

Minamata Initial Assessment Report: São Tomé and Príncipe

Direção Geral do Ambiente

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Glossary

ASGM	Artisanal and small-scale gold mining
ATRC	Agronomic and Technological Research Center
BAT	Best available techniques
BET	Best environmental practices
BRI	Biodiversity Research Institute
BSAP	Biodiversity Strategy and Plan of Action
BSR	Basel, Stockholm and Rotterdam Conventions
CATR	Center of Agronomic and Technological
CCFL	Cold cathode lamps
CFC	Chlorofluorocarbons
CFL	Compact fluorescent lamps
CGD	Caixa Geral de Depositos
CIAT	Center for Research, Agronomy and Technology
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (with the threat of extinction)
CMS	Bonn Convention on the Conservation of Migratory Species belonging to wild fauna
COB	Convention on Biodiversity
COP	Conference of Parties
DGA	Environmental Directorate
DGRNE	General Directorate of National Resources and Energy
EEFL	Electronic electrode fluorescent lamps
EEZ	Economic Exclusion Zone
FAO	United Nations Food and Agriculture Organization
FNDC	Foreseen Nationally Determined Contributions
GDE	General Directorate for the Environment
GDP	Gross Domestic Product
GEF	Global Environment Facility
HPMV	High Pressure Mercury Vapor Lamps
IGG	Inventory of Gases caused by Greenhouse Effect
IMPAUWS	Integrated Management Plan of Action for Urban Solid Waste
IN1	Inventory of Level 1

kg	Kilogram
Km2	Square Kilometer
Kt	Kiloton
LFL	linear fluorescent lamps
m^3	Cubic Meters
MAP	Mercury- added products
MIA	Minamata Initial Assessment
MPWNRE	Ministry of Public Works, Natural Resources and the Environment
MPWNRE	Ministry of Public Works, Natural Resources, and the Environment
MW	Megawatt
N	No
NAP	National Action Plan
NCOC	National Combustion and Oil Company
NEC	Water and Electric Company
NGOs	Non-Governmental Organizations
NIS	National Institute of Statistics
NLTPS	National Long-Term Perspective Study
NPI-POPS	National Plan for Implementation of the Stockholm on Persistent Organic Pollutants
POPs	Persistent Organic Pollutants
RAMSAR	Convention on Wetlands (of International Importance, especially Waterfowl Habitats)
SB	General State Budget
SNC	Second National Communication
STP	Sao Tome and Principe
TON	Tons
UNCCD	United Nations Convention on Combating Desertification (in countries seriously affected by drought)
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UQBWI	Unified Questionnaire on Basic Welfare Indicators
USWMP	Urban Solid Waste Management Plan
Y	Yes

Foreword by Government Official

Mercury is a chemical substance that has been incorporated into various types of devices and materials, especially batteries, bulbs, electronic materials and all types of equipment used in the health field, among others. Mercury is a heavy metal that is extremely toxic for living beings. Extensive exposure weakens the immune system and can cause psychological or digestive disorders, loss of teeth, and cardiovascular or respiratory problems, among others.

Although São Tomé and Príncipe do not produce mercury, the country has imported it indirectly by way of various types of equipment used in different sectors of the country which contain mercury inside them.

Given the country's socioeconomic development, there exists a constantly increasing possibility that materials containing mercury are being imported, and in the future, will have various types of obsolete equipment containing this substance which is dangerous for the environment and for human health.

Given the danger of mercury for the health of our human population and the environment in general, since mercury is one of many persistent organic pollutants that may remain in the environment for decades before disappearing;

And given the fact that mercury may cause cancer in humans as well as other extremely dangerous illnesses and may contaminate extensive areas including rivers, oceans, shorelines, among others;

Therefore, São Tomé and Príncipe nationally ratified the Minamata Convention on Mercury in 2018 (note: as of the writing of this report, the country has not yet deposited the instrument of ratification with the United Nations and therefore is not yet a Party to the Convention), and together with organizations and international partners is going to create an action plan intended to control imports containing mercury by the country, and to regulate its management in São Tomé and Príncipe.

An inventory of mercury emissions in São Tomé and Príncipe that took place in July 2017, using 2015 as the year of reference, as well as a legal and regulatory baseline of this substance in the country carried out with the assistance of the United Nations Environmental Program and the Secretariat of the Minamata Convention constitute a fundamental tool for developing our strategy and action plan concerning mercury.

The country would never be able to make progress in advancing its strategy for the ecologically rational management of mercury without the assistance of the international community and focusing on international institutions that are dealing with issues of the environment on an international level.

Therefore, I would like to take this opportunity to thank all the international organizations who have assisted São Tomé and Príncipe in developing the strategies for dealing with the problem of mercury in our country, and especially the Secretariat of the Minamata

Convention, and the Biodiversity Research Institute, an executing agency for the United Nations Industrial Development Organization. I want to express the hope that this cooperation will last a long time both in terms of time and of space.



Arlindo de Carvalho
Director General for the Environment

Executive Summary

The Minamata Convention on Mercury is a global treaty that aims to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds to the environment. Mercury is a naturally occurring element and although various natural processes contribute to the release of mercury, the anthropogenic causes are the source of greatest concern. As mercury enters the environment, it persists and cycles through ecosystems. The World Health Organization lists mercury as one of the top ten (10) chemicals of major public health concern as it is toxic to both humans and animals.

The Minamata Convention on Mercury aims to implement measures to reduce the emissions and releases of mercury from products and processes, phase-out the use of mercury-added products and provide environmentally sound management of the storage and disposal of mercury waste. São Tomé and Príncipe supports the objective of the Minamata Convention to protect human health and the environment from the effects of mercury and; now that the Minamata Initial Assessment is complete, São Tomé and Príncipe e is taking steps to ratify the Convention.

Under the MIA Project, a national inventory of the major sources of mercury releases and emissions was conducted using the "Toolkit for Identification and Quantification of Mercury Releases" (Toolkit), made available by the Chemicals Branch of the United Nations Environment (formerly United Nations Environment Programme Chemicals). This project used the Level 1 Toolkit to determine a comprehensive assessment of mercury inputs and releases (the term “releases” is used to cover mercury emissions to air as well as releases to water, land and other output pathways). The methodology is based on mass balances for each mercury release source sub-category and so, estimations provided by the Toolkit have various uncertainties and complexities involved.

For São Tomé and Príncipe, the inventory primarily used 2015 data obtained through research, interviews and stakeholder questionnaires. However, for some sub-categories, data from 2015 was not available and therefore previous years or default calculations were used to develop estimates. Default calculations were based on the Toolkit assumptions and may have resulted in over- or under- estimations of the actual mercury input. Data gaps were also noted for some sub-categories where no estimations could be made such as the use and disposal of polyurethane products with mercury catalysts, cosmetics containing mercury, laboratory chemicals and equipment, miscellaneous mercury-added products, and informal waste burning. The completed inventory Toolkit spreadsheet; a listing of national project stakeholders; and templates of questionnaires used for data collection, are included as Annexes to this document.

Results of National Mercury Inventory

The results show that in 2015 the total estimated input of mercury was 940 kg/year and the activities which contribute the most for the input of mercury include (Figure 1):

(1) Use and disposal of products with mercury content (thermometers, electronic switches and relays, sources of light, batteries, equipment for measuring blood pressure, other pressure gauges, chemical lab products, and other lab and medical products) 916.9 kg/Year;

(2) Disposal of waste 7.3 kg/year;

(3) Informal dumping of general waste 4.8 kg/year; and,

(4) Other fossil fuel and biomass combustion 3.6 kg/year.

An exceedingly large proportion of the country's estimated mercury input is from batteries (81.3%), specifically mercury-oxide batteries (2.33 tons/year or 746 kg mercury/year).

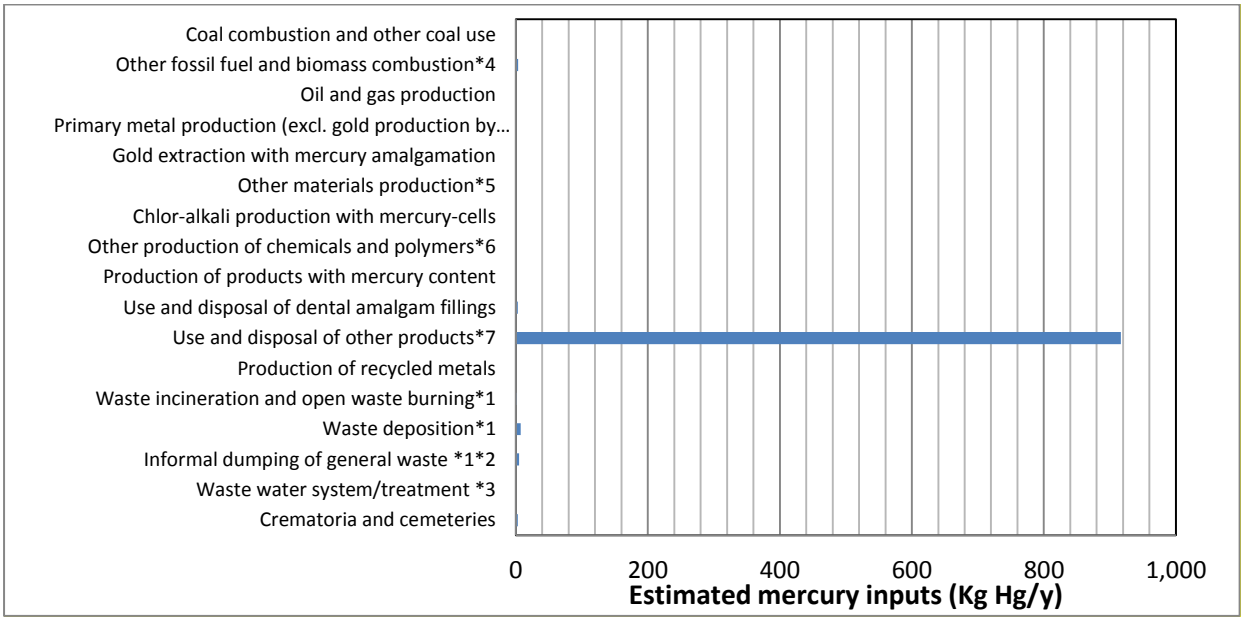

Figure 1. - Estimated amount of mercury input.

Estimated total mercury emissions in 2015 was 950 kg. Due to corrections for double counting, the estimated total input of mercury is not necessarily the same as the estimated total amount of releases. Results indicate that the greatest output of mercury into the environment is to air, which receives 250 kg Hg/year and is equivalent to 26% of the total emissions (Figure 2); this is followed by water (40 kg Hg/year), land (230 kg Hg/year), and general waste at 440 kg Hg/year (Figures 3-5).

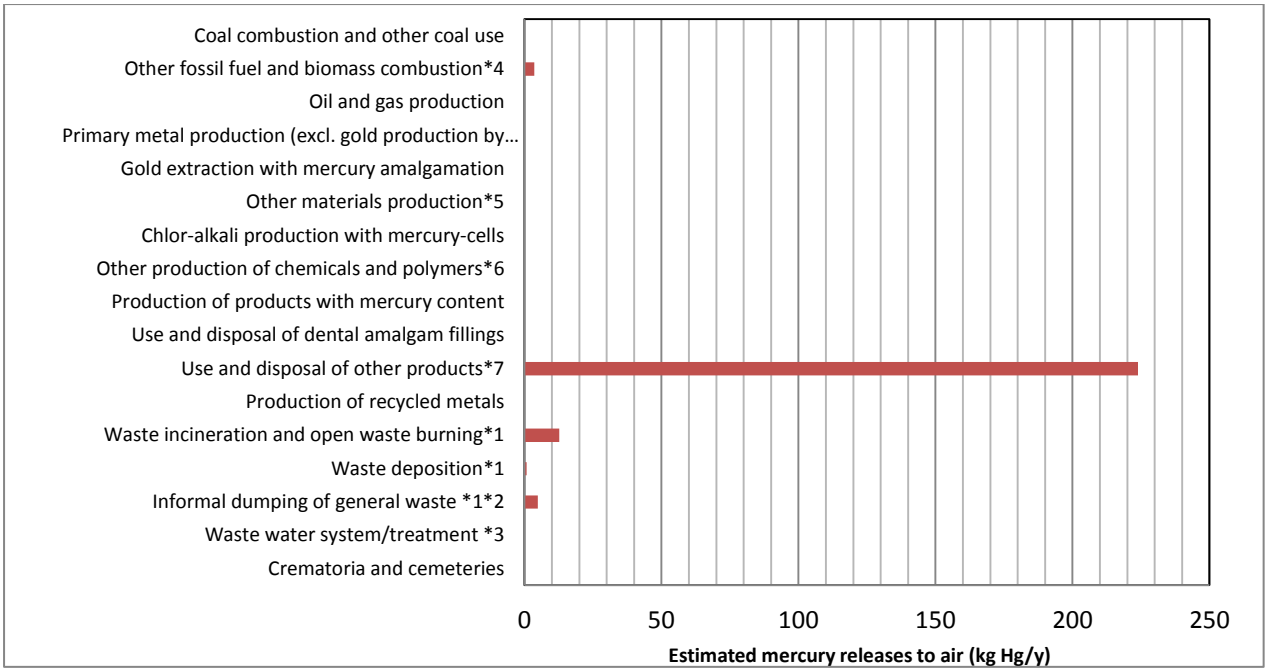

Figure 2. - Estimated mercury emissions into the air (kg Hg/year).

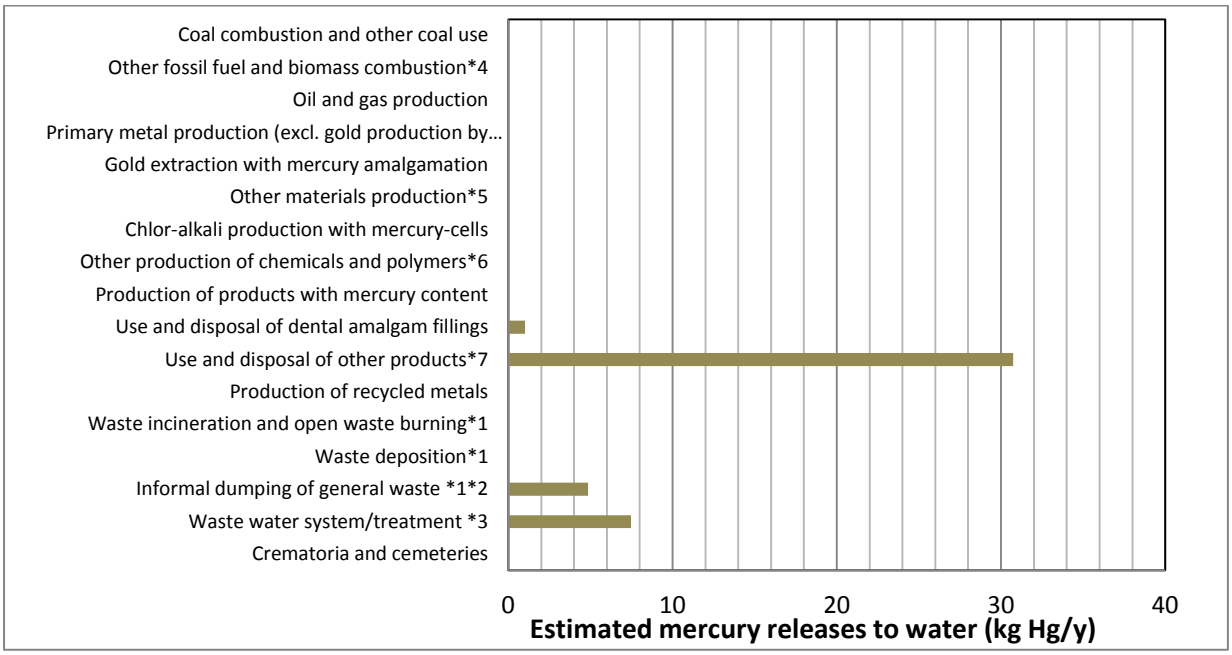

Figure 3. - Estimated mercury emissions into the water (kg Hg/year).

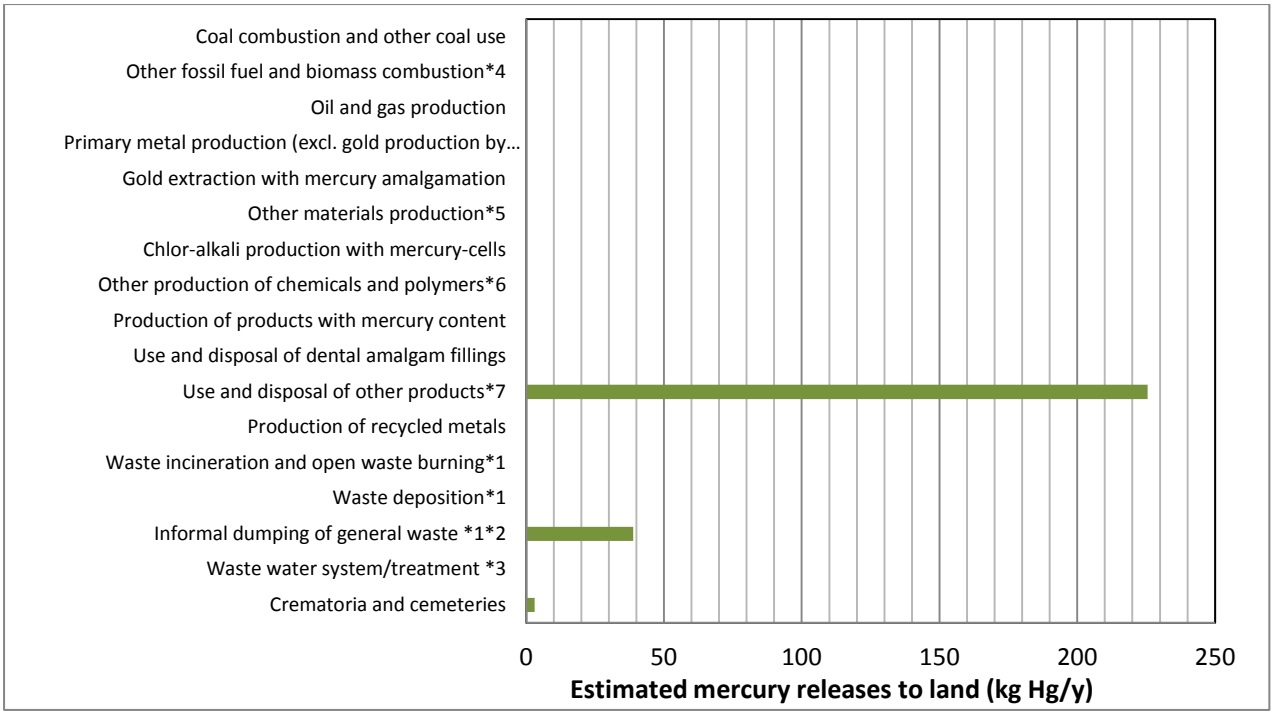

Figure 4. - Estimated mercury emissions into the land (kg Hg/year).

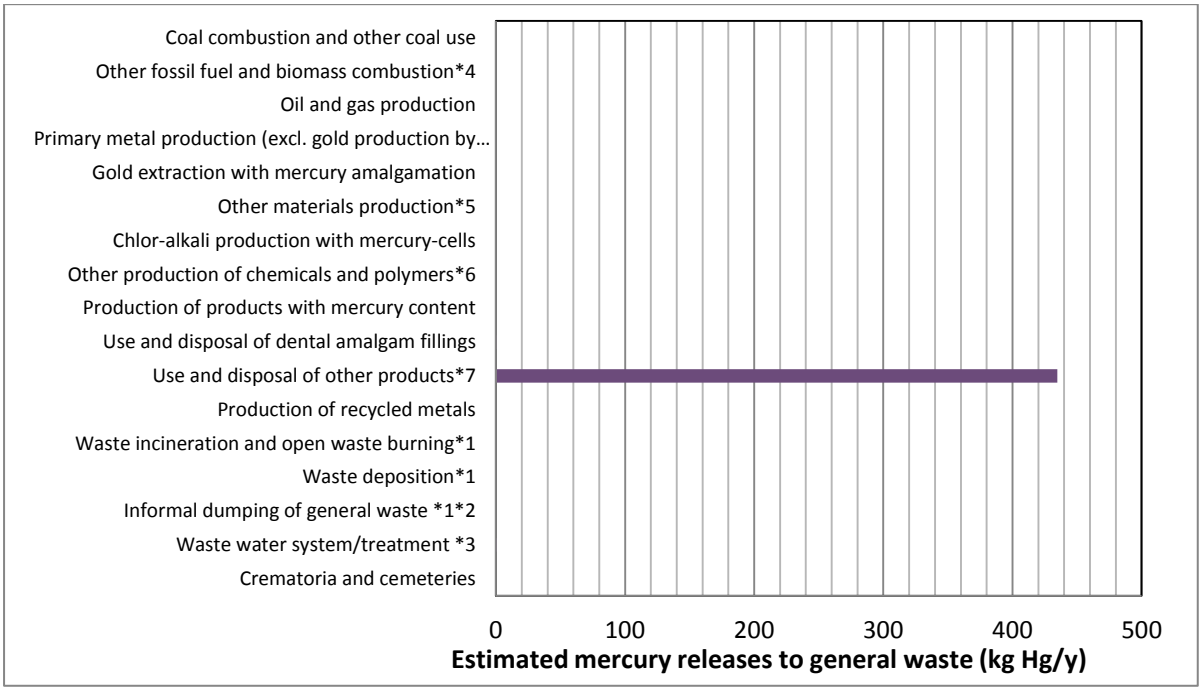

Figure 5. - Estimated mercury emissions into waste (kg Hg/year).

Individual sub-categories of mercury emissions that contributed the highest emissions of mercury to air were: the use and disposal of other products, informal dumping of general waste, waste deposition and, incineration of waste and open waste burning.

The origin of mercury in waste and waste-water produced in the country is due to mercury in products and materials. Therefore, fractions of waste and waste-water do not represent primary inputs of mercury. Waste and waste-water may, however, contain substantial mercury flows of an anthropogenic origin. The main mercury flow in waste and waste-water examined, was: waste deposition, informal waste disposal and the waste-water system/treatment.

In this inventory, default input factors were used for estimating mercury releases from general treatment of both waste and waste-water. Standard factors were based on data from literature about mercury content in waste and waste-water, and this data was only available for developed countries. Calculations indicate that the default input factors for general waste and waste-water may have overestimated the amount of mercury emissions from sources indicated above (see waste data section in this report). Consequently, follow-up work on releases from general waste and wastewater becomes a priority in the event there are technical and technological conditions for that purpose.

