ul>
	Healthy and well-nourished citizens	<ul style="list-style-type: none"> <li>▪ Health and nutrition</li> </ul>
	Transferred economies	<ul style="list-style-type: none"> <li>▪ Sustainable and inclusive economic growth</li> <li>▪ STI driven manufacturing, industrialization and value addition</li> <li>▪ Economic diversification and resilicence</li> </ul>
	Modern Agriculture for increased productivity and production	<ul style="list-style-type: none"> <li>▪ Agricultural productivity and production</li> </ul>
	Blue / ocean economy for accelerated economic growth	<ul style="list-style-type: none"> <li>▪ Sustainable natural resource management</li> <li>▪ Biodiversity conversation, genetic resources and ecosystems</li> <li>▪ Sustainable consumption and production patterns                             <ul style="list-style-type: none"> <li>▪ Water security</li> </ul> </li> <li>▪ Cimate resilience and natural disasters preparedness and prevention</li> <li>▪ Renewable energy</li> </ul>

<sup>12</sup> <http://www.un.org/en/africa/osaa/pdf/au/agenda2063-aspirations.pdf>

<p><b>A prosperous Africa, based on inclusive growth and sustainable development</b></p>	<p>Environmentally sustainable and climate resilient economies and communities</p>	<ul style="list-style-type: none"> <li>· Sustainable natural resource management</li> <li>· Biodiversity conservation, genetic resources and ecosystems</li> <li>· Sustainable consumption and production patterns               <ul style="list-style-type: none"> <li>· Water security</li> </ul> </li> <li>· Climate resilience and natural disasters preparedness and prevention               <ul style="list-style-type: none"> <li>· Renewable energy</li> </ul> </li> </ul>
<p><b>An integrated continent, politically united, based on the ideals of Pan Africanism and the vision of Africa's Renaissance</b></p>	<p>A United Africa (Federal or Confederate)</p>	<ul style="list-style-type: none"> <li>· Frameworks and institutions for a United Africa</li> </ul>
	<p>Continental financial and monetary institutions established and functional</p>	<ul style="list-style-type: none"> <li>· Financial and monetary institutions</li> </ul>
	<p>World class infrastructure criss-cross Africa</p>	<ul style="list-style-type: none"> <li>· Communications and Infrastructure and connectivity</li> </ul>
<p><b>An Africa of good governance, democracy, respect for human rights, justice and the rule of law</b></p>	<p>Democratic values, practices, universal principles of human rights, justice and rule of law entrenched</p>	<ul style="list-style-type: none"> <li>· Democracy and good governance</li> <li>· Human rights, justice and rule of law</li> </ul>
	<p>Capable institutions and transformative leadership in place</p>	<ul style="list-style-type: none"> <li>· Institutions and leadership</li> <li>· Participatory development and local governance</li> </ul>
<p><b>A peaceful and secure Africa</b></p>	<p>Peace, security and stability is preserved</p>	<ul style="list-style-type: none"> <li>· Maintenance and preservation of peace and security</li> </ul>
	<p>A stable and peaceful Africa</p>	<ul style="list-style-type: none"> <li>· Institutional structure for AU instruments on peace and security</li> <li>· Defence, security and peace</li> </ul>
	<p>A fully functional and operational APSA</p>	<ul style="list-style-type: none"> <li>· Fully operational and functional APSA all pillars</li> </ul>
<p><b>Africa with strong cultural identity, common heritage, values and ethics</b></p>	<p>African cultural renaissance is pre-eminent</p>	<ul style="list-style-type: none"> <li>· Values and ideals of Pan Africanism</li> <li>· Cultural values and African Renaissance               <ul style="list-style-type: none"> <li>· Cultural heritage, creative arts and business</li> </ul> </li> </ul>
<p><b>An Africa whose development is people-driven, relying on the potential offered by African people, especially its women and youth, and caring for children</b></p>	<p>Full gender equality in all spheres of life</p>	<ul style="list-style-type: none"> <li>· Women and girls empowerment</li> <li>· Violence and discrimination against women and girls</li> </ul>
	<p>Engaged and empowered youth and children</p>	<ul style="list-style-type: none"> <li>· Youth empowerment and children's rights</li> </ul>
<p><b>An Africa as a strong, united, resilient and influential global player and partner</b></p>	<p>Africa as a major partner in global affairs and peaceful co-existence</p>	<ul style="list-style-type: none"> <li>· Africa's place in global affairs</li> <li>· Partnerships</li> </ul>
	<p>Africa takes full responsibility for financing her development</p>	<ul style="list-style-type: none"> <li>· African capital markets</li> <li>· Fiscal systems and public sector revenue</li> <li>· Development assistance</li> </ul>

## Glossary

**Acetaldehyde:** it is the chemical aldehyde formula  $C_2H_4O$ . It is a colorless liquid, acrid, that boils approximately to the environment temperature; it is the primary metabolic product of the ethanol in its conversion route to acetic acid.