A detailed presentation of mercury inputs and releases for all types of mercury source types in the country will be illustrated in the sections of the report below. The UNEP Toolkit spreadsheet used in the development of this inventory is an integral part of this report and may be sent upon request.

DATA GAPS

The absence of compiled biomass consumption / combustion data for 2015 was one of the shortcomings in obtaining data regarding the energy sector. The lack of accurate and reliable information was also encountered relating to the amount of biomedical waste generated in hospitals and health centers.

One of the constraints about data obtained from the General Directorate of Customs is the non-specificity of information requested. Many imported and exported products are classified in groups, so it was not possible to estimate the quantity of products that may contain mercury through the data provided by this sector.

Data referring to the number of deaths registered in 2015 was obtained through the NIS, taking into account the unavailability of these through the civil registry and notary services.

The country has no studies on the calculation of input factors for mercury in solid waste or domestic waste-water. In addition, there are no emission factors for mercury and waste disposal or waste-water treatment, so it is necessary to develop an environmental monitoring system and monitoring program for the concentration of mercury in municipal solid waste and waste-water.

Strategies for Identification of Contaminated Sites and Assessment of Risks to Human Health

In terms of contaminated sites, the Minamata Convention has no mandatory obligations, but the development of strategies for identifying and assessing sites contaminated by mercury or mercury compounds is recommended.

Exposure to elemental mercury and mercury compounds can pose a higher risk to certain populations that are more sensitive to its effects or have an increased frequency of exposure. In Sao Tome, these groups include pregnant women and women of childbearing age, the fetus, newborns and young children, individuals with health-related preconditions, populations with a regular diet of contaminated high trophic level aquatic organisms, individuals who consistently use mercury-added products such as skin-lightening creams with mercury, people living in areas that are more susceptible to environmental contamination by mercury such as locations surrounding the main landfills and other disposal sites; and workers regularly exposed to mercury.

Skin-lightening creams are generally more popular among women than men, and the risk of using products containing mercury is therefore likely to be higher in the female population. Based on the lack of preliminary information gathered, a more in-depth study of the gender ratios for these professions would be required to accurately confirm and quantify patterns of exposure and at-risk populations, according to gender and occupation type.

FUTURE RECOMMENDATIONS

Considering the gaps of information found during the data collection process, it is necessary to implement strategies for collecting information in order to update this inventory, and to subsequently develop a new Level 2 inventory more closely representing the country's current situation.

Implementation is recommended of inter-institutional cooperation and partnership protocols between the General Directorate for the Environment and the General Directorate of Customs, in order to improve, monitor and quantify possible imports of goods that may contain mercury.

The General Directorate for the Environment, in partnership with the Autonomous Region of Principe, District Town Halls and local NGOs, should join forces with producers, distributors and consumers for selective collection of household hazardous waste (batteries, medications, domestic insecticide lamps, etc). In this case, it is recommended that campaigns to raise awareness be carried out, by the general community and by policy-makers and institutions, on the adverse effects of mercury on health and the environment, as well as initiatives on collecting, separating and eliminating hazardous mercury waste.

A new sub-category is proposed, "Water treatment for human consumption", such as exposure to contamination from anthropogenic and natural mercury found in sediment, may contain considerable amounts of mercury.

A new subcategory, "Disposal / Deposit of waste in an aquatic environment" has been suggested as a non-included tool. This situation has occurred in São Tomé and Príncipe, especially in the sea, and is something that needs to be monitored, because fish represents an important food source for the country.

It is also recommended to strengthen the capacity of institutions that are either directly or indirectly involved with the input and release of mercury, so as to provide more accurate information for the improvement of future inventories.

Major Findings of the Policy, Regulatory and Institutional Assessments

POLICY AND REGULATORY ASSESSMENTS

The Government of São Tomé and Príncipe has not signed the Convention but is taking steps towards ratification/accession.

São Tomé and Príncipe does not have activities related to (1) primary mercury mining; (2) by-product mercury from mining other metals; (3) decommissioning chlor-alkali facilities; (4) recovery of mercury from wastes and used products that contain mercury; and, (5) government or private mercury stocks. And, São Tomé and Príncipe do not manufacture mercury-added products, but it does import, use and discard many of these products. Therefore, measures are being taken to explore, identify, and define source types of mercury in São Tomé and Príncipe to comply with the Minamata Convention provisions.

Overall, the review of existing legislation indicates that current São Tomé and Príncipe legislation will require updating to meet the requirements of the Convention. Even though existing legislation was not specifically considered to deal with mercury phase out and control issues, they do cover some aspects of the Minamata Convention including mercury in food products and cosmetics. Moreover, there is a broad scope of environmental laws, or structured legislative frameworks that are now in place, in São Tomé and Príncipe that allow for the insertion of specific provisions when the need is identified.

São Tomé and Príncipe is a small country with a structured regulatory framework in place. São Tomé and Príncipe is a Party to the Basel, Rotterdam and Stockholm Conventions and will benefit from the existing regulations already in place for these conventions.

The legislative gap analysis identified gaps in the following areas that will need to be addressed for São Tomé and Príncipe to comply with the convention obligations: 1) mercury-added products phase out and management will need to be addressed according to Article 4 and Annex A of the Convention; 2) regulations covering solid waste will need to include mercury management, storage and disposal; and, 3) air quality control laws should be updated in order to make the regulations more robust.

In addition to these gaps, there is a need to increase awareness among key stakeholders and the public about mercury and its environmental and health impacts to ensure the effectiveness of proposed elimination programs. Establishing a coordinating entity to monitor the activities needed to adopt the Convention is recommended.

INSTITUTIONAL ASSESSMENTS

The main gaps that may hinder the implementation of the Minamata Convention in São Tomé and Príncipe include:

- No specific legal and regulatory framework for mercury at national level;
- No existing legislation establishing specific prohibitions or restrictions for chemicals and hazardous waste[1];
- Extensive experience exists within the government related to the management of specific chemicals, primarily pesticides. This experience provides important building blocks towards a more comprehensive approach towards chemicals management that includes mercury and mercury-containing compounds; and,
- There is a need for clear and deliberate coordination across government agencies that clearly define the roles and responsibilities of each agency as it relates to chemicals management.

Proposed Implementation Plan

The Implementation Plan contains the following measures and the action plan:

- Measures to strengthen the national institutional capability and the country's mercury management legislative framework **(Article 14)**;
- Action plan towards the management of mercury-contaminated sites **(Articles 10, 11, 12)**;
- Measures to promote information, awareness and education to the general public **(Articles 17, 18)**;
- Action plan towards the management of mercury-added equipment waste **(Article 4)**
- Measures to improve the national analytical capability, in addition to the mercury monitoring, research and development **(Articles 14, 19)**; and,
- Action plan towards the progressive reduction of mercury emissions **(Articles 8, 9)**.

The costs of the measures and actions proposed were estimated based on the amounts set forth in the action plan to implement the Stockholm Convention regarding persistent organic pollutants, given the similarity of the actions set forth in order to avoid duplication.

The total estimated amount is USD $877,000 for a 5-year period from 2019-2023.

[1] The National Assembly in São Tomé e Príncipe is currently developing legislation designed to be compliant with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. It is anticipated that these new laws and regulations will be adopted by the end of December 2017.

Priority Areas for Consideration in the Implementation of the Minamata Convention

In addition to the legislative and regulatory recommendations for consideration in the implementation of the Minamata Convention, other practical considerations may include:

- Promotion of mercury-free alternative consumer products (which are already widespread on the market). For example, the use of Light Emitting Diodes (LEDs) may be encouraged instead of mercury-containing compact fluorescent lightbulbs (CFLs). Public awareness on the hazards of mercury and the benefits of using mercury-free alternatives should be enhanced to encourage a higher substitution rate.

- Development of proper separation methods for the disposal of mercury-added products both at the household consumer level and in the landfill management procedures. The Government should ensure that the public has access to environmentally sound facilities/locations that could aid in the disposal process, as well as information and guidelines on disposing mercury-added products. A holistic approach for establishing suitable storage and disposal facilities in São Tomé e Príncipe to manage mercury waste as well as other hazardous wastes from all sectors would prove beneficial in the overall environmentally sound management of waste.

BACKGROUND

The Minamata Convention on Mercury, opened for signature in October of 2013 and entered into force on August 16, 2017, is the first global, legally-binding agreement specifically designed to address contamination from a heavy metal. Under the Minamata Convention, individual countries are charged with protecting human health and the environment from the risks of mercury exposure by systematically controlling mercury emissions and releases, including phasing out the use of mercury in certain products and processes.

The Minamata Convention draws attention to a global and ubiquitous metal that, although naturally occurring, has wide uses in everyday objects and is released into the atmosphere, soil and water from various sources. Controlling anthropogenic releases of mercury throughout its life cycle has been a key factor in shaping the obligations under the Convention.

Key highlights of the Minamata Convention include the prohibition of new mercury mines, the elimination of existing mercury mines, the elimination and reduction of the use of mercury in various products and processes, control measures on emissions into the air and releases to land and water, and regulation of the small-scale, artisanal gold mining informal sector. The Convention also addresses the temporary storage of mercury destined for allowed uses, the disposal of mercury wastes, contaminated sites and health strategies.

The International Negotiating Committee (INC) and the Global Environmental Facility

(GEF) have developed a series of pre-ratification activities, called Minamata Convention Initial Assessments (MIA), that are designed to assist countries with pre-ratification and early implementation activities of the Convention. MIAs include four key components or outputs:

1. Identification of institutional gaps and establishment of a national steering committee to coordinate activities related to the Convention;
2. Review and identification of gaps in existing legislation related to mercury, and identification of needed policy reforms for preparation of the implementation of the Minamata Convention;
3. Development of a National Mercury Profile that includes key sectors identified for intervention and investment to reduce, and where possible eliminate, mercury use, release and emissions; and,
4. Development of communication tools and strategies for informing all relevant stakeholder groups, including governmental agencies, NGOs, academia, public and private sectors, on activities related to the Convention.

The Government of São Tomé e Príncipe has not signed the Convention but is taking steps towards ratification/accession. In fact, São Tomé e Príncipe ratified the Minamata Convention on a national level on December 7, 2017, after approval from the National Assembly on November 22nd. The country must now deposit its instrument of ratification/accession at the United Nations Headquarters. The Convention will officially enter into force in the country 90 days after its deposit. The overall objective of this Minamata Convention Initial Assessment (MIA) is to assist São Tomé e Príncipe in completing pre-ratification activities under the Minamata Convention in order to enable policy and strategic decision-making and to prioritize areas for future interventions.

The MIA activities in São Tomé e Príncipe will help lay the groundwork for future efforts to significantly reduce the exposure of mercury to human health and the environment. It is expected that patterns of mercury emissions and releases will be assessed to facilitate the design of targeted interventions, which in turn provide local and global benefits through reduced emissions to the environment. Through assessment of both legislative and institutional capacity development and enhancement at the national level, potential contamination risks from the use of mercury-added products will also be minimized. Lessons learned and experience gained from national inventory development, as well as national and regional capacity building, can be used as a model approach to be replicated in other countries and regions to effectively address similar issues.

This report is part of the UNIDO-GEF Project entitled "Minamata Convention: Initial Assessment in São Tome and Príncipe" with Biodiversity Research Institute (BRI) as the Executing Agency, working in close collaboration Ministry of Public Works, Natural Resources, and the Environment (MPWNRE), through the General Directorate of Environment of São Tomé and Príncipe.

Chapter 1: National Background Information

1.1 Country profile: São Tomé e Príncipe

1.1.1 GEOGRAPHY AND POPULATION

São Tomé and Príncipe (STP) is a small island State with an area of 1,001 km^2 (247,351 acres) comprised by two islands and several islets, located in the Gulf of Guinea.

With a total population of 187,356 (National Statistics Institute (INE), 2012) and an annual growth rate of 2%, over 65% of the population live below the poverty line, with less than 50% having access to electricity services. Its gross domestic product (GDP) growth of around 4% is not enough to meet the high needs for development. On the other hand, more than 90% of the State General Budget (SGB) comes from foreign aid, and the debt rate is high: 70% of GDP (INDC Report, 2015).

The Country is comprised by four regions: North, South, Center and the Príncipe Autonomous Region, which, in turn, is divided into seven districts, six of which are in São Tomé Island, namely, Água-Grande, Mé-Zóchi, Cantagalo, Caué, Lembá e Lobata, and one in the Príncipe Island.

In 2012, the population distribution by gender showed a balanced trend, with a male population of 49.7% versus a female population of 50.03%. (GPHC 2012. INE)

1.1.2 POLITICAL, LEGAL AND ECONOMIC PROFILE

With regards to its political framework, the Democratic Republic of São Tomé and Príncipe consist of a semi-presidential regime, whereby the President of the Republic is the Head of State, and the Prime Minister is the Head of Government with a multi-party system.

The executive power is exercised by the Government, with the legislative power being under the responsibility of the Government and the National Assembly. The judiciary is independent from the legislative and the executive powers, with it thoroughly under the exclusive jurisdiction of courts.

Agriculture and fishing are the Country's main activities, with cocoa being its largest export product, accounting for about 90%. Trade is the economic sector most contributing to GDP, followed by agriculture, transport, communications and construction.

According to PRSP II, 2012-2016, the economic activity performance has been strongly dominated by the tertiary sector. From 2002 to 2011, this sector grew by an average of 6% and represented 66.4% of GDP. This was mainly driven by the trade, transport, storage and communications, and public administration sectors.

The secondary sector represented 16.4% of GDP on average, having risen 2.6% on average during the same period. Within the secondary sector, the lowest records were recorded in manufacturing industries. Ultimately, the primary sector grew by 2.3% on average, becoming the sector least contributing to GDP.

1.1.3 Profiles of Economic Sectors

The Agriculture Sector

Food production in São Tomé and Príncipe has been a major concern for the State. A few limiting factors, such as population growth, diseases and pests, lack of reserves to import food, production credit (cultural diversity), marketing, distribution, training, research and development, cause food production not to be sufficient to meet the basic needs of the population.

The Country has a small insular economy. The agriculture sector has performed well, with cocoa, coffee and palm oil exports having increased in recent years. However, it has not matched the higher imports.

The Fishing Sector

Fishing is the major activity of coastal communities and plays an important role in generating employment and household income. This activity has contributed 4.7% to GDP and employs about 15% of the active population. In general, artisanal anglers are responsible for the fish supply to the population (Quaresma, S., 2017).

The most applied type of fishing in the country is artisanal fishing. Canoes are built of wood using traditional methods, while semi-industrial fishing involves larger fiberglass motor-driven boats. Authorities sell licenses for industrial fishing to entities based in the European Union and Japan. During artisanal fishing, some anglers use inappropriate or prohibited fishing gear and techniques, including chemicals, explosives or grenades.

The Trade Sector

Trade has a great importance in the national economy and represents about 28% of GDP. According to PRSP II, 2012-2016, disorganization of the commercial sector, obsolescence of enforced legislation, lack of mechanisms to safeguard consumers, continuous decapitalization of traders, unfair competition in the sector, weak purchasing power of populations, difficulty in implementing agreements entered into with friendly neighboring countries within the field of export of domestic products, and the high cost of transport are, among others, the factors that have kept trade from thriving.

Most goods consumed in the country are imported; there is a link between fluctuations of internal and international prices, with oil prices being the most notable exception since they

are fixed. Inflation risks stemming from the monetary aspect have been substantially reduced after the Country has indexed its currency to the Euro.

The Energy Sector

According to SCN, 2011, São Tomé and Príncipe is a highly deficitary country. The hydroelectric power produced in small plants represents a reduced portion of the country's actual needs (20% in 2014). Electricity production in the country in recent years has been mainly based on fossil fuels, namely, gas and oil (80% in 2014).

Electricity supply is unreliable, with its distribution reaching only about 65% of the population. Emae (the water and electricity company) has currently 12 MW of installed power, 80% of which come from thermal plants and 20% from hydroelectric plants. However, availability has increased to 15 MW and will continue to increase along with the economic growth in the coming years.

Firewood, coal and oil (kerosene) remain the main sources of energy for domestic consumption, food preparation and use in small industries (bakery/catering). According to INE data referred to in SCN 2012, in 2005 approximately 53.769 kt of firewood were consumed, a part of which, 16,452 kt are destined for coal production. Coal consumption was 4.432 kt.

The Tourism Sector

Tourism is the main component of services exports, and its current contribution as a source of foreign reserves is higher than that of product exports. However, the contribution of tourism in GDP remains poor, despite the country's natural potential and great cultural diversity (PRSP II, 2012-2016). Tourism is an important increasing activity, but it cannot support the growth of the entire economy (Quaresma, S. 2017).

The sector shortages and problems are:

- Inadequate or obsolete legislation;
- Lack of a professional school in tourism and hospitality for training and qualification of human resources in the country;
- Lack of incentives to encourage investment in the tourism sector;
- Need for creation of basic infrastructures (road, water and electricity and telecommunications) in the construction sites of hotel plants, and,
- Weak tourism attractions (few nightlife options, lack of theaters and cinemas).

The Industrial Sector

The industrial sector of STP is quite incipient, accounting for only 4% of GDP in 2014. The industrial sector, after having stagnated and even regressed, made few contributions, with the

existing industries being negligible and, above all, showing irregular production (soap, beer, baking) (PRSP II, 2012-2016).

This sector depends on external industries, with regards to the provision of technology and equipment and supplies and, therefore, reserves to bear such costs. Associated with this, is inadequacy or even lack of qualified human resources to ensure its proper functioning.

The Health Sector

According to (PRSP II, 2012-2016) the health sector is characterized by insufficiency of health infrastructures, low quality of the services provided, poor distribution across the country and poorly motivated human resources, as well as insufficient specialists in different areas.

Access to healthcare is very uneven by region. The population coverage in basic health structures (health centers and healthcare units) is relatively satisfactory as far as physical infrastructures are concerned. The medical personnel coverage is also satisfactory.

There is approximately one doctor for 3,000 inhabitants (including doctors and foreign experts), one nurse for every 900 inhabitants, and one midwife for every 168 pregnant women. However, its distribution across the Country is not even. It is important to note that, because of poor working conditions, insufficient availability of medicines, lack of incentives and extremely low wages, in general, the personnel work motivation is low (PRSP II, 2012-2016).

Health services have no well-defined medical waste management circuits, with contaminated medical waste having been found mixed with domestic and commercial waste.

The Water and Sanitation Sector

Although there is no ongoing monitoring of the quality of water resources, data suggests outbreaks of water contamination of rivers and sources of supply to populations, resulting from the lack of sanitation infrastructure and the use of agricultural chemicals (Participatory Strategy for Water and Sanitation of São Tomé e Príncipe for 2030, 2010).

According to QUIBB (2005), 96.8% of the population have access to water and 88.7% have access to running water. Nonetheless, access to drinking water is much lower. In fact, coverage in 2001 was 19%, and 38% in 2006. In rural and semi-urban areas, the rate of access to drinking water increased from 6.4% to 12.6% between 2001 and 2006, while in urban areas the coverage ranged, on average, 29% in 2001 to 57.2% in 2006.

With regard to sanitation, the major problem identified by the communities was inadequate hygiene behaviors by the populations. The main causes identified leading to such behaviors are weak community awareness, absence and lack of sanitation infrastructures, weak financial resources, poor water availability, structure of houses not enabling installation of latrines and lack of maintenance.

With regard to urban solid waste, most domestic producers of urban solid waste use the collection system of District Chambers, depositing waste in containers (boxes and tanks) whenever they are made available for such purpose. A minority of producers in this class subcontract private services for collection and transports to final disposal sites. Some domestic producers transport their own waste to dumps (such as PAGIRSU 2011-2016).

It is estimated that a large percentage of domestic producers deposit their waste in the ground of their own homes or surrounding areas, which become mini-dumps and waste accumulation points. This situation is very common in less urbanized and more remote areas.

Retail trade produces waste similar to the domestic kind and uses the same system of domestic producers. Many traders use the services of providers in this area or transport the waste to existing dumps.

Água Grande and Mé-zochi districts concentrate around 90% of all commercial establishments on the island. Yet, "traders" in the informal sector need to be taken into account, since they are also waste producers, especially of carton and plastic packages.

1.2 Environmental Overview

Because São Tomé and Príncipe is a small island State, it has higher difficulties in waste management, due to its location, number of inhabitants and existing infrastructures. Proper waste management in the country is especially important given the size of the territory and the need to enhance environmental sanitation and development levels in the country. Despite the fact that 30% of the country was legally established as a protected zone, a high level of environmental degradation resulting from anthropogenic actions has been found, such as illegal tree logging, illegal raw material extraction (especially sand and stone), deforestation and open-air burning. The effects of climate change are being already felt in the country with disastrous consequences on fishing communities, such as flooding, loss of human lives and loss of assets.

The Country is not a producer of mercury, but this metal can be found mainly in commercialized products, such as batteries, hospital and meteorological equipment, which when discarded can undoubtedly cause negative environmental impacts, with harmful consequences on human and environmental health.

The ecological and rational management of waste containing mercury, as well as environmental awareness and education campaigns targeting the most vulnerable and disadvantaged communities are priority actions in implementing the Minamata Convention in São Tomé e Principe.

Chapter II. Mercury Inventory and Identification of Emissions and Resources

2.1 Introduction

Mercury is a metal that is naturally present in the environment and can be found in a liquid state under normal pressure and temperature conditions. It has a low melting point (-38.87 °C) and, therefore, is a white-silvery metal liquid at room temperature, being given the name "elemental" or "metallic" mercury - Hg or HgO (Schhute et al., 1994; WHO, 2003)

It comes in three forms called "types": elemental, inorganic and organic mercury. It is recognized as a chemical substance that produces very significant adverse neurological effects on living creatures and is one of the direct causes of children born with birth defects.

According to R. Baiana Tecnol. 2001;16(3): 87-104, considering the characteristics of mercury lipo-solubility, the possibility of crossing hemato-encephalic and placental barriers, as well as the teratogenic effect, organic mercury compounds are the most relevant from a toxicological point of view.

Unlike metals which are essential to life, mercury is not part of the normal constitution of human beings and does not provide any nutritional or biochemical function. Thus, in whatever form it occurs, when absorbed continuously, even in small amounts, poses a serious risk not only to humans, but all living things in general. Mercury has a cumulative effect, thus becoming, the cause of chronic and progressive metabolic and cellular disturbances for those individuals exposed to it (ATSDR, Azevedo et al., 2003)

Some microorganisms and natural processes can change mercury in the environment from one form to another. The change of inorganic mercury compounds to methylmercury deserves attention due to its bioaccumulation and biomagnification in freshwater and saltwater fish, as well as marine mammals reaching levels higher than those found in the environment.

The methylation process in river sediments contaminates fish and other organisms, creating a potential danger of exposure to methylmercury for the entire food web.

Its introduction into ecosystems can occur naturally or as a result of human activity. When discarded among general waste, it can contaminate the environment and may be transformed by living organisms into highly toxic organic mercury.

Recognizing the adverse effects and harm caused by this substance and taking into account lessons learned from the Minamata disaster in relation to mercury pollution, all countries are encouraged to sign the Minamata Convention on mercury pollution in order to implement actions that are aimed at mitigating the effect of mercury, on both health and the environment.

In response to growing international concern, the United Nations Environment Programme (UNEP) formalized the Global Mercury Partnership in 2008, to systematically eliminate

human-induced mercury releases through strategic intervention, and collaboration with national governments.

From 2009, the Administration Board of UNEP entered into negotiations for the preparation of a comprehensive legally binding instrument on mercury to safeguard both human and ecosystem health. Negotiations were successfully concluded in January 2013, in which 147 governments agreed to the draft text for the Convention on Mercury. At the Plenipotentiary Conference held from 9th to the 11th of October 2013, in Minamata and Kumamoto, Japan, the "Minamata Convention on Mercury" was formally adopted and ready to be signed.

The Minamata Convention takes a step-by-step approach to reducing and, whenever possible, eliminating use of mercury in key industrial sectors. Provisions for the Convention include elimination deadlines for sources of supply and trade, mercury-added products and manufacturing processes in which mercury or mercury compounds are used. Based on these objectives, the Convention is designed to systematically reduce emissions and stop the release of waste into land and water and phase out the use of mercury when alternatives exist.

In São Tomé and Príncipe, mercury can be found mainly in mercury-marketed products such as batteries, hospital and meteorological equipment, etc. These products are imported and, when obsolete, are disposed of improperly in the environment.

In this sense, there is a need for the country to have a systematic inventory or study, regarding emissions and releases of mercury at the national level. However, mercury was discussed very little in the development of the Plan for implementation of the Stockholm Convention.

2.2 Methodology

The Mercury Inventory in São Tomé and Príncipe consisted of three stages: the identification of sources of mercury emissions and releases; the collection of data; and the preparation of the Mercury National Profile.

2.2.1 Identification of mercury emission sources

At this stage, a bibliographical survey and collection of all information at the national level on mercury emissions was carried out to identify possible emission sources.

2.2.2 Data Collection

For collection of relevant information, letters of request were sent to various public and private institutions that were correlated with the entry, issue, commercialization and processing of possible mercury-containing products that have been imported or exported, and meetings were conducted with the various institutions for clarification and to obtain relevant information.

2.2.3 Preparation of the national profile on mercury

After the information was collected, the national profile on mercury releases in São Tomé and Príncipe was drawn up. For this purpose, the "Toolkit for Identification and

Quantification of Mercury Releases" developed by the United Nations Environment Program (UNEP), Inventory - Level I (Version 1.02, April 2015), was used.

This Toolkit is based on the mass balance approach for each mercury release source type. In order to calculate the amount of mercury in the Inventory, the toolkit uses pre-determined input and output distribution factors. These factors were derived from available sources of data on mercury inputs and outputs.

Considering the lack of data relevant to the study on the part of some institutions, some estimates were made based on current knowledge, as well as calculations based on collected data.

2.3 Summary of mercury releases, stockpiles, and supply and trade

2.3.1. MERCURY RELEASE SOURCE TYPES PRESENT

According to the categories of mercury emission sources defined in the Toolkit for Identification and Quantification of Mercury Releases, (Level 1 - Version 1.3, April 2015), the existing sources of releases in the country were identified. Chart 1 shows the release sources identified.

Chart 1. Mercury emission sources in São Tomé and Príncipe.

Categories	**Source present?**
	Y/N?
Energy Consumption	
Combustion of coal in large power plants	N
Other uses of mineral coal	N
Combustion/ use of petroleum coke and heavy oil	N
Combustion/ refining/ use of diesel, oil and kerosene	Y
Combustion of biomass for energy and heat production	Y
Combustion of charcoal	Y
Fuel Production	
Oil extraction	N
Oil refining	N
Extraction and processing of natural gas	N
Primary Metal Production	
Extraction and initial processing of primary mercury	N
Production of concentrated zinc	N
Production of concentrated copper	N
Production of concentrated lead	N
Extraction of gold by methods other than mercury amalgamation	N
Production of bauxite (aluminium production)	N
Production of primary metals (production of gas iron)	N
Gold extraction through amalgamation - no use of retort	N
Extraction of gold through amalgamation - with the use of retort	N
Production of Other Materials	
Production of Cement	N
Pulp and paper production	N
Production of Chemicals and Polymers	

Production of chlorine and alkali with mercury cells	N
Production of vinyl-chloride monomer (VCM) (mercury used as catalyst)	N
Production of acetaldehyde (mercury used as catalyst)	N
Production of products with mercury added	
Thermometers with mercury (medical, air, laboratory, industrial etc.)	N
Electrical switches and relays with mercury	N
Light sources with mercury (fluorescent, compact, and others; see practical guide)	N
Batteries with mercury	N
Manometers and meters with mercury	N
Herbicides and pesticides with mercury	N
Paint containing mercury	N
Creams and soaps with chemical substances of mercury in order to lighten skin	N
Use and disposal of products with mercury added	
Dental amalgam	Y
Thermometers	Y
Electrical switches and relays with mercury	Y
Sources of light containing mercury	Y
Batteries with mercury	Y
Polyurethane (PU, PUR) produced with mercury catalyst	N
Paint with mercury preservatives	N
Creams and soaps with mercury chemical substances to lighten the skin	N
Medical blood pressure gauges (mercury sphygmomanometer)	Y
Other manometers and measures with mercury	Y
Chemical substances for laboratory use	Y
Other medical and laboratory equipment containing mercury	Y
Production of recycled metals	
Production of recycled mercury (secondary production)	N
Production of recycled rusty metal (iron and steel)	N
Incineration of waste	
Incineration of domestic and municipal waste	N
Incineration of dangerous waste	N
Incineration and open burning of medical waste	Y
Incineration of sewage sludge	N
Open burning of waste (landfill and informal burning)	Y
Waste disposal into landfill and waste water treatment	
Controlled landfill disposal / deposit	Y
Informal disposal (trash) of waste in general	Y
Waste-water treatment system	Y
Crematoriums and cemeteries	
Crematorium	N
Cemetery	Y

Sources of mercury emissions identified in the country were:

- Combustion /refining/ use of diesel, oil and kerosene.
- Combustion of biomass for energy and heat production.
- The combustion of charcoal.
- Thermometers.
- Electrical switches and relays with mercury.

- Dental Amalgams
- Sources of light with mercury.
- Batteries with mercury.
- Sphygmomanometers for measuring blood pressure (mercury sphygmomanometer).
- Other manometers and measures with mercury.
- Incineration and open burning of hospital waste.
- Open burning of waste (landfill and informal burning).
- Controlled / deposit landfill.
- Informal landfill (trash) of waste
- Waste-water treatment system
- Cemeteries.
- Chemical substances for laboratory use.
- Other medical and laboratory equipment containing mercury,

2.3.2 Other sources of mercury emission not quantified in the Inventory - Level 1

The miscellaneous mercury release source categories listed in Chart 2 were not quantified in this inventory and can therefore be prioritized in subsequent inventories.

Chart 2. Miscellaneous sources of mercury releases not quantified in the Inventory - Level 1

Category	**Source present?**
	Y/N?
Combustion of bituminous shale	N
Combustion of peat	N
Production of geothermal energy	N
Production of other recycled materials	N
Production of lime	Y
Production of light aggregates (clay items burned for construction purposes)	N
Production of other chemicals (chlorine and sodium hydroxide) in chlorine-alkali plants using mercury cell technology	N
Production of polyurethane with mercury catalysts	N
Preparation of seeds with mercury chemicals	N
Infrared Detection Semiconductors	N
Bougie and Cantor tubes (doctors)	N
Educational use	Y
Gyroscope with mercury	N
Vacuum pumps with mercury	Y
Mercury used in religious rituals (amulets and other uses)	N
Mercury used in traditional medicines (Ayurvedic and others) and homeopathic medicines	N
Use of mercury as a coolant in certain cooling systems	Y
Lighthouses (levelling bearings in maritime navigational lights)	Y
Mercury in bearings of rotating mechanical parts in, for example, old sewage treatment plants.	N
Tanning	N
Pigments	N

Products for gilding and engraving steel	N
Certain types of colored photograph paper	Y
Softeners in shotguns	Y
Explosives (mercury-fulminated a.o.)	Y
Fireworks	Y
Executive toys	Y

2.3.3. SUMMARY OF MERCURY INPUTS TO SOCIETY

The total mercury input was estimated at 940 kilograms (kg / Year). In order to avoid double counting of mercury inputs from waste and products in the total, only 10% of the mercury input from the sources of waste incineration, waste disposal and informal discharge was included in the total for mercury inputs. This 10% represents approximately the mercury input to waste from materials that were not quantified individually in the Level 1 Inventory of this Toolkit (Chart 3).

Chart 3. Summary of mercury inputs.

Category	Source present?			Estimated input of mercury kg Hg/ y
	Y/N?	Activity rate	Unit (t, tonnes)	Standard Estimate
Consumption of energy				
Combustion/ use of diesel, oil, kerosene, LPG and other light or medium distillates	Y	40,469	Consumption of fuel, t/ year	0
Combustion of biomass for the production of energy and heat	Y	70,535	Biomass Combustion, t/ year	2
Combustion of Charcoal	Y	10,317	Combustion of Coal, t/ year	1
Use and disposal of products with mercury added				
Dental Amalgam	Y	189,819	Number of inhabitants	3
Thermometers	Y	5550	Items sold/ year	
Electrical switches and relays with mercury	Y	189,819	Number of inhabitants	16
Sources of light containing mercury	Y	159,200	Items sold/ year	
Batteries with mercury	Y	14	Batteries sold t/ year	917
Paint with mercury preservatives	N	0	Paint sold, t/ year	
Creams and soaps with mercury chemical substances to lighten the skin	N	0	Creams or soaps sold, t/ year	
Pressure gauge for measuring blood pressure (mercury sphygmomanometer)	Y	369	Items sold/ year	
Other manometers and equipment with mercury	Y	189,819	Number of inhabitants	1
Laboratory chemicals	Y	189,819	Number of inhabitants	1
Other medical and laboratory	Y	189,819	Number of inhabitants	5

equipment with mercury				
Incineration of waste				
Incineration and open burning of biomedical waste	Y	27	Incinerated waste, t/ year	1
Open burning of waste (in landfills and informal landfills)	Y	2,425	Burned waste, t/ year	12
Waste disposal into landfill and waste water treatment				
Controlled / disposal landfill	Y	16,628	Waste disposal in trash, t/ year	73
Informal landfills (trash) disposal in general *1	Y	11,085	Waste disposed informally, t/ year	48
Waste-water treatment system	Y	1,579,674	Waste-water, m/ year	8
Crematories and cemeteries				
Cemeteries	Y	1,226	Bodies buried / year	3
TOTAL quantifiable entries				**940**

The estimated quantities include mercury in products which have also been accounted for in each product category. To avoid double counting the emission of mercury into the soil from the disposal of undifferentiated waste was automatically subtracted from the Total.

The estimated entry and emission for water include quantities of mercury, which have also been accounted for in each category of origin. To avoid double counting of entry and emission to water, the waste-water system / treatment was automatically subtracted from the Total.

The total number of entries is not necessarily equivalent to the total number of outputs, due to double counting corrections.

2.3.4 SUMMARY OF MERCURY RELEASES

The estimated total of quantified mercury releases were 940 kg (kg Hg/year). The mercury release estimates for air were 250 kg (Hg/year), water was 40 kg (Hg/year), and undifferentiated waste was 440 kg (Hg/year) (Chart 4).

Chart 4. Summary of mercury releases.

Category	Estimated mercury emissions, standard estimate, kg Hg/ y					
	Air	Water	Land	By-products and impurities	General waste	Sector specific waste treatment/disposal
Consumption of Energy						
Combustion/ use of diesel, oil, kerosene, LPG and other small to medium distillates	0.2	0.0	0.0	0.0	0.0	0.0
Combustion of biomass for the production of energy and heat	2.1	0.0	0.0	0.0	0.0	0.0
Combustion of charcoal	1.2	0.0	0.0	0.0	0.0	0.0
Use and disposal of products with mercury added						
Dental Amalgam	0.1	1.0	0.1	0.1	0.5	0.5
Thermometers	13.2	19.8	13.2	0	19.8	0
Electrical switches and relays with mercury	4.8	0.0	6.4	0.0	4.8	0.0
Sources of light containing mercury	1.0	0	1.0	0	1.3	0
Batteries with mercury	198.9	0	198.9	0	397.8	0
Paint with mercury preservatives						
Creams and soaps with mercury chemical substances to lighten the skin						
Pressure gauge for measuring blood pressure (mercury sphygmomanometer)						
Other manometers and equipment with mercury	0.1	0.2	0.1	0.0	0.2	0.0
Chemical laboratory products	0.0	0.4	0.0	0.0	0.4	0.4
Other medical and laboratory equipment with mercury	0.0	1.5	0.0	0.0	1.5	1.5
Incineration of waste						
Incineration and open burning of biomedical waste	0.6	0.0	0.0	0.0	0.0	0.1
Open burning of waste (in landfills and informal landfills)	12.1	0.0	0.0	0.0	0.0	0.0
Waste disposal into landfill and waste water treatment						
Landfill disposal and controlled disposal	0.7	0.0	0.0	-	-	-
Informal disposal of general waste	4.8	4.8	38.8	-	-	-
Waste-water treatment system	0.0	7.5	0.0	0.0	0.8	0.0
Crematories and cemeteries						
Cemeteries	0.0	0.0	3.1	-	0.0	0.0
TOTAL number of quantified emissions	**250.0**	**40.0**	**230.0**	**0.0**	**440.0**	**0.0**

The estimated quantities of products which contain mercury have also been accounted for in each product category. To avoid double counting, the emission of mercury into the soil from deposited undifferentiated waste was automatically subtracted from the Total.

The estimated entry and emission for water include quantities of mercury, which have also been accounted for in each category of origin. To avoid double counting the input and emission to water, the waste-water system/ treatment was automatically subtracted from the Total.

The most significant sources of mercury emissions to the air were the use and disposal of other products with mercury added (224 kg Hg/ year) (Figure 6).

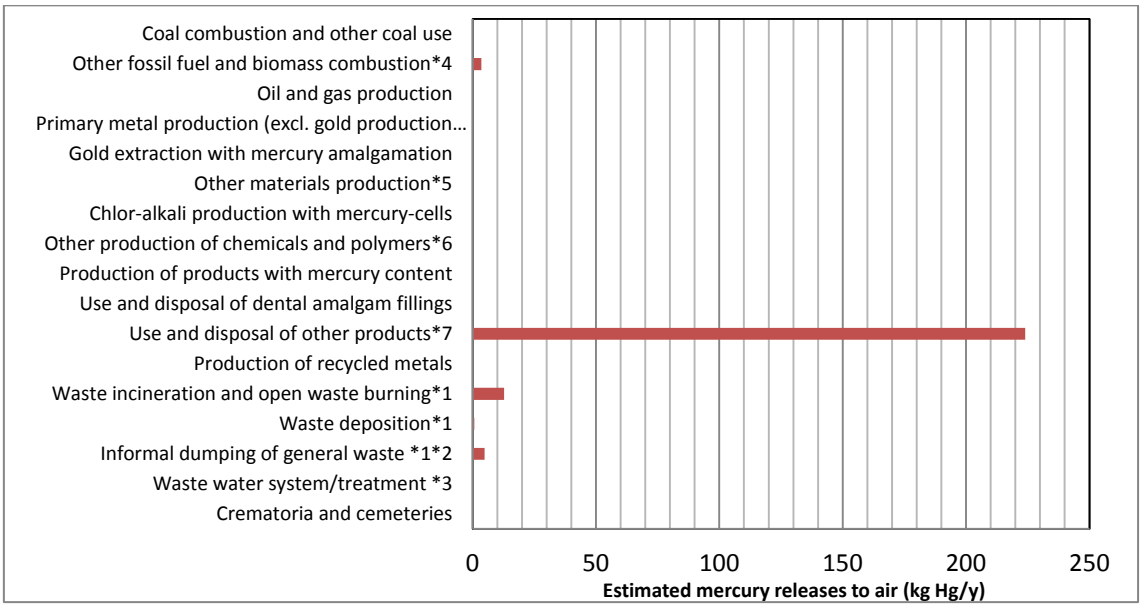

Figure 6. Estimated mercury releases to air.

The most significant sources of mercury releases to water were use and disposal of other products (31 kg Hg/ year), the waste-water treatment systems (7.46 kgHg/ year), and informal disposal of undifferentiated waste (4.85 kg Hg/ year) (Figure 7).

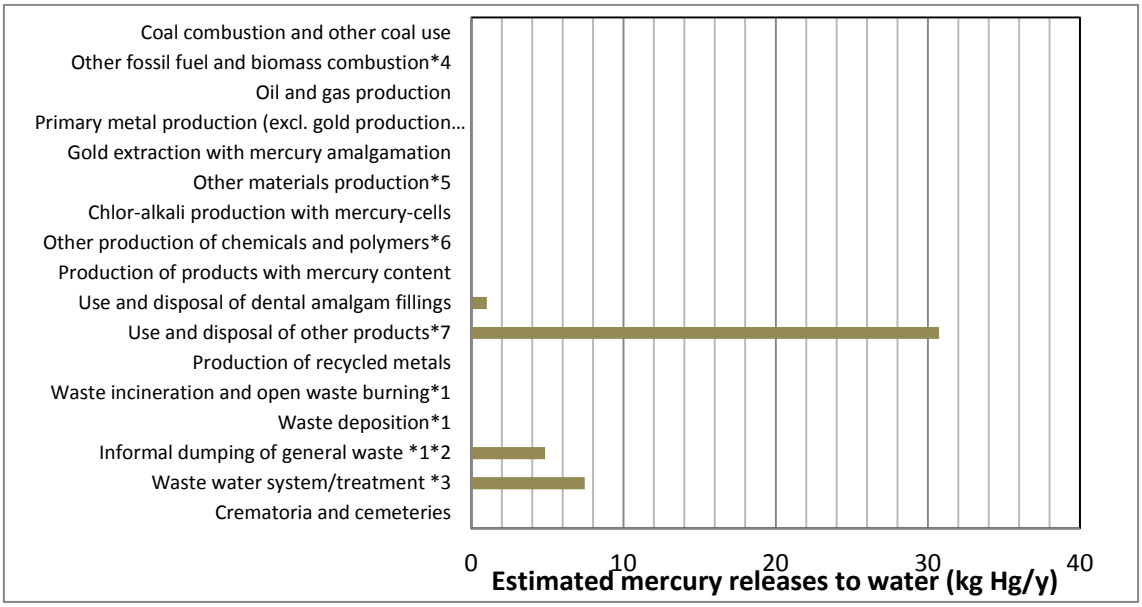

Figure 7. Estimated mercury releases to water.

The most significant sources of mercury releases to land were informal disposal of undifferentiated waste (38.8 kg Hg/ year) and use and disposal of other mercury-added products (226 kg Hg/ year) (Figure 8).

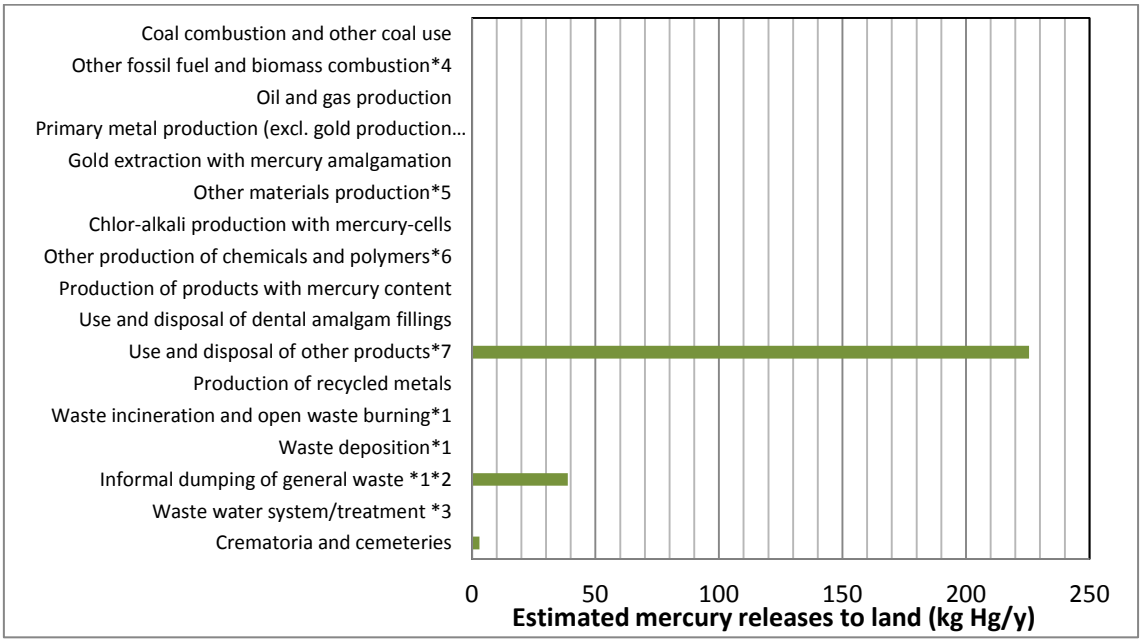

Figure 8. Estimated mercury releases to land.

The approximate releases of mercury were 440 kg Hg/year for general waste from Use and Disposal of other products (434 kg Hg/year) and Waste Water system/treatment (0.8 kg Hg/year) (Figure 9).