**Alkaline battery:** they are a battery type with the similar base operation to the dry battery of Leclanché, the common battery. The difference consists that the fact of the pile of Leclanché is acid and the hydrolysis contain chloride of ammonium ( $NH_4Cl$  (aq)). This is generally the battery type used in the largest quantities, however lately challenged by lithium batteries.

**Aluminum:** it is a chemical element of symbol Al and atomic number 13 (thirteen protons and thirteen electrons) with mass 27 u. In the temperature it adapts it is solid, it is the more abundant metallic element of the terrestrial crust.

**Asphalts:** it is a thick polish, of dark and brilliant agglutinant material, with solid structure, constituted of complex mixtures of hydrocarbon high nonvolatile molecular mass, besides mineral substances, distillation waste to vacuum of the crude petroleum.

**Bauxite:** it is a natural mixture of oxides of aluminum, before considered mineral. its principal components the gibbsite  $Al(OH)_3$ , boehmite,  $\gamma-AlOOH$  and the diaspora  $\gamma-AlOOH$ , mixed with the two oxides of iron (goethite and the hematite), besides kaolinite, mineral clay and small amounts of  $TiO_2$  anatase.

**Bitumen:** or mineral pitch is a liquid mixture of high viscosity, dark color and it is easily flammable. It is formed by chemical compositions (hydrocarbon), and that can happen in the nature and be obtained artificially, in process of petroleum distillation.

**Bituminous schist:** it is a sedimentary rock of fine grain, rich in organic material, containing kerogen (a solid mixture of organic chemical compositions), from which hydrocarbons liquid called schist petroleum can be produced.

**Biocides:** it is collectively the employed term for disinfectants, chemical sterilizer, antiseptics and preservatives.

**Biomass:** it is every organic matter, of origin vegetable or animal, used in the production of energy.

**Biomedical waste (BMR) or hospital residue (RH):** they are constituted by garbage liquid or solid, with the infectious risk, originating from diagnosed products for prevention treatment or of research as regards to health.

**Bitumen:** or mineral pitch is a liquid mixture of high viscosity, dark color and it is easily flammable. It is formed by chemical compositions (hydrocarbon), and that can happen in the

nature and be obtained artificially, in process of petroleum distillation.

**Boiler:** it is a recipient whose function is, among many, the vapor production through the heating of the water. The boilers produce vapor to feed thermal machines, autoclaves for sterilization of several materials, boiling of victuals and of other organic products, environmental heating and other applications of the heat using vapor.

**Catalyst:** it is a substance that alters the speed of a reaction, normally without being consumed, during the process. Catalysts have wide employment in the industry, for instance in the process of production of acids (as sulfuric acid and acid nitric), hydrogenation of oils and of derived of the petroleum. Some catalysts stay in the products however, for example in polyurethane flexible rubbers.

**Caustic soda (In OH):** also known as hydroxide of sodium, it is a caustic hydroxide used in the industry, mainly as chemical base, in the papermaking, woven, detergents, victuals and biodiesel.

**Cellulose:**  $(C_6H_{10}O_5)_n$  is a polymeric of long chain composed with only one monometer (glucose), classified as polysaccharide or carbohydrate. It is one of the principal representatives of the cellular walls of the plants (about 33% of the mass of the plant), in combination with the lignin, with hemicellulose and pectin and it is not digestible for the man, constituting a dietary fiber.

**Charcoal coal:** it is obtained through f burning or wood carbonization, after that process results in a black substance.

**Chlorine (gas Cl<sub>2</sub>):** it is a chemical element; symbol Cl, atomic number 17. It is contained in the group of the halogens (group 17 or VIIA) and it is the second lighter halogen, after the fluorine.