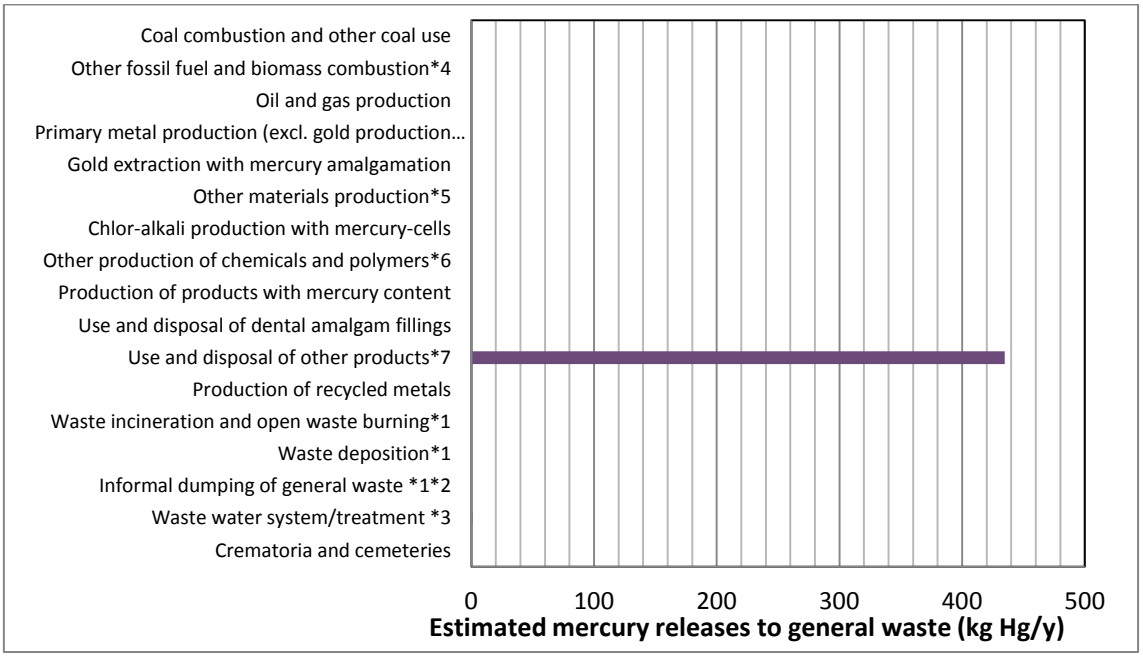

Figure 9. Estimated mercury as general waste.

Chart 5 below illustrates the general definitions and descriptions of the output pathways.

Chart 5. Definitions and general descriptions of output pathways

Type of result and calculation	**Description**
The estimated input of mercury, kg Hg/ year	The standard estimate of the amount of mercury entering this source category with input materials, for example, the calculated amount of mercury in coal used annually in the country for combustion in large plants
Air	Mercury emissions into the atmosphere from scattered and point sources from which mercury can be disseminated locally, or through long range air masses; For example: • Point sources, such as coal-fired power plants, metal fusion, and waste incineration; and, • Sources of diffusion, such as small-scale gold mining, informal burning of waste consisting of fluorescent lamps, batteries and thermometers.
Water	Mercury emission for aquatic environments and waste-water systems; Point sources and scattered sources from which mercury will be spread, to marine environments (oceans) and springs (rivers, lakes, etc.). For example, throwing away: • Wet flue/ gas cleaning systems in coal-fired power stations; • Industrial environments, households environments, etc. for aquatic environments; and, • Surface waste and trash filled soil contaminated with mercury.
Soil	Mercury released into the environment: soil and underground water. For example, releases of: • Solid waste from cleaning combustion gases in coal-fired power plants used for gravel road construction; • Uncollected waste products dumped or buried informally; • Informal local industrial releases, such as storage/ burial of hazardous waste on site; • Dissemination of sewage waste with mercury content in agricultural land (sewage waste used as fertilizer); and, • Application on soil, seeds or seedlings of pesticides with mercury compounds.
Secondary products and Impurities	Mercury-containing by-products that are sent to the market and cannot be directly allocated to environmental emissions, for example: • Sheetrock panels produced from solid waste from flue gas cleaning combustion gases in coal-fired power plants; • Sulfuric acid produced by de-sulphurisation of combustion gases (flue gas cleaning combustion) in non-ferrous metal plants, with trace mercury concentrations; • Chlorine and sodium hydroxide produced with mercury-based alkaline chloride technology; concentrations with traces of mercury; and, • Elementary mercury as a by-product of non-ferrous metal mining (high concentrations of mercury).

Type of result and calculation	Description
Undifferentiated waste	Undifferentiated waste: Typically, household waste and institutions where the waste can undergo a general treatment, such as incineration, landfill or informal disposal. Mercury sources are consumer products with intentional mercury content (batteries, thermometers, fluorescent tubes, etc.) as well as high volume waste, such as printed paper, plastic, etc., which have a small concentration of mercury.
Treatment / disposal of waste specifically from the sector	Industrial and consumer waste that is collected and treated separately, and in some cases recycled; for example: Contained waste treatment for flue gas cleaning combustion at allocated areas in coal-fired power plants; Hazardous industrial waste with high mercury content that are deposited in allocated and safe locations; Hazardous consumer waste with mercury content, especially gathered, collected separately, and dealt with safely, such as thermometers, mercury switches, missing teeth with amalgam fillings, etc.; and, Confined clearing for tailing and rocks / high volume of non-ferrous metals waste.

2.3.5 Summary of Mercury Stockpiles, and supply and trade

2.4 Data and inventory on energy consumption and fuel production

2.4.1 Combustion of diesel, oil, LPG and other light distillates

According to data provided by the National Fuel and Oil Company (NFOC), the total consumption of kerosene (gas and diesel) for 2015 was 48,359 m^3. Of the total, 6,185 m^3 corresponds to the consumption of oil, 9,160m^3 for gas, and 33,014 m^3 for diesel (Chart 6).
Consumption of butane gas was 91,493 kg according to data provided by the General Directorate of Customs (Chart 6).

For the conversion of fuel volume (m^3) by mass (Ton), the standard kerosene, gas and diesel density data, were used, respectively 0.82 ton /m^3 0.78 ton/m^3 and 0.85 ton/m^3.

The mass in tons of kerosene, gas and diesel, was obtained by the product density multiplied by the volume of fuel used. Total fuel consumption/activity rate was estimated at 40,468.94 tons/year.

Chart 6. - General data on fuel consumption (2015).

Data			
General Entry data:			**Comments/ Source**
Kerosene density	0.82	Ton/m^3	Density Chart
Gas density	0.78	Ton/m^3	Density Chart

Diesel Density	0.85	Ton/m^3	Density Chart
	Consumption amount		**Year 2015**
Oil	6,185	m^3	NFOC
Gas	9,160	m^3	NCFC
Diesel	33,014	m^3	NCFC
Butane Gas	91,493	kg	Customs Directorate
	Mass in Tons		
Oil		5,071.70	Ton
Gas		7,144.80	Ton
Diesel		28,160.94	Ton
Butane Gas		91	Ton
		40,468.94	**Ton**

2.4.2 CHARCOAL COMBUSTION

The absence of compiled data on biomass consumption was one of the difficulties in the energy sector. For this purpose, total data of wood, firewood, and coal consumption are used. The following sources were used: Forest Management (2016); Directorate of Industries (2015); NIS; available in the IGEE for the years 2012, 2013 and 2014.

The total estimated consumption of firewood and coal in 2015 was obtained by extrapolation, using the least squares method, with the total amount being 80,852 Tons. Figure 10 shows extrapolation by the least squares method, and the illustration of the mean squared error.

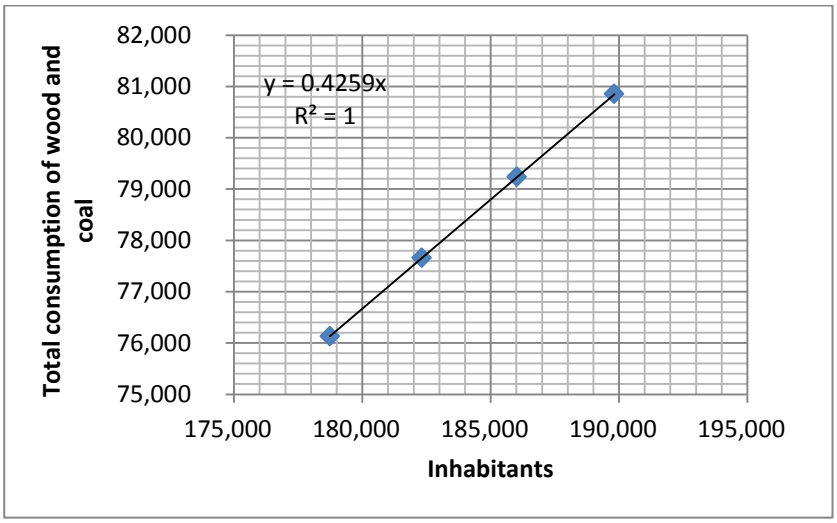

Figure 10. Extrapolation by least square method.

Considering that the percentage of coal is around 13% and taking into account the estimate from previous years, the total coal consumption in 2015 was estimated at 10,317 tons, and firewood equal to 70,535 tons (Chart 7).

Chart 7. Total estimate of coal and firewood consumption (2015)

Firewood	

	70,535
Coal	10,317
Firewood and Coal Total	**80,852**

2.5 Data and inventory on waste handling and recycling

2.5.1 Waste incineration and open fire burning of Biomedical Waste

Data on biomedical waste was obtained from the amounts established in the "Medical Waste Management Plan", prepared in 2009 by the Ministry of Planning and Finance, taking into account the lack of accurate information from hospitals and health centers on the amount of waste generated.

Therefore, it was assumed that the total estimated amount of biomedical waste produced annually in the country remains the same, at 27 tons / year according to the São Tomé and Príncipe Medical Waste Management Plan.

2.5.2 Waste deposition/landfilling and waste water treatment

Waste Disposal

The total amount of waste produced in São Tomé and Príncipe was obtained based on the following hypotheses (Chart 8).

- A population of 189,819;
- Amount of waste generated 0.35 kg / day / per person;
- Amount of waste disposed in trash 0.6 kg / day / per person;
- Amount of informal waste disposal 0.4 kg / day / per person.

From the hypotheses established above, the total amount of waste generated per year in tons, was calculated, based on the following equation:

Total amount of waste = (population x rate of generated waste x 365) / 1000

The total annual amount of urban solid waste generated in 2015, was estimated at 24,249.38 Tons, of which 14,549.63 Tons (60%) was deposited in the trash, and 9,699.75 Tons (40%) was deposited informally.

Chart 8. General data on waste disposal and waste-water treatment.

Hypotheses			
General Data Entry:			**Comments / Source**
Population	189,819	Inhabitants	
Generated waste rate	0.35	kg / day / per person	USWMP (2011-2016)
Amount of waste deposited in trash	0.6		IGG
Calculation			
Amount of waste from informal disposal	0.4		
Total amount of generated waste	24,249.38	Ton / Year	
Result			
Total amount of waste deposited in the trash	**14,549.63**	Ton / Year	
Total amount of waste deposited informally	**9,699.75**	Ton / Year	

It was assumed that 10% of the total amount of both waste deposited in general waste and the amount of that informally deposited was 1,455 tons and 970 tons, thus totalling 2,425 tons of waste.

Waste-water treatment

Data regarding the volume of waste-water generated in 2015 was estimated by taking into account the lack of specific and systematized data. The estimated volume of waste-water was based on the following hypotheses:

- Population: 189,819 (NIS). Population projections for 2015.
- 30% Sanitation rate (participation strategy for water and sanitation in STP).
- Water consumption per capita / day of 95 L. (participation strategy for water and sanitation).
- Return co-efficiency sewage / water is 80% (Lab and Sanitary Chemical Manual of Sanitation II).

Estimated domestic sewage flow was 1,579,673.72 m3 / year and corresponds to the estimated volume of waste-water generated in 2015. The calculation for average domestic sewage flow is based on the following equation.

$$Average\ sewage\ flow\ m(3\ year/=)\ (sanitation\ rate\ \times\ population\ \times\ per\ ca-pita\ water\ consumption\ \times\ sewage\ return\ coefficient\ \times\ 365)\ /\ 1000$$

Standard factors for waste and waste-water testing

In this inventory, standard input factors were used for estimating mercury releases in general waste and waste-water treatment.

Standard factors were based upon literature data regarding mercury contents in waste and waste-water. There is only literature data available for developed countries. The following test of results was performed to qualify results:

The test for general waste compares calculated inputs for the four general waste subcategories, with the overall amount of intentional generated waste. In the IN1 worksheet, the test was performed as follows: Tab "Level 1-total summary":

$$(E60+E64+E66+E67) > 2^* (J25+J26+\sum (J31 \text{ to } J55))$$

$$133 > 14.69$$

The waste-water test compares calculated inputs for waste-water treatment, with the amount of outputs, for the intentional use of mercury in most products processing, using the following data from Inventory Sheet Level 1:

In the IN1 worksheet, the test was performed as follows: Tab "Level 1-ExecSummary":

$$B19 > 2^*(D8+D10+D11+D12+D13+D14+D15).$$

$$8.3 > 6.12$$

Calculations indicate that the standard input factors, for general waste and waste-water treatment, may have overestimated the mercury emissions from these categories. In this sense, monitoring and follow-up of mercury emissions from treatment and final disposal of waste and waste-water becomes a priority and is essential.

2.6 Data and inventory on general consumption of mercury in products, as metal mercury and as mercury containing substances

2.6.1 USE AND DISPOSAL OF MERCURY-ADDED PRODUCTS

In São Tomé and Príncipe, mercury can be found primarily in marketed products such as batteries, hospital, meteorological and laboratory equipment. These products are imported through ports and airports, which are the main points of entry for such products to enter the country.

It is assumed that the data provided by the Customs Directorate, would represent the amount of imported and exported products containing mercury.

Data on imported products that may contain added mercury supplied by the Customs Directorate is listed in Chart 9.

Chart 9. General data on the use and disposal of mercury products.

Data			
			Comments / Source
Batteries	13,727	kg	Customs management
Light bulbs and electric incandescent tubes	34,869	kg	
Hydrometers, manometers, weighing liquids and similar floating instruments, thermometers, barometers and hygrometers	922	kg	
Instruments and apparatus for measuring or checking the flow, level of pressure, or other variables of liquids and gases			

It should be noted that one of the constraints regarding the data obtained from the Customs Directorate is due to the non-specificity of the products being classified by groups, and therefore, it was not possible to estimate the imported and exported products that may contain mercury. Chart 10 illustrates the classification categories of possible products with mercury added.

Chart 10. Customs classification of products possibly containing mercury.

Customs Code	Description	Unit	
85.06	**Batteries, battery stacks and electrical batteries**	kg	**13,727**
85.06.10.00	- From manganese dioxide	kg	
8506.30.00	- From mercury oxide	kg	
8506.40.00	- From silver oxide	kg	
8506.50.00	- From lithium	kg	
8506.60.00	- From air – zinc	kg	
8506.80.00	- Other batteries and battery stacks	kg	
8506.90.00	- Parts	kg	
85.07	**Electric accumulators and their separators, either rectangular or square**	kg	
85.07.10.00	- From lead, the type used for starting piston engines	kg	
8507.20.00	- From other lead accumulators	kg	
8507.30.00	- From nickel – cadmium	kg	
8507.40.00	- From iron – nickel	kg	
8507.50.00	- From nickel - hydride metal	kg	
85.07.60.00	- Lithium ion	kg	
8507.80.00	- Other chargers	kg	
85.07.90.00	- Parts	kg	
85.39	**Incandescent light bulbs or electric tubes or rechargeable devices, including headlights and projectors in sealed units and ultraviolet or infra-red lamps and tubes; light bulbs; lamps and tubes, light emitting diode (LED)**	kg	34,869
8539.21.00	- Halogen, from tungsten	kg	
8539.31.00	- Fluorescent, from hot cathode	kg	
8539.32.00	- Mercury or sodium vapor lamps; metal	kg	

Customs Code	Description	Unit	
	hologram bulbs		
8539.39.00	Others (ultraviolet or infra-red lamps and tubes; bow lamps)	kg	
90.25	**Hydrometers and similar floating devices, thermometers, barometers, hygrometers and psychometric, registered or not, and any combination of these instruments;**	kg	**922**
	- Thermometers and barometers not combined with other devices:	kg	
9025.11.00	Direct liquid reading	kg	
9025.19.00	Other	kg	
9025.80.00	- Other tools	kg	
9025.90.00	Parts and accessories	kg	
90.26	**Instruments and tools for measuring or checking the flow, level, pressure or other variables of liquids or gases (for example; flow meters, level gauges, manometers, heat meters), except for instruments and positioning devices 90.14, 90.15, 90.28 or 90.32.**	kg	
9026.10.00	- For flow measurement or control (of the flow) or level of the liquid	kg	
9026.80.0	Other tools and devices	kg	
9026.90.00	Parts and accessories	kg	

It was decided not to include these data in the inventory, considering that the approximate estimates made, could overestimate the entry and emission of mercury, taking into consideration the factors mentioned above.

General Support Data

Supporting calculations for the product groups listed below were based upon population data, electrification rate, and technical density listed in Chart 11.

Chart 11. Hypotheses for calculating general mercury consumption in products.

Sub-categories	Data types used such as activity rates
Dental amalgam fillings ("silver" fillings)	Population, number of dental personnel per 1000 inhabitants
Electrical switches and relays with mercury	Population, electrification rate (percentage of population with access to electricity)
Other pressure gauges with mercury	Population, electrification rate (percentage of population with access to electricity)
Chemical laboratory products	Population, electrification rate (percentage of population with access to electricity)
Other chemical laboratory products	Population, electrification rate (percentage of population with access to electricity)

Supporting data for standard calculations for dental amalgam and other types of products (Chart 12).

Chart 12. Supporting data for standard calculations and range test.

PREVIOUS DATA FOR STANDARD CALCULATIONS AND RANGE TEST			
Country	Population estimate in 2015	Dental staff per 1,000 inhabitants	Electrification rate, % of population with access to electricity
São Tomé and Príncipe	189,819	0.067	60

São Tomé and Príncipe do not have a crematorium, so this option was not considered in this inventory. The data referring to the number of deaths registered in 2015 was obtained through NIS projections, taking into account the unavailability of these in either the civil registry or notary services.

According to NIS, the number of deaths in 2015 was 1,226.

2.8 Stocks of mercury and/or mercury compounds, and storage conditions

There were no relevant activities.

2.9 Supply and trade of mercury and mercury containing compounds, including sources, recycling activities and quantities

There were no relevant activities.

2.10 GAPS AND BARRIERS

The absence of compiled biomass consumption data for 2015 was one of the gaps in the energy sector. The absence of accurate information from hospitals and health centers regarding the amount of biomedical waste generated was also encountered during the inventory.

One of the constraints regarding the data obtained from the Customs Directorate is the non-specificity of potential imported and exported mercury-added products, which are

classified by groups. Therefore, it was not possible to estimate the quantity of products that may contain the mercury through the data provided by this sector.

The data referring to the number of deaths registered in 2015 were obtained through NIS, as data were unavailable in either the civil registry or notary services.

The country has not undergone any studies, on the calculation of input factors for mercury, regarding solid waste or domestic waste-water. In addition, there are no mercury emission factors, such as disposal of general waste or waste-water treatment, so it is necessary to develop an environmental monitoring program for the amount of mercury in municipal solid waste and waste-water.

2.11 CONCLUSIONS

The total amount of mercury inputs in 2015 was 940 kilograms (kg) and the activities that contributed the most to the input of mercury were: Use and disposal of other products (thermometers, electric switches and relays, light sources, batteries, blood pressure monitoring equipment, other manometers, chemical products from labs and others from laboratory and medical uses) (917 kg /year); disposal of general waste (7.3 kg /year); informal dumping of general waste (4.8 kg /year); and other fossil fuels and biomass combustion (3.6 kg /year).

The estimated total of mercury releases in 2015 was 950 kg. Due to corrections from double counting, the total estimated mercury input is not necessarily equal to the total emissions. Regarding mercury emissions and releases in the environment, the results indicate that the highest contributions are to air, which receives 250 kg Hg /year, which is equivalent to 26.5% of the total input to the country. Mercury releases to water, land, and general waste represent 690 kg /year.

The individual sub-categories of mercury emissions that contributed to the highest emissions of mercury in the air were: the use and disposal of other products with mercury added, informal disposal of general waste, and the incineration of waste and open burning.

The origin of mercury in waste and waste-water produced in the country is due to mercury in products and materials (predominantly batteries). The amount of waste and waste-water do not represent therefore, original mercury ingredients in society (except for imported waste). Waste and waste-water may, however, contain a substantial flow of mercury from an anthropogenic origin. The main streams of mercury in waste and waste-water were from the disposal of waste, informal waste disposal and the waste-water systems.

In this inventory, standard input factors were used for estimating mercury emissions from general waste and waste-water treatments. Standard factors were based on literature data regarding mercury contents in waste and waste-water, and this data is only available for developing countries.

The calculations indicate that, the standard input factors for general waste and waste-water may have overestimated the mercury releases from the sources indicated above (Section 11). Accordingly, monitoring work on emissions from general waste and waste-water will be a priority, if there are technical and technological conditions for this.

2.12 RECOMMENDATIONS

Considering the information gaps encountered during the data collection process, it is necessary to implement strategies for the compilation of information, in order to update this inventory, and to subsequently develop a new Level 2 inventory, closer to the country's current situation.

For the second version of this inventory, detailed data on the use and disposal of mercury-containing products is recommended (especially for the magnitude and type of batteries), therefore detailed information on importing mercury-containing products is necessary.

It is therefore recommended that implementation of inter-institutional cooperation and partnership protocols between the Directorate-General for the Environment and the Customs Directorate, occur in order to improve, monitor and quantify possible import and export of goods that may contain mercury.

A new subcategory of "Disposal / Storage of waste in aquatic environment" is suggested, as a non-inclusive tool, seeing that this situation has occurred in São Tomé and Príncipe, especially in rivers and sea.

The General Directorate of the Environment, in partnership with the local Town Halls and local NGOs, should join their efforts with producers, distributors and consumers, for selective collecting of domestic hazardous waste (batteries, medicines, household insecticidal lamps etc.). It is recommended that awareness-raising campaigns be carried out by communities and by policy-makers and institutions on the adverse effects of mercury on health and the environment, as well as on the collection, separation and elimination of hazardous waste.

In São Tomé and Príncipe there are few data regarding the calculation of mercury input factors, in solid waste or domestic waste-water. In addition, there are no mercury emission factors, waste disposal or waste-water treatment, so it is necessary to develop an environmental monitoring program for the amount of mercury in municipal solid waste and waste-water. Consequently, monitoring work on releases from general waste and waste-water will be a priority.