**Charcoal coal:** it is obtained through f burning or wood carbonization, after that process results in a black substance.

**Coal:** it is a combustible sedimentary rock, with black or brown color, that happens in strata called layers of coal. The hardest forms, as the anthracite, metamorphic rocks can be considered due to the subsequent exhibition to the temperature and elevated pressure.

**Coal or bituminous coal:** it is a type of mineral coal that contains polymers. Depending on the tenor of carbon, the mineral coal is classified as lignite, coal and anthracite. It is denominated of coal when the tenor of carbon is between 60 and 80%.

**Copper:** element with the atomic NUMBER 29, of symbol Ass, metallic, red, very malleable and ductile, one of the best drivers of the heat and of the electricity.

**Combustion:** or burnt it is an exothermic chemical reaction among a substance (the fuel) and

a gas (the carburant), usually the oxygen, to liberate heat and light.

**Coke of petroleum:** in English “petcoke” it is the solid product from petroleum distillation, obtained from the breaking of the heavy waste fractions. It is solid material and with granulomere that varies from 0 to 75mm, as supplied by the refineries. In Brazil it is known as petrocoque.

**Dairy products:** also denominated milky products, they are the group of victuals that includes the milk, as well as flowed processed (usually fermented).

**Dental amalgam:** means a material used to stamp the resulting cavities of the removal of the affected dental fabric for the decay. It usually contains about 50% mercury, besides silver, zinc and copper. Although it is still called stuffing “, dental amalgam doesn’t contain lead.

**Diesel:** it is a derived oil of the distillation of the rude petroleum used as fuel in the diesel motor, constituted basically by hydrocarbons.

**Dry weight:** or dry extract is the remaining part of the material weight after the loss of all the water that is possible to extract through a heating done in controlled conditions of laboratory.

**Electrolytic process:** it is the whole process where the passage of electric current exists for a chemical solution. For instance, the “baths “of metals (adornment, nickel-planting, silvering etc.) they are in majority done through electrochemical process.

**Electrode:** electrode or electrode, usually known by pole, in a general way it is the terminal used to connect an electric circuit to a metallic part or not metallic or aqueous solution.

**Extraction of petroleum:** it is the process in which usable petroleum is extracted and removed of the underground.

**Fluorescent lamps:** it is a lamp type created by Nikola Tesla, introduced at the consuming market in 1938. Unlike the filament lamps, it possesses great efficiency for emitting more electromagnetic energy in light form than heat.

**Ferrous metals:** they are the steel, the melted iron and the laminated iron. Those metals are leagues of iron and carbon that can still present in its composition elements as match, manganese, silicic, copper, sulfur, among others.

**Gold:** it is a chemical element with atomic number 79 that is placed in the group eleven of the periodic table, and atomic mass 197 u. In the nature, the gold is produced through the collision of two neutrons stars.

**Halogenates lamps:** they are incandescent lamps with tungsten filament contained in an inert gas and with a small amount of an element halogen as iodine or bromine.

**Heavy sands:** it is a group of particles of rocks composed by minerals with a superior density to 2, 87 (zircon, titanite, tourmaline, grenade). Due to your density, most is naturally concentrated

in sedimentary rocks, especially in the sands of the river and of the beach, where they can accumulate and be explored.

**Hydrocarbons:** it is a chemical composition constituted by atoms of carbon and hydrogen united tetrahedral by covalent connection as well as all the organic compositions. 3-ciclopentil-3-etilexano, a complex hydrocarbon.

**Input:** it is an English expression that means entrance.

**Inks of latex:** it is dispersion in water of particles of polymeric sub micrometric. In the context of the latex inks it just means an aqueous dispersion. The natural eraser (latex) it is not present in the formulation.

**Incineration:** it is the burning process of the garbage in ovens and own plants. It presents the advantage of reducing plenty the volume of waste. Besides, it destroys the microorganisms that cause diseases, contained mainly in the hospital garbage and industrial.

Kerosene oil: also designated by illuminant petroleum or paraffin oil, it is a liquid resultant of the fractional petroleum distillation, with temperature ebullition between 150 and 290 degrees Celsius, fraction between the gasoline and the diesel oil.

Lamps of sodium of high pressure: it is the given designation the type of discharge lamp in half gaseous that uses a plasma of vapor of sodium to produce light. Two variants of this type of lamps exist: of low pressure (in general designated LPS) and of high pressure (HPS).