A new sub-category "Water treatment for human consumption" is suggested, because exposure to anthropogenic and natural mercury from mud and the like may contain considerable amounts of mercury. Thus, it is recommended that parameters for water quality intended for human consumption be monitored.

It is also recommended, that the capacity of institutions that are directly or indirectly involved in the import and export of mercury be strengthened, so that the necessary information can be available for the improvement of future inventories.

OPERATIONAL ACTION PLAN FOR THE REDUCTION OF MERCURY EMISSIONS					
GENERAL OBJECTIVE: To provide the country with an operational strategy to reduce the contamination and emissions of mercury by 2025					
Intervention Logic	**Objectively verifiable indicators**	**Verification source**	**Actors**	**Time Horizon**	**Important Hypotheses / Assumptions**
OBJECTIVE 1: Reduce and discourage the use of materials containing mercury					
OBJECTIVE 2: Encourage selective collection of hazardous and general waste					
Activities					

Intervention Logic	**Objectively verifiable indicators**	**Verification source**	**Actors**	**Time Horizon**	**Important Hypotheses / Assumptions**
1. Improvement of district services for the selective collection of waste	Amount of waste collected daily	National statistics	Municipal Authorities NGO Ministry of Environment Private Sector	2018-2025	Technical Assistance / Financial support
2. Promoting projects aimed at minimizing waste generated	Name of the project carried out	National Statistics Inquiry report into the minimization of waste generated	Ministry of Environment Private Sector NGO Other Ministries concerned	2015-2025	Technical Assistance / Financial support
3. Evaluation and implementation of the best solid waste collection and transport technology	Report on new technology implemented	National Report	Ministry of Environment Municipal Authorities	2018-2020	Technical Assistance / Financial support
4. Evaluation of implementing recycling waste and re-usage	Number of recycling centers in the country	National Reports	Ministry of Environment Private Sector NGO	2018-2025	Technical Assistance / Financial support
5. Construction of a landfill for the final disposal of waste, and the use of methane gas for energy production	Report on the level of work accomplished	National Report	Ministry of Environment	2020-2025	Technical Assistance / Financial support
6. Prepare and draw up studies on hazardous	Studies drawn up and validated	National Reports	Ministry of the Environment	2019-2025	Technical Assistance / Financial

waste in São Tomé and Príncipe.					support
7. Raising awareness among the population about the care needed when handling and exposing Mercury to solid waste management	Name of organized awareness campaign	National Reports	Ministry of Environment Private Sector NGO Municipal Authorities Ministry of Education	2018-2025	Financial support
11. Training of national experts on the monitoring and evaluation regarding the impact mercury has on health and the environmental	Training report	National Reports	Ministry of the Environment Private Sector NGO Municipal Authorities Ministry of Education Ministry of Health	2017-2030	Technical Assistance / Financial support

Chapter III: Policy, Regulatory and Institutional Framework Assessment

3.1 Policy and Regulatory Assessment

3.1.1 Executive Summary

The Minamata Convention on Mercury, opened for signature in October of 2013, is a global treaty specifically designed to protect human health and the environment from the adverse effects of mercury. Under the Minamata Convention, individual countries are charged with protecting human health and the environment from the risks of mercury exposure by systematically controlling mercury emissions and releases, including phasing out the use of mercury in certain products and processes. The Government of São Tomé and Príncipe has not signed the Convention but is taking steps towards ratification/accession. In fact, São Tomé e Príncipe ratified the Minamata Convention on a national level on December 7, 2017, after approval from the National Assembly on November 22nd. The country must now deposit its instrument of ratification/accession at the United Nations Headquarters. The Convention will officially enter into force in the country 90 days after its deposit. São Tomé and Príncipe does not have activities related to (1) primary mercury mining; (2) by-product mercury from mining other metals; (3) decommissioning chlor-alkali facilities; (4) recovery of mercury from wastes and used products that contain mercury; and, (5) government or private mercury stocks. And, São Tomé and Príncipe do not manufacture mercury-added products, but it does import, use and discard many of these products. Therefore, measures are being taken to explore, identify, and define source types of mercury in São Tomé and Príncipe to comply with the Minamata Convention provisions.

Overall, the review of existing legislation indicates that current São Tomé and Príncipe legislation will require updating to meet the requirements of the Convention. Even though existing legislation was not specifically considered to deal with mercury phase out and control issues, they do cover some aspects of the Minamata Convention including mercury in food products and cosmetics. Moreover, there is a broad scope of environmental laws, or structured legislative frameworks that are now in place, in São Tomé and Príncipe that allow for the insertion of specific provisions when the need is identified.

São Tomé and Príncipe is a small country with a structured regulatory framework in place. São Tomé and Príncipe is a Party to the Basel, Rotterdam and Stockholm Conventions and will benefit from the existing regulations already in place for these conventions.

The legislative gap analysis identified gaps in the following areas that will need to be addressed for São Tomé and Príncipe to comply with the convention obligations: 1) mercury-added products phase out and management will need to be addressed according to Article 4 and Annex A of the Convention; 2) regulations covering solid waste will need to include mercury management, storage and disposal; and, 3) air quality control laws should be updated in order to make the regulations more robust.

In addition to these gaps, there is a need to increase awareness among key stakeholders and the public about mercury and its environmental and health impacts to ensure the effectiveness of proposed elimination programs. Establishing a coordinating entity to monitor the activities needed to adopt the Convention is recommended.

3.2 Background

São Tomé e Príncipe have ratified the main chemicals and waste management treaties: Basel, Rotterdam, and Stockholm; however, the obligations of the Conventions have not been fully incorporated into domestic law due to the relative infancy of the country and slow legislative pace. In this report, we shall conduct an analysis of the existing legislation related to mercury, directly or indirectly, to identify gaps, overlaps and needed legislation for São Tomé and Príncipe to be in compliance with the Minamata Convention.

3.3 Minamata Convention on Mercury

The objective of the Minamata Convention on Mercury is to protect human health and the environment from the adverse effects of mercury. This Convention was adopted on 10 October 2013 in Kumamoto, Japan. São Tome and Príncipe are conducting a Minamata Initial Assessment (MIA) project with the intent of assisting the country with preparations for accession and the ultimate implementation of the Minamata Convention. As part of the MIA project, the government of São Tome and Príncipe has conducted a review of existing laws and regulations to identify gaps and areas where legislative updates may be required in order to ensure compliance with the Convention's obligations.

The Convention draws attention to a global and ubiquitous metal that, although naturally occurring, has wide uses in everyday objects and is released into the atmosphere, soil and water from various sources. Controlling anthropogenic releases of mercury throughout its life cycle has been a key factor in shaping the obligations under the Convention.

Key highlights of the Minamata Convention include the prohibition of new mercury mines, the elimination of existing mercury mines, the elimination and reduction of the use of mercury in various products and processes, control measures on emissions into the air and releases to land and water, and regulation of the small-scale, artisanal gold mining informal sector. The Convention also addresses the temporary storage of mercury destined for allowed uses, the disposal of mercury wastes, contaminated sites and health strategy.

The Convention also provides for sources of financial and technical assistance, as well as capacity building and technology transfer, as a matter of urgency, to increase compliance to related mercury activities in support of developing Parties in the implementation of the Convention.

The Convention focuses on the management of mercury through its full life cycle. The following are some of the main areas covered under the Convention:

Article 3: Mercury Supply Sources and Trade;
Article 4: Mercury-added Products;

Article 5: Manufacturing Processes in which Mercury or Mercury Compounds are used;
Article 7: Artisanal and Small-scale Gold Mining (ASGM);
Article 8: Air Emissions;
Article 9: Releases to Land and Water;
Article 10: Environmentally Sound Interim Storage of Mercury, other than Mercury Waste;
Article 11: Mercury Wastes;
Article 12: Contaminated Sites;
Article 16: Health Aspects;
Article 13: Financial Resources and Mechanism;
Article 17: Information Exchange; and,
Article 18: Public Information, Awareness and Education.

On December 7, 2017 the President of the Republic ratified, after approval by the National Assembly on November 22, 2017, the Minamata Convention on Mercury. The country must now deposit the documents of ratification at the United Nations Headquarters. The Convention officially enters into force in the country ninety days after its deposit.

3.4 Summary of Existing Legislation on Chemicals and Waste and its Implications on Mercury

There is no legal and regulatory framework in place for chemicals in São Tomé and Príncipe, although the Legislative and Regulatory Framework for Chemicals and Hazardous Waste is being prepared and expected to be approved by the end of 2018.

The Legislative and Regulatory Framework for Chemicals and Hazardous Waste aims to promote sustainable development by preventing pollution and protecting the environment and human health from the risks associated with chemicals and hazardous waste – and the intent is to include mercury pollution. It also aims to ensure the management of activities related to chemicals, especially those relating to new chemicals, hazardous chemicals, and chemicals banned in the country. The draft law in question aims to regulate the importation, storage, management, transport, commercialization, export and disposal of chemical and hazardous waste in the country.

São Tomé and Príncipe have ratified three international treaties, namely the Stockholm, Basel and Rotterdam Conventions which, given the legislation vacuum in the country, appear as a reference for the main parties involved in the management of chemicals. Details include:

The Stockholm Convention on Persistent Organic Pollutants, signed in 2001 in Stockholm, Sweden, was ratified by São Tome and Príncipe on 04/12/2006 and entered into force in the country on 11/07/2006;

The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC procedure), entered into force on 24/02/2004 and was ratified by São Tome and Príncipe on 05/23/2004 / 2013 and entered into force in the country on 08/21/2013; and,

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 and entered into force in the country on

10/02/2014. After São Tome and Príncipe ratified the Basel Convention, the country adopted Decree Nº. 36/1999, Decree on Waste. This decree regulates solid waste disposal requirements. It provides that the generator of solid waste, regardless of its nature and origin, shall promote its collection, storage, transport and disposal or use in such a way as not to endanger humans and animals or to cause damage to the environment.

The Decree provides in Article 19º and 21º that waste treatment can be carried out by landfill, incineration, composting and recycling. It bans waste disposal processes such as the discharge into springs, rivers and streams, and in the coastal and territorial sea marine habitats. The Decree includes the immersion of waste in those habitats as well.

Decree Nº 36/1999 covers solid waste including industrial solid waste. Art. 17 specifies how solid waste transport should be carried out, however, these rules apply only to solid wastes, and do not cover the transport of hospital waste, toxic and other dangerous wastes.

Currently there is no established regulatory structure in the country on the movement of hazardous chemicals and wastes. There is a need to adopt regulations on the movement of hazardous chemicals in order to comply with Article 11 of the Convention.

From the survey of existing chemicals and waste legislation, this study found that there is a lack of legislation on chemicals, including mercury, in São Tome and Príncipe. However, the country has adopted a set of environmental legislation identified during the bibliographic review. São Tome and Príncipe adopted the following laws:

- Decree-Law nº 8/2014 on the Protection of Sea Turtles and their derivatives;
- Law of the Natural Park Obô de São Tomé and Príncipe, Law nº 6/06, published in the DR 29, of 08/02/2006;
- Príncipe Natural Park Law, Law nº 7/06, published in the DR 29, of 08/08/2006;
- Law nº 9/2001 of 31 December 2001 on Fisheries and Fishery Resources;
- Law nº5/2001 of 31 December 2001 on Forest Resources;
- Decree-Law nº 40/99 - Competence of Phytosanitary Control of products or materials of vegetal origin by CIAT, published in the DR 12, November 30, 1999;
- Law nº. 11/99 of 31 December 1999 on Fauna, Flora and Protected Areas;
- Decree nº 35/99 of 12 December 1999 on the extraction of aggregates, particularly on the extraction of sand;
- Decree nº. 36/99 of 31 November 1999 on the management of solid waste;
- Decree nº 37/99 of 31 November 1999 on Environmental Impact Assessment;
- Law nº 3/91 of 31 July 1991 on land ownership;
- Decree-Law nº 51/91 of 7 December 1991 laying down the criteria for the distribution of agricultural land;
- Decree-Law nº 63/81 of 31 December 1981 on the protection, exploitation and management of the marine resources of the Exclusive Economic Zone; and,
- Decree-Law nº 59/80, on the public health code. The Decree Law disposes on all relevant matters related to the promotion, protection and recovery of the health of the inhabitants of São Tomé and Príncipe. Article 58º of the Decree-Law may relate to the management

of mercury insofar as it states that the sanitary conditions of production, importation sale, storage, transportation, distribution and disposal of toxic and dangerous products of irritating character, flammable, fuel or explosive shall be fixed by the Ministry of Health and Sports

3.5 Challenges for implementation

As previously indicated, there is no legal and regulatory framework in place for chemicals in São Tomé e Príncipe, although the Legislative and Regulatory Framework for Chemicals and Hazardous Waste is being prepared and expected to be approved by the end of 2018. The draft legislation will need to add mercury to the list of hazardous chemicals to be in compliance with the Minamata Convention. The framework legislation on mercury should cover a number of areas of mercury management, including health, safety, environment, and trade, national standards for the import, sale, storage, transport, distribution, export and elimination of mercury-containing products.

Moreover, in addition to the lack of a specific legal and regulatory framework for mercury, the implementation of the law itself is one of the greatest challenges, since as a rule, the Santomean State after adherence to international instruments and conventions, takes a long time to legislate and pass laws aimed at implementing the subject matter of these international conventions and instruments. Sectoral regulation and the definition of technical guidelines are also one of the problems facing implementation.

Given that waste contaminated by mercury represents a public and environmental health problem, the Waste Decree Number 36/1999 will need to be revised and expanded, so it no longer regulates only solid waste, but also covers hazardous waste including mercury. There is also a need to adopt regulations that address the movement of hazardous chemicals in order for São Tome and Principe to meet the obligations of the international treaties that the country has ratified.

In terms of challenges for the implementation of the Minamata Convention, there is a need to identify national stakeholders engaged in chemicals management including mercury; their roles in mercury management and monitoring, and institutional capacity. In addition, it is necessary to provide key national stakeholders with new and up-to-date information on the mercury cycle, the capacity to manage the risks arising from mercury, as well as to make known the obligations deriving from the Minamata Convention for the country The dissemination of information, promotion of the framework law to be approved, the monitoring and evaluation of the implementation of the law, and the incipient capacity to implement approved policies and legislation are major challenges to the implementation of the convention.

3.5.1 Review of Primary Authorities for each of the Measures of the Convention

Institutions	Role
The Ministry of Infrastructures, Natural Resources and Environment ➢ **The General Directorate of Environment**	➢ Control the direct and indirect effects of the emission of mercury into the environment (air, water and land) ➢ Monitor the effects of mercury on the environment ➢ Promote Good Practices / Good Practices in Environmental Licenses / Study of Environmental Impacts
Ministry of Agriculture ➢ **Center for Research, Agronomy and Technology**	➢ Make the registration of agricultural chemicals ➢ Develop and enforce legislation on pesticides ➢ Support farmers through extension service of agricultural advice on chemicals ➢ Better control of illegal use and sale of pesticides ➢ Promote alternatives to pesticides
Ministry of Finance and Blue Economy	➢ Allocations of financial resources for activities related to mercury ➢ Allocate resources for inspection, awareness and enforcement
Ministry of Health	➢ Short-term and long-term impacts of mercury (including emergencies and poisonings) on the general public or on specific population groups
Ministry of Justice	➢ Ensure that environmental crimes are penalized appropriately ➢ Promote public access to information on sources of pollution ➢ Records of polluting incident
Ministry of Labour	➢ Occupational health and safety issues related to the use and handling of mercury in the workplace ➢ Participation in relevant international agreements and conventions
Ministry of Foreign Affairs	➢ Participation in relevant international Agreements and Conventions
Directorate of Industry	➢ Introduction of cleaner production technologies ➢ Promote public access to information on sources of pollution

Directorate of Commerce	➢ Regulate the import and export of mercury-added products (MAPs), the authority to issue commercial licenses
General Directorate of Customs	➢ Control the entry or exit of MAPs in the country in line with regulations, tariffs and duties
Directorate of Transportation	➢ Knowledge of international transport rules and the Basel Convention ➢ Apply the labeling and transport obligations

3.5.2 Summary of Major Environmental, Chemical, Trade Laws and Clauses that pertain to Chemicals and Waste Management.

There is no overarching legal and regulatory framework in place for chemicals in São Tomé and Príncipe. The organic law of the Government (Decree Law Number 1/2015) provides that the Ministry of Infrastructures, Natural Resources and Environment (MIRNA) is the Central State Administration responsible for designing, implementing, coordinating, supervising and evaluating the policy defined and approved by the Government in the areas of public works and natural resources. However, it does not provide a basis for law to be developed around chemicals management.

It is not possible to provide a summary of major environmental, chemical, trade laws and clauses that pertain to chemicals and chemicals management in São Tomé and Príncipe because it does not yet exist in the country. In spite of this, the Legislative and Regulatory Framework for chemicals and hazardous wastes is in preparation and is expected to be approved during the year 2018.

The Legislative and Regulatory Framework that is in development will regulate the entire cycle of chemicals and hazardous wastes from the time it enters the country, namely the importation, storage, management, transport, commercialization, export and disposal of chemical and hazardous waste.

The proposed Law of the Legislative and Regulatory Framework for chemicals and hazardous wastes consist of 10 chapters that are divided into 74 articles and three Annexes. The chapters are as follows:

CHAPTER 1: General Provisions, Definitions and Scope of Action of Law

CHAPTER 2: Management of Chemicals and Related Activities

CHAPTER 3: Activities in the Management of Chemicals

CHAPTER 4: Declaration, Registration and Supply of Information on Chemicals

CHAPTER 5: Measures to Protect Goods, Human Health and the Environment

CHAPTER 6: Classification, Labeling, Packaging and Safety Data Sheets for Chemicals

CHAPTER 7: Development of the Chemical Industry

CHAPTER 8: Responsibilities of State Bodies Connected with Activities Related to Chemicals

CHAPTER 9: The Instruction of the Process

CHAPTER 10: Provisions for Implementation

The three annexes are as follows:

Annex 1: (Specific categories of chemicals whose import, use and export are completely prohibited)

Annex 2: (Specific categories of chemicals in which trade is permitted subject to authorization by the competent government authorities)

Annex 3: (Table of fines)

In the absence of a legal framework for environmentally sound chemicals management in São Tomé and Príncipe, and in view of the legislative vacuum on chemicals management, the Stockholm, Basel and Rotterdam Conventions have played an important role in helping to manage hazardous chemicals in the country.

To elaborate, in the context of projects aimed at implementing the Basel Convention, there is a project in the country currently underway that focuses on the collection and packaging of hazardous waste in the country, namely obsolete pesticides, to be exported to the United Kingdom for appropriate treatment. These obsolete pesticides are to be incinerated in United Kingdom, since in São Tome and Príncipe there are no suitable means to incinerate hazardous waste. That said, it is important to note that despite ratifying the Basel, Stockholm and Rotterdam conventions (BSR), obligations have yet to be incorporated into domestic law in São Tome and Príncipe. There is currently no national law regulating the export of hazardous waste. The export of obsolete pesticides to the United Kingdom for incineration was made following the procedures recommended in the Basel Convention.

3.5.3 Convention Obligations and Legislation in São Tomé e Príncipe

ARTICLE 3: MERCURY SUPPLY SOURCES AND TRADE

Summary of obligations of Convention

Article 3 of the Convention focuses on limiting mercury supply and trade. Article 3 focuses on limiting mercury supply and managing trade. It bans mercury mining for those sites not already mined and phases out existing mercury mines 15 years after entry into force of the Convention. There are five main sources of mercury supply: (1) primary mercury mining; (2) by-product mercury from mining other metals; (3) decommissioning chlor-alkali facilities; (4) recovery of mercury from wastes and used products that contain mercury; and, (5) government or private mercury stocks (Lennett and Gutierrez 2014). São Tomé and Príncipe are not conducting any activity that involves any of these five main sources outlined in Article 3.

Article 3 - Supply and Trade	Domestic Law	Comments
Not allow new primary mercury mining	No law covers this issue.	There is no mining activity in São Tomé and Príncipe.
Phase out existing primary mercury mining within 15 years	No law covers this issue.	
Prevent the import and use of mercury from primary mercury mining for artisanal and small-scale gold mining.	No law covers this issue.	
In accordance with Article 3.5(b), restrict the import and use of excess mercury from decommissioning chlor-alkali plants, and require environmentally sound disposal.	No law covers this issue.	São Tomé and Príncipe are not conducting activities that involve the main sources of mercury supply.
Obtain information on stocks of mercury or mercury compounds exceeding 50 metric tons (MT), and mercury supply generating stocks exceeding 10 MT/yr	No law covers this issue.	
Not allow the export of mercury unless the importing country provides written consent, the mercury is for an allowed use or environmentally sound storage, and all other conditions of Article 3.6 are met.	While São Tomé and Príncipe are a Party to the BSR conventions, no domestic law covers this issue.	
Not allow the import of mercury without government consent, ensuring both the mercury source and proposed use are allowed under the Convention (and applicable domestic law).	While São Tomé and Príncipe are a Party to the BSR conventions, no domestic law covers this issue.	

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

As stated above, there is no specific legal and regulatory framework for mercury in São Tomé and Príncipe, and there is no legislation establishing specific prohibitions or restrictions on mercury. Moreover, there is no law regulating the types of industries that can be developed in the country, nor a law controlling trade that could be strengthened in order to restrict import or export of mercury.

Therefore, given the lack of a specific legal and regulatory framework for mercury at national level, and the fact that environmental laws adopted by the country regulate other matters, there are gaps in the legislation regarding the obligations of the Convention.

With the ratification of the Minamata Convention on December 7, 2017 by the President of the Republic, the Ministry of Infrastructures, Natural Resources and Environment, through the General Directorate of Environment, must initiate the procedures for the production of legislative and regulatory texts for mercury.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- The General Directorate of Environment
- General Directorate of Customs
- Directorate of Industries

ACTIONS TO TAKE

São Tomé and Príncipe are not conducting any activity that involves any of these five main sources outlined in Article 3. Given the lack of a specific legal and regulatory framework for mercury, legislative and regulatory requirements need to be developed and approved in order to be in compliance with the Minamata Convention on Mercury.

Even though São Tomé and Príncipe are not conducting any activity that involves these five main sources of mercury, it would be prudent to prohibit these banned activities in the future, especially since there is no foreseeable need at the present. Additionally, in order to prevent unwanted mercury in São Tomé and Príncipe, it would be prudent for the country to set up control measures to prevent illegal dumping and shipping of mercury through the country

It is important to note that the legislative process in the country is slow and does not necessarily respond quickly to social changes. This results in low legislative productivity by the National Assembly. When regulations are drafted to meet the obligations of the Minamata Convention, it is imperative that they be broad reaching as amending law is a time consuming and difficult process.