**Lead:** it is a chemical element of symbol Pb, atomic number 82 (82 protons and 82 electrons), with atomic mass same to 207,2 u, belonging to the group 14 or IVA of the periodic classification of the chemical elements.

**Lenhite:** it is a soft, brown sedimentary rock and fuel formed by the turf compression. It is considered a low coal due to low caloric power.

**Liquefied propane:** or liquefied Gas of petroleum (GLP or GPL) it is the mixture of condensed gases, presents in the natural gas or dissolved in the petroleum. The components of GLP, although to the temperature and environmental pressure are gases, they are easy to condense. In practice, it can be said that GLP is a mixture of the gases propane and butane.

Lamp of vapor of mercury of high pressure: it is a type of discharge lamp, in which the light is produced by the passage of an electric current through the mercury vapor.

**Mineral graves:** it is an attaché of substances of mineral origin that is in the terrestrial crust and that is susceptible of economical exploration.

**Manometer:** it is an instrument used to measure the pressure of fluids contained in closed recipients. They exist, basically, two types: the one of liquids and the one of gases.

**Mercury oxide:** containing this formula  $\text{HgO}$  and a molecular mass 216.6. it Possesses red or yellow-orange coloration, coming as a solid, the temperature and pressure adapts. its montroydite mineral form is very rarely found.

**Odontology:** it is the science that studies and treats the diseases related to the stomatognathic apparel, formed by the face, mouth cavity and neck. The professional formed in dentistry is the dentist.

**Output:** it is an English expression that means exit.

**Phosphate:** in the chemistry, a phosphate is an ion polyatomic or a radical consisting of a match atom and four oxygen. In the ionic form, it has the formal load of -3, being denoted like  $\text{PO}_4^{3-}$ . In mineralogy and geology, it refers to a rock or nugget containing ions of phosphate.

**Potassium hydroxide:** also known as caustic potash it is a caustic hydroxide that has the following chemical formula:  $(\text{KOH})$ .

**Pressure gauges:** or sphygmomanometer is an apparel to verify the blood pressure (SHOVEL). It consists in a system for compression of the brachial artery. It is composed by an inflatable bag of format eraser to laminate, which is involved by a layer of inelastic fabric (handle, cuff with mitt = bladder).

**Per capita:** it is a Latin expression that means "for head ". It is frequently used in the statistics field to indicate an average per person for a determined value: for instance, the income.

**Potassium Permanganate:** is a composed of inorganic salt chemical function, don formed by the potassium ions  $(\text{K})^+$  and permanganate  $(\text{MnO}_4)$ . it is an oxidizer fort agent that presents solid state and in aqueous solution a coloration quite intense violet, in the proportion of 1,5g per liter of water, becomes strong red.

**Pesticides:** they are all the substances or mixtures that have, as objective, to impede, to destroy, to repel or to mitigate any curse. A pesticide can be a chemical substance or a biological agent (just as a virus or bacteria) that is thrown from encounter to the curses that are destroying a plantation, disseminating diseases, inconveniencing people.

**Pycnometer:** it is a technique laboratorial used to make determination of the specific mass and of the density of liquids. It can also to determine the specific mass and the density of solids, before dissolved.

**Pigments:** it is a material that changes the color of the light that contemplates as a result of the selective absorption of color. This physical process differs in fluorescence, phosphorescence and other luminescence ways, in that the material emits light. Many materials absorb selectively certain light waves, depending on your wavelength.

**Porosimetry:** it is an analytic technique that allows measuring some characteristics of a

material due to the presence of pores, including: total volume of pores, diameter of the pores, superficial area, apparent density and absolute density.

**Polyurethane:** (denominated by the acronym PU) it is a polymeric one that understands a chain of united organic units for urethane connections.

**Process of the membrane:** it is a group of methods or process for the separation of elements using artificial membranes.

**Quarries (inert/aggregates):** it is an open sky mining type where rocks or mineral are extracted. The quarries are used to extract construction materials, such as ornamental stones. The quarries are usually less deep than other types open sky mines type.

**Raw materials:** it is a natural product or semi-manufactured that should be submitted to a productive process until becoming a finished product.

**Rude petroleum:** it is not the term for the oil processed. It is also known just as petroleum. The rude petroleum is a fossil fuel, which means that it is formed by an organic decomposition process of matter, vegetable remains, algae, some plankton types and remains of sea animals - happened during hundreds of millions of years in the geological history of the Earth.