ARTICLE 4: MERCURY-ADDED PRODUCTS

SUMMARY OF OBLIGATIONS OF CONVENTION

Under Article 4, the Convention will reduce mercury demand in products through a combination of measures which phase out mercury uses in many key products, phase down mercury use in dental amalgam, and discourage the manufacture of new products using mercury. The products covered by the Convention phase-out mandate are specified in Part 1 of Annex A.16. The phase-out date for these products is 2020, unless additional time is sought under Article 6.

Mercury-added products includes batteries, switches and relays, compact fluorescent lamps (CFL), linear fluorescent lamps (LFL), high pressure mercury vapor lamps (HPMV), cold cathode lamps (CCFL) and electronic electrode fluorescent lamps (EEFL), cosmetics with mercury content above 1.0 ppm, pesticides, biocides, topical antiseptics, and non-electronic measuring devices such as barometers, hygrometers, manometers, thermometers, and sphygmomanometers.

São Tomé and Príncipe do not manufacture mercury-added products (MAPs), but it imports, uses and discards many of these products, the magnitude of which will be determined when the Minamata Initial Assessment is complete.

Article 4 – Mercury added products	Domestic Law	Comments
Not allow the manufacture, import, and export of products listed in Part I of Annex A, following the phase out date in Annex A.	No law covers this issue.	
Phase down the use of dental amalgam through two or more measures listed in Part II of Annex A.	No law covers this issue.	
Prevent the incorporation of products listed in Part I of Annex A (i.e., switches and relays, batteries) into larger, assembled products.	No law covers this issue.	.
Discourage the manufacture and distribution of MAPs not covered by any known use before the Convention entered into force.	No law covers this issue.	

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

There is not current legislation in São Tomé and Príncipe that address Article 4. Unfortunately, the Decree Law 40/99 on Phytosanitary Control cannot be a vehicle for improving regulations related to pesticides and biocides because this decree only defines the attributions of the Center of Agronomic and Technological Research of São Tomé and Príncipe (CATR). CATR is the only institution dedicated to phytosanitary control and responsible for conducting a physical-chemical quality analysis of products or materials of plant origin upon entry into and exit from the country.

As such, to address Article 4 gaps, a proposed regulatory framework should adopt measures conferring authority to the General Directorate of Customs and to the Fiscal Police to control the prohibition on imports and exports of mercury-added products listed in Part I of Annex A after the phase-out date specified for those products. Ideally, under this proposed regulatory framework, these institutions should also have authority to control the imports and exports of MAPs even before the phase out date specified for those products. Additionally, through their authority to issue commercial licenses, the Directorate of Industry should also play an important role in the prohibition of manufacturing any new products using mercury.

In accordance with the law to be adopted, all import and export of mercury-containing products may only be carried out with the authorization of the Directorate of Commerce, with the General Directorate of Customs and the Fiscal police being responsible for inspection at the airports and

ports of the country and the Inspection of Economic Activities being responsible for inspection in the country.

Moreover, to address the gap in regulations for Article 4, the proposed framework should assign authority to the General Directorate of Environment to oversee the implementation and coordination all different measures or strategies to address products listed in Part I of Annex A.

AUTHORIZED MINISTRY/DEPARTMENT

- General Directorate of Customs
- Directorate of Commerce
- Customs Tax Police
- Inspection of Economic Activities

ACTIONS TO BE TAKEN

Following the ratification of the Minamata Convention on Mercury on December 7, 2017 by the President of the Republic, the country must now do the following: a) deposit the documents of ratification at the United Nations Headquarters, and b) define strategies for implementation of the Convention and start to elaborate and approve a legal and regulatory framework for mercury at national level.

The Government, through the Ministry of Infrastructures and Natural Resources, should trigger the legislative impulse and the General Directorate of the Environment should lead the process.

ARTICLE 5: MANUFACTURING PROCESSES

SUMMARY OF OBLIGATIONS OF CONVENTION

Article 5 sets out measures either to phase out or to restrict existing manufacturing processes in which mercury or mercury compounds are used. It also does not allow the development of new facilities that would use manufacturing processes listed in Annex B and discourages the development of new manufacturing processes in which mercury or mercury compounds are intentionally used.

Article 5 – Manufacturing Processes	**Domestic Law**	**Comments**
Not allow the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B, following the Annex B phase out date.	No law covers this issue.	
Restrict (as specified in the Annex) the use of mercury in the processes listed in Part II of Annex B.	No law covers this issue.	
Not allow new facilities to use mercury in the regulated processes under Article 5, as specified in Annex B.	No law covers this issue.	.

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATION

In São Tomé and Príncipe, there are no known existing industries that add mercury as part of manufacturing. Therefore, the obligations under this article are not immediately applicable to São Tomé and Príncipe. However, it would be prudent for the government to ban these activities from happening in the future.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- The General Directorate of Environment

ACTIONS TO BE TAKEN

Actions to be taken are mainly the approval of legislation on mercury that provides: a) forbids the use of mercury or mercury compounds in the manufacturing processes listed in Part I of Annex B, following the Annex B phase out date; b) restricts (as specified in the Annex) the use of mercury in the processes listed in Part II of Annex B; c) not allow new facilities to use mercury in the regulated processes under Article 5, as specified in Annex B.

ARTICLE 7: ARTISANAL AND SMALL-SCALE GOLD MINING

SUMMARY OF OBLIGATIONS OF CONVENTION

The obligations for governments where ASGM activity is "more than insignificant" are the following:

Article 7 - ASGM	Domestic Law	Comments
For All Governments		
Take measures to reduce, and where feasible, eliminate mercury and mercury compound use, emissions (to air), and releases (to land and water) associated with ASGM.	Not applicable	
For governments where ASGM and mercury use is "more than insignificant".	Not applicable	
Establish coordinating mechanism and delineate agency roles for development/implementation of an ASGM National Action Plan (NAP).	Not applicable	
Define and formalize or regulate ASGM consistent with the Convention.	Not applicable	
Eliminate whole ore amalgamation, open burning of amalgam or processed amalgam, burning of amalgam in residential areas, and cyanide leaching of mercury-laden sediment, ore or tailings (the "worst practices").	Not applicable	

Set mercury use reduction goals or targets consistent with the timely elimination of the worst practices and other use reduction efforts.	Not applicable	
Reduce mercury emissions, releases, and exposures associated with ASGM, and prevent mercury exposures of vulnerable populations (particularly women of child-bearing age and children).	Not applicable	
Prevent the diversion of mercury and mercury compounds from other sectors to ASGM and manage mercury trade consistent with the NAP.	Not applicable	
Implement a public health strategy to address mercury exposures to ASGM miners and communities.	Not applicable	

Analysis of gaps in legislation relative to Convention obligations

Artisanal and small-scale gold mining activity does not exist in São Tomé and Príncipe, therefore there is no national legislation regarding such activity in the country.

Authorized Ministry/Department

Not applicable

Actions to be taken

São Tomé and Príncipe are two small islands of volcanic origin in which there is no gold. Since there is no ASGM activity in São Tomé and Príncipe, nor is it predictable that there will be, the obligations under the Convention are not applicable. As such, there is no need to develop and implement a national action plan in accordance with Annex C, under Paragraph 3 of Article 7 of the Convention

ARTICLE 8: EMISSIONS

Summary of obligations of Convention

Article 8 regulates the emission of mercury and mercury compounds to the atmosphere. Member states have to control and where feasible reduce emissions from processes listed in Annex D. The five primary source categories are: (1) coal fired power plants, (2) coal-fired industrial boilers, (3) smelting and roasting processes in the production of non-ferrous metals (e.g., lead, zinc, copper and industrial gold), (4) waste incineration facilities, and (5) cement production facilities. Waste incineration facilities include incinerators burning hazardous waste, municipal waste, medical waste, or sewage sludge; cement production sources cover the co-burning of wastes as we

ll (Lennett and Gutierrez 2014).

Article 8 - Air Emissions	Domestic Law	Comments
Require best available techniques/best environmental practices or associated emission limit values for new (as defined in Article 8.2(c)) sources listed in Annex D.	Decree-Law Nº 26/2014 (Legal Regime of the Organization of the National Electric Sector)	There are no environmental measures in the national legislation established for emission limit values by industrialists.
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.	No law covers this issue.	
Require monitoring/reporting and otherwise establish a mercury emissions inventory for sources listed in Annex D.	No law covers this issue.	

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

São Tomé and Príncipe derive two-thirds of its energy from oil and natural gas and one-third from hydropower. Petroleum is imported into the country - there is not oil or gas production where by-product mercury can be generated. São Tomé and Príncipe do not currently have a medical waste incinerator, but the Ministry of Health is working with an international partner to purchase one for the country. Currently, medical waste is deposited in a dump site and open burned. Authorities will need to determine the path forward for controlling mercury emissions as part of the ratification process.

None of the major emissions sources listed in annex D are present in São Tomé and Príncipe, and there are no plans for the development of any coal combustion facilities. However, environmental protection is one of the priorities of the government program. The current XVI Constitutional Government decided to promote the production of clean energy through renewable sources. The government program also states, "Given its geographic dimension and archipelagic nature, São Tomé and Príncipe must make a rational management of its territory and optimum preservation of its environment, in order to ensure a better quality of life for the current generations, without compromising the interests of future generations". As a result, the major emissions sources listed in annex D are not compatible with a rational management of territory and optimum preservation of environment.

Currently there is no legislation in the country on mercury emissions. Although none of the major emissions sources are present in the country, the Decree-Law Nº 26/2014 (Legal Regime of the Organization of the National Electric Sector) that regulates and establishes the bases for the organization and operation of the National Electricity Sector, defining the entities and the model of the electricity market, as well as the general principles of the exercise of the activities

of production, transportation, distribution and commercialization of electricity may allow for the inclusion of some BAT/BEP in the future if the country identifies it as appropriate.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- The General Directorate of Environment

ACTIONS TO BE TAKEN

The magnitude of emissions will be determined when the MIA is complete and authorities will then need to determine the path forward for controlling mercury emissions as part of the implementation process.

ARTICLE 9: RELEASES TO LAND AND WATER

SUMMARY OF OBLIGATIONS OF CONVENTION

The purpose of Article 9 is to reduce mercury releases to land and water from sources not addressed by other provisions in the Convention. Parties must identify significant point sources of mercury releases.

Article 9 – Releases	Domestic Law	Comments
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.	No law covers this issue.	
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.	Unlikely to apply. No law covers this issue.	

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

The existing national legislation does not address releases of mercury to land or water or measures to control or reduce it. While Decree-Law 63/81 on the protection of marine resources regulates the conditions for the exercise of fishing, it does not provide an opportunity for further regulations related to mercury (and other contaminants) since there is no language on waste management, disposal or monitoring in this decree.

At a national level, the only legislation dealing with releases to land or water of waste is the Decree nº 36/99 on the management of solid waste. This Decree 36/99 says in Article 21 that waste disposal processes, such as the discharge into the sources, rivers and streams, the seacoast, as well as in the territorial sea, exclusive economic zone, and continued zone are prohibited in the territory of São Tomé and Príncipe.

This article could be an opportunity for regulating releases to land or water of waste that may contain mercury, but the scope of the above-mentioned decree is solid waste, as provided in article 2 of the Decree.

Waste is defined as the set of materials that may comprise what remains of raw materials after its use and which cannot be considered as by-products or products of which the possessor intends or has needed to untangle himself.

The Decree also defines industrial solid wastes as all substances, products or materials that are present in a solid state, resulting from the work of industrial plants that cannot be released into the effluent systems nor are considered as by-products.

By-products are understood as the products obtained from raw materials whose production was not the determining reason for the use of those raw materials.

According to Article 1 of the Decree in question, the holder of solid waste, regardless of its nature and origin, must promote its collection, storage, transport and disposal or use in a way that does not endanger the species or environment.

The Decree goes further by defining in Article 17 that the transport of the waste must preferably be carried out in closed-box vehicles with an identification mark or when it is not possible to use closed-box vehicles, the waste may be transported in open box vehicles properly secured, provided that it is carried out in a period of little traffic.

However, the Decree also provides that the forms defined for transportation do not apply to the transport of hospital waste, toxic or hazardous waste, thus circumscribing the scope of the law only to solid waste.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- General Directorate of Environment
- General Directorate of Natural Resources and Energy (DGRNE)
- Ministry of Defense and Internal Administration

ACTIONS TO BE TAKEN

The results of the MIA in São Tomé and Príncipe are helping to determine the country's approach to releases under the convention. There is a need for São Tomé and Príncipe to determine how to adopt future guidance on this issue from the Convention. The aforementioned Decrees may provide a basis to address this issue. Additionally, depending on the finding of the national mercury profile in São Tomé and Príncipe, authorities may decide to prepare a national implementation plan setting out measures to be taken to control releases as well as expected targets, goals and outcomes.

ARTICLE 10: ENVIRONMENTALLY SOUND INTERIN STORAGE OF MERCURY

SUMMARY OF OBLIGATIONS OF CONVENTION

Article 10 covers mercury, as a product or non-waste, and requires parties to ensure that these classes of mercury are placed in environmentally sound storage. Environmentally sound storage guidelines are currently being developed by the Conference of Parties (COP).

Article 10 – Interim Storage	Domestic Law	Comments
Take measures to ensure interim mercury storage is conducted in an environmentally sound manner, taking into account guidelines to be developed by the COP.	No text covers this issue.	See comments below.

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

As stated above, for all precedents of the Articles of the Convention there are no national laws on chemicals or mercury, and as a result there are gaps in legislation.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment General Directorate of Environment.

ACTIONS TO BE TAKEN

São Tomé and Príncipe will clearly need to take measures to ensure that mercury and mercury compounds that are intended for a use allowed under the Convention are stored in an environmentally sound manner, considering any guidelines and in accordance with any requirements that the COP. The Legislative and Regulatory Framework that is in development may serve as the legal basis to address this Article, considering guidelines developed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and other relevant guidance.

Additionally, there is a need to build cooperation with other parties and other entities as appropriate to enhance capacity building for the environmentally sound interim storage of mercury and mercury compounds intended for an allowed use.

ARTICLE 11: MERCURY WASTE MANAGEMENT

SUMMARY OF OBLIGATIONS OF CONVENTION

This article addresses the definition of mercury wastes, as well as treatment of waste; including taking measures to manage mercury waste in an environmentally sound manner. The definition of mercury wastes is the substances or objects consisting, containing, or contaminated with mercury or mercury compounds in a quantity above the relevant thresholds that are: (1) disposed

of, (2) intended to be disposed of, or (3) required to be disposed of by the provisions of national law or Article 11 (Lennett and Gutierrez 2014).

Article 11 – Mercury Waste Management	Domestic Law	Comments
Use a definition of mercury waste consistent with Article 11.2.		See discussion below.
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.	São Tomé and Príncipe is a Party to the Basel Convention, although the obligations under the Convention are not yet part of domestic law.	
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.	No law covers this issue.	
Require transport across international boundaries in accordance with the Basel Convention, or if the Basel Convention does not apply, consistent with international rules, standards, and guidelines.	São Tomé and Príncipe is a Party to the Basel Convention, although the obligations under the Convention are not yet part of domestic law.	

Analysis of gaps in legislation relative to Convention obligations

As mentioned, legislation is being developed to manage hazardous waste in accordance with guidelines developed under the Basel Convention and the intent is to include mercury waste as part of these legislations.

Authorized Ministry/Department

- The Ministry of Infrastructures, Natural Resources and Environment
- General Directorate of Environment

Actions to be taken

Since mercury wastes will be designated as hazardous wastes under domestic laws currently under development, and subject to national hazardous waste management standards, the action to be taken is to finalize the law and submit it to approval.

ARTICLE 12: CONTAMINATED SITES

SUMMARY OF OBLIGATIONS OF CONVENTION

Under this Article, each Party shall endeavor to develop appropriate strategies for identifying and assessing sites contaminated by mercury or mercury compounds. The Conference of the Parties shall adopt guidance on managing contaminated sites that may include methods and approaches for:

(a) Site identification and characterization;
(b) Engaging the public;
(c) Human health and environmental risk assessments;
(d) Options for managing the risks posed by contaminated sites;
(e) Evaluation of benefits and costs; and,
(f) Validation of outcomes.

Article 12 – Contaminated Sites	Domestic Law	Comments
Develop strategies for identifying and assessing mercury/mercury compound contaminated sites.	No text covers this issue.	See discussion below.
If risk reduction activities are taken at contaminated sites, they are taken in an environmentally sound manner, incorporating risk assessment where appropriate.	No text covers this issue.	See discussion below.

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

The existing legislation does not address strategies for identifying and assessing sites contaminated by mercury or mercury compounds.

From the analysis of existing national legislation, we cannot find a law that can be updated or modified to include strategies for identifying and assessing sites contaminated by mercury or mercury compounds.

Since the Article 12 allows governments to develop their own legal framework, within their financial and technical capability to remediate mercury contaminated sites, the Ministry of Infrastructures, Natural Resources and Environment, through the General Directorate of Environment must develop a strategy for contaminated sites as required by the Convention. The strategy should define and identify institutions and their respective competences to deal with sites contaminated by mercury or mercury compounds.

The best way to fill strategy gaps for identifying and assessing sites contaminated by mercury or mercury compounds is through the approval of a legal and regulatory framework for mercury. Updating or revising existing laws, such as the decree on solid waste and environmental impact assessment decree, does not seem viable because of the scope of these laws.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- General Directorate of Environment

ACTIONS TO BE TAKEN

Article 12 of the Convention calls for the creation and adoption of guidelines in approaching contaminated sites. There are no mandatory obligations for cleanup. São Tomé and Príncipe has the option to create legislation on this matter or wait for further initiatives from the COP. However, proper identification of contaminated sites is recommended.

Any proposed legislation should provide guidance on the management of contaminated sites; (1) find ways of assessing human health and environmental risk; (2) develop a process for identifying institutions or persons assumed to be responsible as the polluters; and, (3) and how such accountability should be carried out with due penalties.

When taking action to reduce the risks posed by sites contaminated by mercury or mercury compounds, it is important to ensure that actions are performed in an environmentally sound manner, and actions incorporate, where appropriate, an assessment of the risks to human health and the environment from mercury or mercury compounds contained in these sites.

ARTICLE 13: FINANCIAL RESOURCES

SUMMARY OF OBLIGATIONS OF CONVENTION

Each Party is expected to provide, within its capabilities, resources in respect of those national activities that are intended to implement this Convention, in accordance with its national policies, priorities, plans and programs.

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

São Tomé and Príncipe is a country without large financial resources, primarily relying on developmental partners. Approximately 92% of the overall state budget is financed by the country's development partners. However, given the global economic crisis, traditional partners have reduced their development aid to the country

There are no laws at the national law level regulating the issue of resources necessary for national implementation activities of conventions that the country ratifies. National legislation does not provide for activities that, depending on the specific needs and the special circumstances of the country, define plans and programs that are intended to implement the Convention.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment
- Ministry of Health
- Ministry of Finance

ACTIONS TO BE TAKEN

São Tomé and Príncipe will need to find domestic funding, bilateral and multilateral funding for the national implementation of the Convention. Once São Tomé and Príncipe have ratified the convention, they are eligible for additional funding under GEF 7.

ARTICLE 16: HEALTH ASPECTS

SUMMARY OF OBLIGATIONS OF CONVENTION

Article 16 focuses on health ministries by providing guidance on the activities the ministries can undertake to minimize the exposure of their population to mercury.

Article 16 – Public Health	Domestic Law	Comments
Promote the development and implementation of strategies to identify and protect populations at risk, such as developing fish consumption guidelines.	Public Health Code (Decree 59/80); Fisheries and fishery resources decree	See discussion below.
Promote occupational exposure educational and prevention programs.	Public Health Code (Decree 59/80); Fisheries and fishery resources decree	See discussion below.
Promote prevention, treatment, and care services for affected populations.	Public Health Code (Decree 59/80); Fisheries and fishery resources decree	See discussion below.

ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

There are no laws at the national level regulating health aspects regarding mercury or other chemicals. Given the existence of this gap in the law, it is necessary to legislate on these matters. The best legislative drafting technique is to adopt a new law regulating all aspects of mercury related to health.

While the Public Health Code could potentially be used to adopt new regulations pertaining to mercury and health, it is an old law that is practically unused and is unknown to many health professionals. The Health Code was approved in 1980, five years after national independence, in an ideological context that does not exist today. In São Tomé and Príncipe, access to old laws and regulations is prohibitive; they are only available in the Official Gazette in paper.

Not only do individuals not have access to the Health Code, many of the provisions of this Code are out of date and the responsible institutions obsolete. As such, the best legislative drafting technique is to adopt a new law regulating all aspects of mercury related to health.

The Fisheries and Fisheries Resource Decree regulate the conditions for the exercise of fishing and could update to meet the obligation of the Minamata Convention. Currently, São Tomé and Príncipe do not have laboratories capable of analyzing and determining the concentrations of mercury in fish.

AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment.
- General Directorate of Environment.
- Ministry of Health.
- Directorate of Primary Health Care.
- National Center for Endemic Diseases.

ACTIONS TO BE TAKEN

While regulations do exist that can potentially be updated and broaden to minimize exposure by the population to chemical hazards; there still is a need to elaborate health related regulation on mercury in São Tomé and Príncipe, especially in terms of promoting prevention, treatment, and care services for affected populations and occupational exposure and education.

ARTICLE 18: INFORMATION EXCHANGE AND AWARENESS-RAISING

SUMMARY OF OBLIGATIONS OF CONVENTION

Article 17 focuses on the exchange of information between countries and identifies key information that need to be share among Parties. The article also identifies mechanisms for sharing the information covered under Article 17.

Article 17 – Information Exchanges	Domestic Law	Comments
Collect and disseminate information on annual quantities of mercury and mercury compounds emitted, released, or disposed; and other information specified in Article 18.	No text covers this point.	See comments below.
Share information on the health and safety of humans and the environment as non-confidential, in accordance with Article 17.5.	No text covers this point.	See comments below.
Report to the COP on progress in implementing Convention obligations under Article 21.	No text covers this point.	See comments below.

3.6.2 ANALYSIS OF GAPS IN LEGISLATION RELATIVE TO CONVENTION OBLIGATIONS

In this study, no legal provisions were found in São Tomé and Príncipe domestic laws dealing with information exchange. To help comply with Article 17 requirements, São Tomé and Príncipe will need to ensure that during its update of appropriate legislation and regulations on mercury that data on quantities of emissions, releases, and disposal are included. Authorities should be encouraged to include mercury monitoring in fish and other environmental media.