**Recycling:** it is the process that seeks to transform used materials in new products.

**Refining:** it is a process that removes the breaking of the different weights, volatilities and temperatures of ebullition of the hydrocarbons for separating, giving origin to the intermediate and final products.

**Relay:** it is an electro mechanic switch. The physical movement of this switch happens when the electric current travels the spiral bobbins of the relay, creating a magnetic field that attracts the responsible lever for the change of the state of the contacts.

**Silver:** it is a chemical element with the symbol Ag and atomic number same to 47 (47 protons and 47 electrons) its atomic mass is 107,87. TO THE environment temperature, the silver is in the solid state. In the fire test, it assumes the color lilac.

**Silver oxide:** it is the chemical composition with the formula  $Ag_2O$ . It is a black or brown fine powder that is used to prepare other composed of silver.

**Switches:** it is a simple device, used to open or to close electric circuits. They are used in the opening of nets, in electric outlet and entrances of electronic apparels, basically in most of the situations that involve the ligament or electric power disconnection.

**Thermometers:** it is an apparel used to measure the temperature or the temperature variations. It is an instrument composed by a sensor element that it possesses a thermometric property, that is, a property that varies with the temperature.



**Toolkit / toolbox:** Box of tools used for construction of the Inventory - “Toolkit for the Identification and Quantification of Mercury Releases” - it was developed by the United Nations Environment Program (UN Environment).

**Turf:** it is a material of vegetable origin, partially decomposed, found in layers, usually in marshy areas and also under mountains. It is formed mainly by Sphagnum and Hyponym, but also of rushes, trees.

**Waste:** it is everything that people do not take advantage of in their activities, originating from the industries, trade and residences.

## Letra Da Música Sobre Os Perigos Do Mercúrio

### Início:

Vamos contar-vos um pouco a história do porquê da escolha da cidade de Minamata (Japão) para a Convenção sobre o Mercúrio...

### Refrão:

**Ministro Serifo Embaló, aconselhou-nos de distanciar-nos do mercúrio, livremo-nos dele, pois o mercúrio é perigoso;**

**Eng. Viriato aconselhou-nos de distanciar-nos do mercúrio, livremo-nos dele, pois o mercúrio é perigoso;**

**Eng. Mudjus aconselhou-nos de distanciar-nos do mercúrio, livremo-nos dele, pois o mercúrio é perigoso;**

### Estrofe:

Numa vila de pescadores, próxima a cidade de Minamata, Japão, nasceu uma criança de nome Sakamoto. Após o nascimento, os pais aperceberam que havia algo de errado com a criança. Com os 3 anos, a criança não conseguia andar e nem se movimentava bem. Os pais decidiram leva-la a um centro de reabilitação, onde foi submetida a terapia para que ele conseguisse andar. No decorrer do processo foi diagnosticada por médicos com paralisia cerebral.

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

Afinal, Sakamoto não era um caso isolado, pois antes do seu nascimento, peixes e outras espécies marinhas foram encontrados mortos na Baía da Minamata;

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

### Estrofe:

Aves marinhas perderam a habilidade e mobilidade de voar, os gatos ficaram trémulos e não conseguiam andar bem. Até chamava na aldeia da doença de dança. Afinal, tudo era o resultado da contaminação da baía da Minamata, pelos dejectos industriais, que eram jogados no rio, onde estão os peixes que eram consumidos pela população.

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

Como foi descoberto, o mundo não parou, pois o perigo se avizinhava cada vez mais. Por isso decidiu-se a criação da convenção da Minamata, que é um tratado global com vista a proteger a saúde humana e o ambiente, dos efeitos adversos do mercúrio.

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

Meus irmãos, o mundo não parou! Problemas provocados pelo homem ao mundo, hoje estão a dar-lhe dores de cabeça e só ele (homem) deve lutar a fim de encontrar soluções adequadas para os referidos problemas.

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

### Estrofe:

Todo mundo está consciencializado hoje em dia e o homem lançou a voz/apelo com vista a proteger, defender e pediu stop aos danos ambientais e humana, que de uma forma foram criados pelo próprio homem, motivados pelas suas actividades, luta pela sobrevivência, ganância e irracionalidade perante o meio em que ele vive... Eis as consequências! A nossa saúde, a nossa vida, o nosso ambiente está ameaçado, está em perigo. E, o meio ambiente

é o nosso amigo e tornou-se o nosso inimigo número um (1)...