3.6.3 AUTHORIZED MINISTRY/DEPARTMENT

- The Ministry of Infrastructures, Natural Resources and Environment.
- General Directorate of Environment.

3.6 Conclusions and Recommendations

3.6.1 CONCLUSIONS

Although the President of the Republic has already signed the Minamata Convention after approval by the National Assembly on November 22, 2017, there is much to be done at the legislative level to prepare the country for ratification and then the implementation of the Minamata Convention in São Tomé and Príncipe.

There is a legislative omission regarding the existence of a legislative and regulatory framework for chemicals, also associated with the lack of regulations related to mercury, necessary to meet the requirements of the Minamata Convention. The lack of legislation establishing specific prohibitions or restrictions on mercury, as well as legislation that is in harmony with the obligations under the Convention for States is notorious.

It is therefore necessary to legislate and approve legislation in conformity with the Basel and Minamata Convention and to define, among other things, hazardous waste, including mercury-containing wastes, storage and transport of waste, as a way to ensure the compliance of national legislation with these Conventions.

On the other hand, gaps in the political and legislative frameworks to support the provisions of the Convention, coupled with a lack of data on the sources of mercury release and release in the country, are largely ignored. The following summarizes the relationship of São Tomé and Príncipe regulatory instruments along with the articles of the Minamata Convention:

1. Within the country of São Tomé and Príncipe, some parts of the Convention are not immediately relevant and therefore do not need to be part of the country's priorities in addressing legal gaps. These include: supply/mining of mercury (Article 3); manufacturing processes that use mercury or mercury compounds (Article 5); ASGM (Article 7); and, most of the activities listed in Annex D.

2. The life cycle management of mercury-containing products presents a challenge for São Tomé and Príncipe. The country is a net importer of MAPs, thus Articles 3, 4, 10, and 11 are important obligations that will need to be addressed. There are some regulating authorities in São Tomé and Príncipe with competency regarding MAPs; however, existing regulations will need to be bolstered to address the obligations of the Convention.

3. Overall, the review of legislation revealed that a limited number of laws in São Tomé and Príncipe specifically address mercury and MAPs. However, a broad scope of laws and regulations exist in São Tomé and Príncipe that can provide the basic framework for the insertion of specific provisions to address the obligations of the Minamata Convention.

3.6.2 RECOMMENDATIONS

Following the initiative of the General Directorate of Environment, and in addition to measures already taken at national level, the implementation strategy for the Minamata Convention on mercury should be based on the following points:

- In view of the existing legislative gaps and the lack of data on the sources of mercury emission and release in the country, it becomes a priority to draw up an initial diagnosis of mercury management information as well as the preparation of the national emissions inventory and mercury releases and the definition of strategies for implementation of the Convention.
- Legislative and regulatory framework for mercury at national level should be developed in a manner consistent with the Minamata Convention on mercury and other relevant conventions.
- Prepare a decree regulating the management of mercury at national level, and this decree should be in line with the Legislative and Regulatory Framework for Chemicals and Hazardous Waste to be approved.
- The Government should carry out the legislative and regulatory reforms necessary for the implementation of the Minamata Convention in the country and must also generate and disseminate information. Additionally, the Government should create mechanisms for the implementation of strategies and programs to identify and protect populations at risk, particularly vulnerable populations.
- Finally, the Government should initiate mechanisms for obtaining bilateral or multilateral financial resources or financial resources available under the Convention financial mechanism for the national implementation of the Convention.

3.7 Institutional Assessment

3.7.1 INTRODUCTION

In São Tomé e Príncipe, no one institution exists to monitor mercury import, use and disposal in the country. The Convention proposes regulating mercury sources and supplies, mercury added products, mercury wastes and contaminated sites. It also proposes to undertake a national inventory of mercury emissions and releases, and to develop mechanisms that educate and inform the public as well as decision-makers in the country.

In order to thoroughly address these issues, this report on the institutional capacities and gaps in São Tomé e Príncipe is organized in a manner to addresses the major gaps and barriers as they relate to each article of the Minamata Convention on Mercury. The Minamata Focal Point for the Ministry of Public Works, Natural Resources and the Environment (MPWNE) and the National Project Coordinator for the Minamata Initial Assessment, representing the government of São Tomé e Príncipe, identified the principal uses, stakeholders and priority level of the article-specific problems associated with mercury in this analysis (see each table under all articles).

3.7.2 INSTITUTIONAL GAPS

The main gaps that may hinder the implementation of the Minamata Convention in São Tomé and Príncipe include:

- No specific legal and regulatory framework for mercury at national level;
- No existing legislation establishing specific prohibitions or restrictions for chemicals and hazardous waste[2];
- Extensive experience exists within the government related to the management of specific chemicals, primarily pesticides (Chart 13). This experience provides important building blocks towards a more comprehensive approach towards chemicals management that includes mercury and mercury-containing compounds; and,
- There is a need for clear and deliberate coordination across government agencies that clearly define the roles and responsibilities of each agency as it relates to chemicals management.

Chart 13. Institutions Involved in Chemicals Management in São Tomé and Príncipe.

Institutions	Role
The Ministry of Infrastructures, Natural Resources and Environment: The General Directorate of Environment	- Control the direct and indirect effects of the emission of chemicals into the environment (air, water and land) - Monitor the effects of chemicals on the environment - Promote Good Practices / Good Practices in Environmental Licenses / Study of Environmental Impacts
Ministry of Agriculture: Center for Research, Agronomy and Technology (CIAT)	- Make the registration of agricultural chemicals - Develop and enforce legislation on pesticides; - Support farmers through extension service of agricultural advice on chemicals - Better control of illegal use and sale of pesticides - Promote alternatives to pesticides
Ministry of Finance and Blue Economy	- Allocations of financial resources for activities related to chemicals - Allocate resources for inspection, awareness and enforcement
Ministry of Health	- Short-term and long-term impacts of chemicals (including emergencies and poisonings) on the general public or on specific population groups
Ministry of Justice	- Ensure that environmental crimes are penalized appropriately - Promote public access to information on sources of pollution - Record of polluting incidents
Ministry of Labour	- Occupational health and safety issues related to the use and handling of chemicals in the workplace

[2] The National Assembly in São Tomé e Príncipe is currently developing legislation designed to be compliant with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. It is anticipated that these new laws and regulations will be adopted by the end of December 2017.

Institutions	Role
	- Participation in relevant international agreements and conventions
Ministry of Foreign Affairs	- Participation in relevant international agreements and conventions
Directorate of Industry	- Introduction of cleaner production technologies - Promote public access to information on sources of pollution
Directorate of Commerce	- Regulate the import and export of chemical substances, the authority to issue commercial licenses
General Directorate of Customs	- Control the entry or exit of chemicals in the country in line with regulations, tariffs and duties
Directorate of Transportation	- Knowledge of international transport rules and the Basel Convention - Apply the labelling and transport obligations

The Ministry of Infrastructures, Natural Resources and Environment (MIRNA) is responsible for designing, implementing, coordinating, monitoring and evaluating environmental policy.

The General Directorate of Environment (DGA) is one of the directorates of the Ministry of Infrastructures, Natural Resources and Environment, and is charged with the coordination of the country's environmental actions, including defining and participating in the implementation of state policy on the environment.

Article 3: Mercury supply sources and trade

Article 3 focuses on limiting mercury supply and trade. It bans mercury mining for those sites not already mined and phases-out existing mercury mines 15 years after entry into force of the convention. There are five main sources of mercury supply: (1) primary mercury mining, (2) by-product mercury from mining other metals, (3) decommissioning chlor-alkali facilities, (4) recovery of mercury from wastes and used products that contain mercury, and (5) government or private mercury stocks (Lennett and Gutierrez 2014). São Tomé e Príncipe is not conducting activities that involve any of these five main sources.

Article 3- Mercury supply sources and trade		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
At national level, there is no specific legal and regulatory framework for mercury. The Legal and Regulatory Framework for Chemicals and Hazardous Wastes is being	MPWNRE GDE Ministry of Health - Directorate of Primary Health Care - National Center for Endemic Diseases	LOW

developed under the Stockholm Convention on Persistent Organic Pollutants. There is the Law of Bases of the Environment nº 10/99, of April 15, that creates the juridical legal framework of the environment in São Tomé and Príncipe and in its Article 2 says that "every citizen has the right to an environmentally balanced human environment and the duty to defend it." Decree No. 37/99 - Regulation on Environmental Impact Assessment, aims to protect the environment preventively the guarantee of compliance with the process of environmental impact assessment in both public and private activities that can influence the environment.	Ministry of Agriculture and Rural Development Directorate of Agriculture - Center for Agronomic and Technological Research (CIAT) Ministry of Finance, Commerce and the Blue Economy General Directorate of Customs - Customs Tax Police - Directorate of Industries - Directorate of Commerce Ministry of Labor - General Labor Inspection NGOs	

Since none of the major sources of elemental mercury are currently present in São Tomé e Príncipe, the government has identified full compliance with Article 3 as a low priority. Compliance with Article 3 would help provide the institutional structure for improved monitoring of the movement of mercury and would have synergistic overlap with tracking the import of mercury-containing protects (see Article 4).

Article 4: Mercury added products

This article bans the import and export of *products* listed in Annex A Part I and II of the Convention and regulates *processes* listed in Part II of Annex B. The ban is to be effective after the phase-out date, which is the year 2020. The Convention will reduce mercury demand in products through a combination of measures, which (1) phase out mercury uses in many key products, (2) phase down mercury use in others (3) require the review of some products for possible restrictions within five years, and (4) discourage the manufacture of new products using mercury (Lennett and Gutierrez 2014).

Mercury-added products includes batteries, switches and relays, compact fluorescent lamps (CFL), linear fluorescent lamps (LFL), high pressure mercury vapor lamps (HPMV), cold cathode lamps (CCFL) and electronic electrode fluorescent lamps (EEFL) and cosmetics with mercury content above 1.0 ppm, Pesticides, biocides and topical antiseptics and in non-electronic measuring devices such as barometers, hygrometers, manometers, thermometers, and sphygmomanometers.

While São Tomé e Príncipe does not manufacture mercury-added products, it does import, use and discard many of these products. The magnitude of the import, use, and waste of mercury-added products will be determined during the development of National Mercury Profile.

In addition to the product phase-out, reductions, or alternative suggestions, Article 4 also covers measures to phase down the use of dental amalgams. Identifying the use and prevalence of mercury dental amalgams and setting national objectives in São Tomé e Príncipe will be determined through the MIA process.

The phase out of mercury-added products will require a comprehensive approach that includes education, sorting of mercury-added products from the general waste stream, and the establishment of an environmentally sound interim storage facility (see discussion about Article 10). Compliance with Article 4 will require improved coordination between Customs agents and distributors of consumer goods. In addition waste management officials will play an important role in the sorting and proper collection and disposal of these products that contain mercuy.

Article 4 - Mercury-added Product		
Principal Uses	**Stakeholders (see Table 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
At the national level, mercury-added products are not manufactured, but some mercury products are imported and are subject to compliance with the Minamata Convention.	General Directorate of Customs Directorate of Commerce Customs Tax Police Inspection of Economic Activities -	HIGH

As with many small island developing states, São Tomé e Príncipe face the challenge of proper disposal of imported items that contain mercury. Managing the importation, use and disposal of mercury-added products represents a significant challenge for the country. The National Mercury Profile helped quantify the amount of mercury-added products that enter the country and also consider viable alternatives for future use.

Article 5: Manufacturing processes

This article exempts manufacturing processes that uses mercury added products, as well as processes for manufacturing such mercury added products or processes that handle mercury containing waste. The two primary manufacturing processes that consume a large quantity of mercury are (1) in the production of chlorine and caustic soda at mercury-cell chlor-alkali plants and (2) in the production of vinyl chloride monomers. Other uses include sodium or potassium methylate or ethylate as catalysts in the manufacture of biodiesels and polyurethane elastomer applications that require a mercury catalyst. In São Tomé e Príncipe, there are no known existing industries that add mercury as part of the manufacturing process.

Article 5 - Manufacturing Processes in which mercury or mercury compounds are used		
Principal Uses	**Stakeholders**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
There are no known industries in the country that has industrial processes using mercury	N/A	N/A

Article 7: Artisanal and small-scale gold mining

Article 7 addresses artisanal and small-scale gold mining (ASGM) were mercury is used to extract gold. ASGM is defined as "gold mining conducted by individual miners or small enterprises with limited capital investment and production". ASGM is the largest use and emitter of mercury in the world (Lennett and Gutierrez 2014). There is no ASGM activity in São Tomé e Príncipe.

Article 7 - Artisanal and small-scale gold mining		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
ASGM does not exist in São Tomé e Príncipe	N/A	N/A

Article 8: Air emissions

Article 8 regulates the emission of mercury and mercury compounds to the atmosphere. Member states have to control and where feasible reduce emissions from processes listed in Annex D. The five primary source categories are: (1) coal fired power plants, (2) coal-fired industrial boilers, (3) smelting and roasting processes in the production of non-ferrous metals (e.g., lead, zinc, copper and industrial gold), (4) waste incineration facilities, and (5) cement production facilities. Waste incineration facilities include incinerators burning hazardous waste, municipal waste, medical waste, or sewage sludge; cement production sources covers the co-burning of wastes as well (Lennett and Gutierrez 2014).

For existing sources, a government may choose among five options to control mercury emissions. They are: (1) develop a quantified goal for controlling and reducing emissions from relevant sources, (2) identify emission limit values for controlling and reducing emissions from relevant sources, (3) use the best available techniques and best environmental practices to control emissions from relevant sources, (4) generate a multi-pollutant control strategy that would deliver co-benefits for control of mercury emissions and (5) identify alternative measures to reduce emissions from relevant sources (Lennett and Gutierrez 2014).

The five primary sources categories listed above do not exist in São Tomé e Príncipe.

Article 8 - Air Emissions		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
There are no environmental measures in the national legislation established for emission limit values by Industrialists. Article 38 of Basic Law 10/99 refers to Pollution and Contamination, where the introduction of any pathogenic substances, radiations or micro-organisms into the air, water, soil or the environment is a cause of pollution and / or contamination of the environment. Subsoil that alter, temporarily or irreversibly, its quality or interfere with its normal, conservation or evolution.	MPWNRE GDE	LOW

The primary fuel for energy production on the island is heavy fuel oil for diesel generators and there are no plans for the development of any coal combustion facilities. Currently no waste incinerators are present on the island but Article 8 provides the structure for future emissions control from these sources if one does get built.

It is part of the government program to privilege and promote the production of clean energy through renewable sources.

Article 9: Releases to land and water

This Article addresses identifying and reducing releases of mercury and mercury compounds to land and water from the relevant point sources not addressed in other provisions of this Convention. Parties must identify significant point sources of mercury releases. There are four control measures that must be taken for the release of mercury to land and water and they include: (1) define release limit values, (2) use BAT and BEP, (3) identify a multi-pollutant strategy that will deliver co-benefits for control of mercury releases and (40 identify alternative measures to reduce releases from relevant sources (Lennett and Gutierrez 2014).

In São Tomé e Príncipe, the release of mercury and mercury compounds to land and water is relatively unknown and not described. The MIA process facilitated the quantification of potential

sources of mercury released. In response, the government of São Tomé e Príncipe will make a decision to prepare an optional plan that would establish expected targets, goals, and outcomes.

Article 9 - Releases to Land and Water		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
Environmental legislation established for emission limit values by industrialists does not exist in national legislation, but the Environmental Law no. 10/99 in its Article 29 on water, Article 30 addresses the defense and valorization of Soil and Article 31 addresses the defense and valorization of the subsoil. Article 38 of Basic Law 10/99 refers to Pollution and Contamination, where the introduction of any pathogenic substances, radiations or micro-organisms into the air, water, soil or the environment is a cause of pollution and / or contamination of the environment. Subsoil that alter, temporarily or irreversibly, its quality or interfere with its normal, conservation or evolution. Article 21 of the Decree on Waste (Decree No. 36/99) provides that waste disposal processes are prohibited in the country by dumping or immersing in springs, rivers and streams, along the sea coast, as well as in the territorial sea, Exclusive Economic Zone, continuous zone and in any other place contrary to the provisions of the decree.	MPWNRE GDE Directorate General of Natural Resources and Energy (DGRNE) Ministry of Defense and Internal Administration - Coast Guard - Port Maritime Institute (IMAP**)**	HIGH

Mercury releases to land and water can originate from a variety of sources including direct point sources, waste deposits, legacy deposits from abandoned contaminated sites and other sources. Because of the limited institutional capacity for handling, managing, and storing mercury or mercury-containing waste, it is thought that releases of mercury from waste management areas is a high concern, particularly in and around the capital of São Tomé.

Article 10: Environmentally sound interim storage of mercury

Article 10 addresses ensuring interim mercury storage is conducted in an environmentally sound manner, taking into account guidelines to be developed by the Conference of the Parties (COP). In São Tomé e Príncipe, there are no government-sanctioned facilities or storage of mercury and/or mercury containing products.

Article 10 - Environmentally Sound interim storage of mercury		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
There is no national law on hazardous waste, specifically mercury waste. Under the Stockholm Convention on Persistent Organic Pollutants, the drafting of the Hazardous Waste Act and Regulation in which mercury is to be included is underway.	MPWNRE GDE	HIGH

Article 11: Mercury waste management

This article addresses the definition of mercury wastes, as well as treatment of waste; including taking measures to manage mercury waste in an environmentally sound manner. The definition of mercury wastes is the substances or objects consisting, containing, or contaminated with mercury or mercury compounds in a quantity above the relevant thresholds that are: (1) disposed of, (2) intended to be disposed of, or (3) required to be disposed of by the provisions of national law or Article 11 (Lennett and Gutierrez 2014).

In São Tomé e Príncipe, regulations are being developed to manage hazardous waste in accordance with the guidelines developed in Stockholm Convention and the intent is to include mercury waste as part of these regulations. The guidelines developed will need to be in compliance with the requirements developed by the COP for the Minamata Convention.

Article 11- Mercury Waste Management		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**

There is no national law on hazardous waste, specifically mercury waste. Under the Stockholm Convention on Persistent Organic Pollutants, the drafting of the Hazardous Waste Act and Regulation in which mercury is to be included is underway.	MPWNRE GDE	HIGH

As a small island developing state with limited institutional capacity or infrastructure for managing mercury or mercury-containing waste, Articles 10 and 11 represent a high priority. São Tomé e Príncipe is signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The country's participation in the Basel Convention (as well as the Stockholm and Rotterdam Conventions) provides some existing structure for mercury management to be included. Effectively combining mercury with the on-going efforts of the government (e.g., management of POPs) will be an important goal of future implementation of the Minamata Convention.

Article 12: Contaminated sites

The Article recommends Parties to develop strategies for identifying and assessing sites contaminated by mercury or mercury compounds. The article specifies that the COP will issue guidance on managing contaminated sites and encourages Parties to cooperate in developing strategies and implementing activities with regards to identifying, managing and remediation of contaminated sites. However, there are no mandatory obligations in cleaning up contaminated sites or for assessing risk to human health.

São Tomé e Príncipe has taken measures to identify and assess contaminated sites under the Stockholm Convention, but an inventory of sites contaminated with mercury and mercury compounds is needed. The MIA process facilitated the identification and determination of the overall magnitude and risk that mercury-contaminated sites may pose.

Article 12 – Contaminated Sites		
Principal Uses	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
There are no national laws on contaminated sites. There are reports on POPs contaminated sites, under the Stockholm Convention for the elaboration of the Stockholm Convention National Plan	MPWNRE GDE	HIGH

(NIP), but a detailed inventory of sites contaminated by Mercury is needed.		

Article 13: Financial resources

This Article addresses financial resources available under the Convention financial mechanism and other resources available from multilateral, regional, and bilateral funding sources.

Article 13 - Financial Resources		
Principal Activities	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
At the national level there is a financial constraint to managing chemicals in specific mercury. There is a need for technical assistance from the Convention to meet the obligations of the Convention.	Government of São Tomé e Príncipe GEF Minamata Convention Bilateral cooperation	HIGH

Access to financial resources to support implementation activities will be important for São Tomé e Príncipe. The National Mercury Profile and MIA Report have identified priority areas for future action. The likelihood of implementing strategies that address these priorities will be greatly enhanced through financial (and technical) assistance.

Article 16: Public health

This article addresses promoting the development and implementation of strategies to identify and protect human populations at risk, such as developing fish consumption guidelines, which recognize activities will involve the World Health Organization and public health ministries. Article 16 provides guidance to health ministries, including (1) adopting science-based health guidelines, (2) setting targets for mercury exposure and reduction, and (3) public education (Lennett and Gutierrez 2014). Sensitization sessions and awareness campaigns of communities in terms of prevention, treatment and health care services for the population will be developed.

Article 16 - Public Health		
Principal Activities	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
There are no known studies or information available that addresses the effects of mercury on human health including vulnerable populations. It is necessary to establish a national database on possible negative impacts on the health of population and the environment in São Tomé e Principe. Sensitization sessions and public awareness about the harmful effects of mercury on human health and the environment need to be developed.	MPWNRE GDE Ministry of Health - Directorate of Primary Health Care - National Center for Endemic Diseases	MEDIUM

Article 18: Information exchange and awareness-raising

The article addresses providing information to the public on mercury and mercury added products with regards to environmental and health impacts. Information to be made available includes: (1) the health and environmental effects of mercury and mercury compounds, (2) alternatives to mercury and mercury compounds, (3) topics identified in Article 17 (Information Exchange), (4) results of research, development and monitoring activities identified in Article 19, and (5) activities to meet obligations under the Convention (Lennett and Gutierrez 2014).

Article 18 - Information Exchange and Awareness-Raising		
Principal Activities	**Stakeholders (see page 2 for full names)**	**Priority level of this problem associated with mercury based on the São Tomé e Príncipe government evaluation:**
Education, training and public awareness are needed about the effects of exposure to mercury on human health and the environment. Currently, there is no national plan for education and information exchange related to mercury. Need to create an internal mechanism for emissions records and transfer of pollutants and, where appropriate, for the collection and disclosure of information on estimates of annual amounts of mercury and mercury compounds are emitted, released or disposed of through human activities.	MPWNRE GDE Ministry of Health - Directorate of Primary Health Care - National Center for Endemic Diseases	HIGH

In São Tomé e Príncipe, there is little capacity for assessing potential health exposure risks associated with mercury. Laboratory capacity is low and medical professionals are not aware nor have the capacity to identify symptoms associated with mercury exposure. Similarly, laboratory capacity is limited for measuring mercury in biotic or abiotic matrices. This may inhibit future assessment and monitoring efforts in the country.