**Solo: Livremo-nos dele, pois o mercúrio é perigoso;**

**Estrofes:**

O mundo, confrontado com esse fenómeno, não há tempo a perder, as pessoas se uniram para conversar, unir esforços, e criaram um espaço de concertação e de reflexão, com o intuito de lutar e minimizar os danos maiores que o mercúrio está a provocar a nossa saúde e o nosso ambiente.

O mercúrio é usado em: termómetros, barómetros, lâmpadas fluorescentes, nos medicamentos, espelhos, denotadores, corantes... As mulheres hoje em dia estão a mudar a cor da pele. Mudar a cor da pele é muito perigoso, pois pode provocar doenças, como cancro, porque o mercúrio é um produto químico altamente perigoso que se encontra na composição dos cremes do género e até nas pilhas que usamos no dia-a-dia...

Os sintomas de contaminação por vapor do mercúrio são: dor de estômago, diarreia, tensão alta, insónia, perda de memória, fadiga, fraqueza dos músculos, falta de concentração...  
Meus

irmãos, escutemos e acatemos os conselhos das pessoas, dos técnicos do ambiente, pois a saúde é um bem precioso...e que tem a saúde plena, tem tudo.

**Refrão:**

**Ministro Serifo Embaló, aconselhou-nos de distanciar-nos do mercúrio, livremo-nos dele, pois o mercúrio é perigoso;**

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**Eng. Mudjus aconselhou-nos de distanciar-nos do mercúrio, livremo-nos dele, pois o mercúrio é perigoso;**

Mistério do Ambiente, sempre preocupado na conservação do ambiente, pelo bem-estar da sua população...

**Solo: Livremo-nos dele, pois o mercúrio é perigoso... (6 vzs)**

## Guinea-Bissau Jingle On The Hazards Of Mercury

### **Start:**

Let us tell you a bit about the history of the choice of the city of Minamata (Japan) for the Convention on Mercury

### **Chorus:**

Minister Serifo Packed, advised us to distance ourselves from mercury, let us get rid of it, because mercury is dangerous;

Eng. Viriato advised us to distance ourselves from mercury, let us rid ourselves of mercury, because mercury is dangerous;

Eng. Mudjus advised us to distance ourselves from mercury, let us free ourselves from it, because mercury is dangerous;

### **Strophe:**

In a fishing village near the town of Minamata, Japan, a child named Sakamoto was born. After his birth, the parents realized that something was wrong with the child. At age 3, the child could not walk and did not move well. The parents decided to take him to a rehabilitation center where he undergo therapy so he could walk. In the course of the therapy he was diagnosed by doctors with cerebral paralysis.

**Solo:** Let's get rid of it, mercury is dangerous; After all, Sakamoto was not an isolated case, because before his birth, fish and other marine species were found dead in Minamata Bay;

**Solo:** Let's get rid of it, mercury is dangerous;

### **Strophe:**

Seabirds lost the ability and mobility to fly, the cats became tremulous and could not walk well. They even called the sickness dance village. After all, it was the result of the contamination of Minamata Bay by the industrial droppings that were thrown into the river, where is the fish consumed by the local population.

### **Solo:**

Let's get rid of him, mercury is dangerous; the world did not stop, because the danger was closer and closer. That is why it was decided to create the Minamata Convention, which is a global treaty to protect human health and the environment from the adverse effects of mercury.

**Solo:** Let's get rid of it, mercury is dangerous;

My brothers, the world has not stopped! Problems caused by man to the world today are giving him headaches and only him (man) must fight in order to find suitable solutions to those problems.

**Solo:** Let's get rid of it, mercury is dangerous;

### **Strophe:**

Everyone is aware today and the man has launched the voice / a call to protect, defend and stop the environmental damage, which in a way were created by himself, motivated by their activities, struggle for survival, voracity and irrationality in the environment which he lives... Here are the consequences! Our health, our life, our environment is threatened, it is in danger. And, the environment is our friend but now it has become our number one enemy...

**Solo:** Let's get rid of it, mercury is dangerous;

### **Strophe:**

The world faces this phenomenon, there is no time to lose, people have come together to ta