3.8 Recommendations of the changes needed for the implementation of the Minamata Convention

The General Directorate of Environment submitted the Minamata Convention to the Government and it was approved by the Council of Ministers and was subsequently submitted to the National Assembly for ratification. São Tomé e Príncipe has begun the process of implementing the Minamata Convention, even before formal ratification.

Following the initiative of the General Directorate of Environment, and in addition to measures already taken at national level, the strategy for implementing the Minamata Convention on mercury should be based on the following points:

- Promotion of adequate institutional arrangements for the implementation of the Convention- this process should be coordinated by the General Environment Directorate, as one of the directorates of the Ministry of Infrastructures, Natural Resources and Environment.
- Institutionalization of a coherent legal and regulatory framework;
- Accountability of all parties involved in the management of chemicals;
- Raising awareness, education, training and exchange of information; and,
- Capacity building for institutions involved in the implementation of the Convention.

For this purpose:

- Legislative and regulatory texts should be developed in a manner consistent with the Minamata Convention on Mercury and other relevant conventions;
- Measures to strengthen the national institutional capacity and legislative framework of the country for mercury should be reinforced;
- Civil society and the private sector should be involved in the implementation of the Minamata Convention;
- Measures should be taken to disseminate information, raise public awareness and education;
- Training should be organized; and,
- Implementation of the strategy and action plans should be based primarily on two levels (National Level, District and Regional Level).

3.9 Conclusions

São Tomé e Príncipe will likely ratify the Minamata Convention on Mercury and therefore will be obliged to implement the provisions of the Conventions. Based on this Institutional Gap Analyses, the following is considered:

- Within São Tomé e Príncipe, several parts of the Convention are not particularly relevant and therefore may not be part of the country's implementation plan. These are related, but not limited to, in-country chemical manufacturing processes such as production of non-ferrous metals and other processes (Article 5) and ASGM (Article 7);

- Other articles of the Convention are relevant and apply in São Tomé e Príncipe. It is likely that the country is importing mercury-added products and these would need to be halted by 2020 based on the Convention. In accordance to the Convention, there is a pressing need for a baseline assessment of mercury, called the Minamata Initial Assessment.

- In terms of institutional and technical capacity, governmental staff who can oversee effective implementation of mercury assessment may be limited in the knowledge needed to meet the obligations of the Minamata Convention and therefore may need expert assistance.

- São Tomé e Príncipe requires interim storage facilities for mercury or mercury containing waste products.

- From past exercises, there is generally limited education and awareness among stakeholders and the public on chemical related issues, especially mercury. This is in part related to low awareness by stakeholders. These limitations may reduce the ability of national plans to be effectively executed. As such, an education and media plan will be a key component of a future information communication.

- There is a general lack of information on mercury concentrations in the environment in São Tomé e Príncipe. Future implementation activities and related reporting would benefit from biomonitoring of mercury, particularly in commonly consumed fish and humans.

Chapter IV: Identification of Populations at Risk and Gender Dimensions

4.1 Preliminary review of potential populations at risk and potential health risks

Many environmental variables can influence human health. Designated as a global pollutant and contaminant of concern, mercury is recognized as a human health issue due to the multiple neurological and physiological effects that have been documented at varying exposure levels. In São Tomé and Príncipe, some populations may have a greater risk for mercury exposure and health-associated impacts due to occupational hazards, social and economic factors, and proximity to mercury point sources. Avenues for direct mercury exposure include ingestion, inhalation, dermal contact, and trans-placental/in-utero exposure. Additionally, the severity of exposure may vary based on the duration, frequency, and magnitude of exposure levels.

As an island nation, São Tomé and Príncipe naturally rely heavily on its marine resources. Therefore, dietary dependence upon seafood greatly increases the risk of exposure to mercury, particularly through the consumption of high trophic-level, long-lived predatory species, such as tuna. According to Carniero (2012), the fishing sector in São Tomé and Príncipe is mainly dominated by traditional, small-scale fishing activities, and therefore many of the marine resources are harvested in waters within close proximity to the coast, with foreign fleets harvesting many of the migratory, pelagic fish species. Demersal fish species, including seabreams and wreckfish, are commonly captured by local artisanal fishermen, while several species of tuna, shark and swordfish are primarily targeted by larger vessels from foreign fleets (Carniero, 2012). Smaller pelagic species, including mackerel, round scad, sardines and flying fish are frequently caught by artisanal boats and are commonly available at local markets for consumption. As exposure levels are directly dependent upon both the amount and type of fish consumed those individuals that rely heavily on seafood as primary dietary items may be at greater risk to the health impacts of mercury exposure.

Quantitative information related to mercury exposure and occupational hazards are limited for São Tomé and Príncipe. As a result of the National Mercury Inventory, it was determined that dental amalgams are currently prepared, used and disposed of throughout the country. Therefore, this source of mercury represents a potential exposure risk to those individuals with mercury amalgam fillings, in addition to dental professionals during the preparation and disposal phases. Mercury-added products, including thermometers, electrical switches and relays, batteries, light sources-containing mercury, and medical blood pressure gauges, were also identified as sources of mercury release in São Tomé and Príncipe. These sources may expose individuals to mercury during the disposal phase of these products due to end-of-life handling and storage, particularly during clean-up as a result of breakage or during disposal within landfill settings. Additionally, other medical equipment and laboratory chemicals were identified as sources of mercury, based on country population estimates, and may represent exposure pathways to medical professionals and laboratory employees, through the general use and handling during breakage.

The open burning in both formal and informal landfills waste and, was also identified as a source of mercury contamination, and therefore a potential exposure risk in São Tomé and Príncipe.

Through the inventory process, it was determined that each year 2,425 tonnes of the collected municipal and general waste is openly burned at both landfills and informal dump sites, representing an estimated release of 12 kg of Hg. It was also determined that 27 tonnes of medical waste is burned each year through open burning, resulting in an estimated output of 1 kg of Hg/year. An additional 9,700 tonnes of waste is estimated to be collected and disposed of at informal dump sites, resulting in approximately 48 kg of Hg/year. The open burning of waste and disposal at informal sites may represent an exposure risk to landfill employees that are conducting the burning, as well as residents that may be living in close proximity to these sites.

Further quantitative assessments of mercury concentrations in the environment (air, water, soils, fish) paired with associated public health surveys in São Tomé and Príncipe would work to better identify and understand potential populations at risk to mercury exposure. This effort could be conducted in collaboration with the WHO, local and international researchers, NGOs, research facilities and relevant government ministries.

4.2 Assessment of potential gender dimensions related to the management of mercury

As a result of differing social, familial and occupational roles in society, men and women often have varying exposure risks to harmful contaminants, including mercury. While dedicated studies have not been conducted regarding the differences in mercury exposure as it relates to gender dynamics in São Tomé and Príncipe, the following broad assumptions may be made, but would require further study to confirm their validity:

Occupational Differences

- Medical, hospital and health-care employees
- Industrial employees
- Waste management employees, including waste collectors, incinerator workers and landfill workers
- Dental professionals & dental hygienists

Social Factors

- Use of mercury containing cosmetics, soaps, and skin creams

Family Roles

- Cleaning of broken thermometers, light bulbs, or other mercury containing products
- Informal burning of waste (household)

Chapter V: Awareness/Understanding of Workers and the Public; and Existing Training and Education Opportunities of Target Groups and Professionals

The implementation of awareness-raising actions concerning the harmful effects of mercury on health and the environment is still at a very early stage. In the meantime, the Democratic Republic of São Tomé and Príncipe has ratified the Stockholm Convention on Persistent Organic Pollutants and the Rotterdam Convention on International Trade in Hazardous Chemicals, and therefore under the Rotterdam Convention, carried out some awareness- national technical staff and civil society as follows:

- **Practical training on operational aspects and identification of the elements of the action plan**

The objective of this action was to inform the national actors involved in the management of chemicals listed in the annexes to the Rotterdam Convention on all aspects of the Convention and on the importance of their rational management. Twenty-seven technicians from national institutions and civil society participated on 10-14 March 2014.

- **Preparation of the study on the use of pesticides and products of industrial use**

It aimed to draw up an inventory at the national level in order to contribute to the raising of farmers and to protect the health of the populations and the preservation of the environment. Information on the import and use of pesticides of agricultural use and products of industrial use, identification of pesticide formulations, identification of the risk factors associated with health and the environment in the use of pesticides and the identification of possible accidents caused by the use of pesticides.

- **Training workshop on the effective use of pesticides**

It was designed to provide trainees with knowledge on the sustainable use of chemicals to protect not only the environment, but also the health of pesticide users and the population. A total of 53 technicians from national public institutions, NGOs and agriculturists took part in target groups dealing with chemical products.

- **National campaign to raise awareness of the general population in the media**

It aimed to inform, educate, communicate and raise awareness among the general population about the measures necessary to protect health and the environment from the negative effects of poor use of chemicals (pesticides) and to impart knowledge to all segments of the population about the rational management of products through environmental education on TVS, national radio.

Elaboration of a theatrical play

Elaboration of a theatrical piece on the use of the individual protective equipment.

- **Distribution of personal protective equipment Kits (PPE) to farmers/horticulturalists**

The main purpose of the distribution of the kits was to equip some farmers / horticulturists in the country with EPIs kits composed of masks, gloves, glasses, boots, hats and sweaters, for the purpose of changing people's behavior, implementing good agricultural practices.

The country has faced several difficulties regarding the ecologically sound management of chemicals specifically agricultural pesticides and industrial chemicals.

Chapter VI: Implementation Plan & Priorities for Action

This implementation plan outlines the activities to be performed by the Country under the Minamata Convention. The charts below illustrate the actions set forth for the 2019–2023 timeframe, as well as the estimated costs to perform the activities, the schedule and the institutions in charge of the implementation of each activity.

The Implementation Plan contains the following measures and the action plan:

- Measures to strengthen the national institutional capability and the country's mercury management legislative framework **(Article 14)**;
- Action plan towards the management of mercury-contaminated sites **(Articles 10, 11, 12)**;
- Measures to promote information, awareness and education to the general public **(Articles 17, 18)**;
- Action plan towards the management of mercury-added equipment waste **(Article 4)**;
- Measures to improve the national analytical capability, in addition to the mercury monitoring, research and development **(Articles 14, 19)**; and,
- Action plan towards the progressive reduction of mercury emissions **(Articles 8, 9)**.

The costs of the measures and actions proposed were estimated based on the amounts set forth in the action plan to implement the Stockholm Convention regarding persistent organic pollutants, given the similarity of the actions set forth in order to avoid duplication.

The total estimated amount is USD $877,000 for a 5-year period.

Priority order	**Measures and action plan**	Amount (USD)
1	Measures to strengthen the national institutional capability and the country's mercury management legislative framework **(Article 14)**	$108,000
2	Action plan towards the management of mercury-contaminated sites **(Articles 10, 11, 12)**	$186,000
3	Measures to promote information, awareness and	$270,000

	education to the general public **(Articles 17, 18)**	
4	Action plan towards the management of mercury-added equipment waste **(Article 4)**	$95,000
5	Measures to improve the national analytical capability, in addition to the mercury monitoring, research and development **(Articles 14, 19)**	$140,000
6	Action plan towards the progressive reduction of mercury emissions **(Articles 8, 9)**	$78,000
	Total	**$877,000**

Article 14: Building technical assistance capability and technology transfer		Amount USD	Responsible Person	Period
1. Measures to strengthen the national institutional capability and the Country's mercury management legislative framework (Article 14)		**108,000**		
Mercury-added products	Strengthening the National Intersectoral Commission for chemical safety	$5,000	MIRNA/DGA	2019
	Strengthening the legal realm with competent authorities to update, approve and implement environmental laws in accordance with international standards	$3,000	MIRNA/DGA	2019–2023
	Implementing a law on chemicals, standards, barcode and labeling, as well as tagging to facilitate the environmentally safe handling of chemicals	$60,000	MIRNA/DGA	2019
Mercury-contaminated sites	Establishing procedures and standards to manage contaminated sites	$10,000	MIRNA/DGA	2019–2022
	Promoting exchanges with benchmark international institutions towards the management of contaminated sites	$30,000	MIRNA/DGA	2019–2022

Article 17: Sharing information **Article 18: Information, awareness and training the general public**		Amount USD	Responsible Person	Period
2. Measures to promote information, awareness and education to the general public (Articles 17, 18)		**$186,000**		
	Preparing informational material in an accessible language, highlighting the risks of mercury to health and the environment	$8,000	MIRNA/DGA	2019–2022
	Promoting domestic technical reports about mercury	$5,000	MIRNA/DGA	2019–2022
	Awareness-raising campaigns to recall obsolete mercury-added equipment	$20,000	MIRNA/DGA	2019–2023
	Workshops and awareness-raising	$25,000	MIRNA/DGA	2019–

	actions through the media (TV, radios, newspapers, magazines)			2023
Mercury-added products	Training domestic technical cadres for continuous follow-up of mercury-added products	$50,000	MIRNA/DGA	2019–2023
	Elaborating information brochures on the impact of mercury on health and the environment	$8,000	MIRNA/DGA	2019–2022
	District and regional seminars towards the promotion of guides and training the technicians involved in the actions	$15,000	MIRNA/DGA	2019–2021
	Workshops with NGOs and the civil society	$10,000	MIRNA/DGA	2019–2020
Mercury-contaminated sites	Awareness-raising campaigns in rural communities, creation of posters, brochures, foldouts and leaflets	$20,000	MIRNA/DGA	2019–2022
	Production and promotion of radio and television shows	$10,000	MIRNA/DGA	2019–2023
	Training NGOs, district chambers and community leaders on mercury management	$10,000	MIRNA/DGA	2019–2020
	Promoting reports on mercury-contaminated sites	$5,000	MIRNA/DGA	2019-2022

Article 14: Building technical assistance capability and technology transfer **Article 19: Research, development and surveillance**		Amount USD	Responsible Person	Period
3. Measures to improve the national analytical capability, in addition to the mercury monitoring, research and development (Articles 14, 19)		**$270,000**		
	Strengthening existing laboratories and training national technical cadres	$30,000	MIRNA/DGA MADR/CIAT Ministry of Health	2019–2022
	Developing nationwide investigations to identify the level of mercury toxicity in the Country	$40,000		2019–2020
	Establishing sub-regional exchanges for sharing information and experiences related to the ecological and rational management of mercury-added products	$25,000		2019–2020
	Elaborating mercury-related statistics	$60,000		2019-2020
	Establishing a multisectoral technical team to monitor contaminated sites	$5,000	MIRNA/DGA	2019
	Strengthening existing institutional	$10,000	MIRNA/DGA	2019-

	capabilities			2020
Mercury-added products	Strengthening existing laboratories with equipment and consumables to perform chemical, biological and toxicological analyses	$100,000	MIRNA/DGA	2020–2021

Article 10. Environmentally rational temporary storage of mercury **Article 11. Mercury waste** **Article 12. Contaminated sites**		Amount USD	Responsible Person	Period
4. Action plan towards the management of mercury-contaminated sites (Articles 10, 11, 12)		**$95,000**		
	Establishing a technical team to inspect, evaluate and investigate contaminated sites	$5,000	MIRNA/DGA	2019-2020
	Creation of a national inventory of mercury-contaminated sites	$30,000	MIRNA/DGA	2019-2020
	Creating a domestic database through the geographic information system towards the management of contaminated sites	$10,000	MIRNA/DGA	2019
	Recovery and management of contaminated sites	$50,000	MIRNA/DGA	2019-2022

Article 4. Mercury-added products		Amount USD	Responsible Person	Period
5. Action plan towards the management of mercury-added equipment waste (Article 4)		**$140,000**		
	Recovery/improvement of the Morro Carregado warehouse	$40,000	MIRNA/DGA Ministry of Health	2019–2021
	Training and exchange among technical cadres, countries and institutions associated with mercury	$25,000	MIRNA/DGA	2019-2021
	Awareness-raising campaigns to collect obsolete equipment	$10,000	MIRNA/DGA MADR/DA	2019-2021
	Implementing the best techniques and environmental practices available	$50,000	MIRNA/DGA	2019-2021

	Elaborating and publishing procedure guides to identify mercury-added equipment waste	$15,000	MIRNA/DGA	2019-2020

Article 8. Emissions **Article 9. Releases**		Amount USD	Responsible Person	Period
6. Action plan towards the progressive reduction of mercury emissions (Articles 8, 9)		**$78,000**		
	Evaluation, selection and implementation of technology transfer to the main emission sources identified	$20,000	MIRNA/DGA	2020-2021
	Organization of awareness-raising campaigns in rural communities, schools, etc.	$8,000	MIRNA/DGA MADR MECC	2019–2022
	Preparing a domestic waste management master plan	$50,000	MIRNA/DGA	2019–2021
	Developing and implementing an ecologically rational policy of hazardous medical waste	$50,000	MIRNA/DGA Ministry of Health	2019-2022

References:

- Azevedo FA, Nascimento ES, Chasin A. (Environmental Notebook) Updated Aspects of the Toxicological Risks of Mercury. TECBAHIA R. Baiana Tecnol. 2001; 16(3)
- Azevedo, F. A.; Nascimento, E. S.; Chasin, A. A. M. Mercury. In: Azevedo, F. A.; Chasin, A. A. M., Eds. Metals: management of toxicity. Sao Paulo: Atheneu; 2003.
- Baia, D. (2014) Young People's Attitude Toward Environmental Issues Associated with Climate Change
- Carneiro, G. (2012). They Come, They Fish, and They Go:" EC Fisheries Agreements with Cape Verde and São Tomé e Príncipe.
- CGD (2014) - *São Tomé and Príncipe : Opportunities and potential for development.* Caixa Geral de Depositos Portugal.
- Diagnosis of the energy sector of São Tomé and Príncipe - Republic of China, Taiwan - 2008.
- Lennett, D. and R. Gutierrez. 2014. Minamata Convention on Mercury: Ratification and Implementation Manual. Zero Mercury Working Group (available for download at: http://nrdc.cn/Public/uploads
- Ministry of Infrastructures, Natural Resources and Environment, NAPA, Sao Tome, 2006.
- Ministry of Infrastructures, Natural Resources and Environment, SNC, Sao Tome, 2011.
- National Institute of Statistics - NIS (2012). IV General Census of Population and Housing, São Tomé and Príncipe .
- NIS-STP (2012) - *General Census of Population and Housing in STP* Ministry of Planning and Finance. São Tomé and Príncipe
- Participatory Strategy for Water and Sanitation of São Tomé and Príncipe for 2030, 2010
- Quaresma, S. (2017) Baseline Study on Pesticide Management
- RDSTP, UNDAF. United Nations Framework Program for Development Assistance, 2012-2016.
- RDSTP. National Strategy for Poverty Reduction II (2012-2016)
- RDSTP. National Inventory of GEE, Sao Tome, 2009.
- Schhute, N. P.; Knight, A. L.; Jahn, O. Mercury and its compounds. In: Zenz, O. C.; Dickerson, B.; Horvarth, E. P. (eds.). Occupational medicine. 3rd ed. St. Louis: Mosby-Year Book;
- Thesis (2010), Plan of Action for the Integrated Management of Urban Solid Waste.

ANNEX I: Stakeholder Engagement Process

Nº	NOME	INSTITUIÇÃO	CONTACTO
NOMES DOS MEMBROS DO COMITÉ NACIONAL DE GESTÃO DOS PRODUTOS QUÍMICOS			
1.	Aline Castro	Direção de E. Informação e C. Ambiental	9925534
2.	Antónia Júnior	Direção dos Cuidados de Saúde	9917907
3.	Antónia Neto	Universidade USTP	9913772
4.	Arlindo Tavares Pereira	Rep.Sector Privado- Camara do Comércio	9918387
5.	Constantina Oliveira	Direção Geral do Ambiente	9910267
6.	Dalanda Leonor Quaresma	Direção do Comercio	9912565
7.	Darnel Hélio de Sousa Baia	Direção jurídica e de Impacto Ambiental	9921463
8.	Ersted Gomes	DGRNE	9926132
9.	Felisberto Pimentel	Direção da Industria	9971063
10.	Fernando Candô	Polícia Fiscal Aduaneira	9912320
11.	Juvenal Bonfim da Graça	Direção de Apoio ao D Agricultura	9928575
12.	Lewis da Trindade	Centro de Investigação A Tecnológica CIAT	9992025
13.	Luís Neto	CONPREC	9913522
14.	Mikhail Saraiva	Representante da ONGs-FONG	9866181
15.	Osvalda dos Santos	Descentralização. A. Autarquias	9912564
16.	Celso Fernandes	Direção Geral das Alfandegas	9903893
17.	Sulisa Quaresma	DCSQA	9971852
18.	Wanderley Rodrigues de Carvalho	Direção de Regulação e C A Económicas	9854155
	INSTITUIÇÕES ESTATAIS		
19.	Abnilde Lima	Observatório Ambiental	9971692
20.	António Brito	Secretaria Regional para Ambiente	9949217

21.	Francisco Gula	Secretaria Regional para Ambiente	9946363
22.	Odair dos Santos	Policial Fiscal Aduaneira	9921457
23.	Manuel do Rosário	DGA	9911266
24.	Kassi Bragança	DGA	9808627
25.	Miriam Matias	DGA	9919600
26.	Loy Heng	Representante do Ministro	
27.	Salvador Pontes	DGA-DCSQA	9909132
28.	Antonio Ramos	Direcaõ dos Trsnportes	9911060
	ONGs		
29.	Inês Ribeiro	TESE	9865624
	COMUNICAÇÃO SOCIAL		
30.	Delfim Rocha	TVS	9907643
31.	Djair Nascimento	TVS	9085204
32.	Wilddley dos Santos	TVS	9016932
33.	Vencislau Pereira	RTP- AFRICA	9905576
34.	João D'Alva	RTP- AFRICA	9953777
35.	Heracio Herculano	RADIO NACIONAL	9866890

Ministries Involved:

- General Directoriate of the Environment
- Ministry of Agriculture and Rural Development
- Ministry of Public Works, Natural Resources and the Environemtn
- Ministry of Education, Culture and Science
- Ministry of Defense and Internal Administration
- Ministry of Finance, Commerce and Blue Economy
- Ministry of Health

ANNEX II: UNEP Toolkit Inventory Level 1 Calculation Spreadsheet (attached separately)