Report

The Minamata Convention on Mercury

and its implementation in the **Latin America and Caribbean** region

Basel Convention Coordinating Centre
Stockholm Convention Regional Centre
URUGUAY

UNEP

This report provides basic information on the **Minamata Convention on Mercury** and its implementation in the region of Latin America and the Caribbean. For further precision and detail on the provisions and scope of the Convention, please see the original text thereof, available at the official website: **www.mercuryconvention.org.**

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Prologues

The region of Latin America and the Caribbean actively participated throughout the negotiating process of the Minamata Convention on Mercury, thus contributing responsibly to the search of appropriate solutions to the serious adverse effects on human health and the environment derived from the production, use and disposal of mercury and mercury-added products.

These issues pose important challenges for many of the countries of the region, for example to reduce the use of mercury in artisanal and small-scale gold mining. While some examples of regulations, policies and measures to deal with these problems are already in place in the region, there is still a long way to go. The Minamata Convention represents an opportunity to address these activities within an internationally agreed framework that will provide cooperation and supporting mechanisms to developing countries in accordance with their needs.

Our region is in general characterized by a high degree of adherence to the multilateral environmental agreements, and we hope that this trend is also reflected in the prompt ratification of the Minamata Convention, and that its implementation contributes to an enhanced environmental management in our countries. By providing relevant information to our region on the key elements of the Convention, this report aims to contribute to the analysis on the opportunities and challenges posed by the implementation of the Convention, both for decision makers as to a wider range of recipients of the private sector and civil society.

Margarita Astralaga
Director and Regional Representative
United Nations Environment Programme

Prologues

The Minamata Convention on Mercury is a landmark in the Latin American and Caribbean leadership in the global sustainable development agenda.

The Latin America and the Caribbean countries coordinated their positions from a strong regional perspective, respecting the whole spectrum of situations in the continent, but always in solidarity building consensus positions, which – to a great extent – set out the unique personality of the legally binding agreement.

The Convention comes after more than a decade of hard work in the chapter on chemicals and wastes, where the region made contributions, articulated and determined the course of the work in a unique manner, both in the development of the three Conventions and in SAICM.

Also, the instrument should be considered as the first United Nations Convention arising under the influence of the Rio+20 agreements: a true sustainable development agreement. It was Latin America and the Caribbean who, based on the specificity of their mining sector both industrial and small scale, from the public health perspective, and considering the core importance of the human rights dimension, insisted in shaping a text that addressed the entire life cycle of mercury, applying a holistic view and a contemporary vision of sustainable development.

The region led the international community from the Bureau of the Intergovernmental Negotiating Committee, and directly drafted crucial areas of the Convention, such as the innovative articles of its financial mechanism and those referred to compliance and public health, as well as the measures to monitor small-scale gold mining and the references to small island developing states.

The diversity of Latin America and the Caribbean and the transparency of their work in GRULAC were instrumental in achieving this text that today we are to ratify and efficiently implement.

Thinking of the people that are most vulnerable to mercury pollution in the continent, but also aware that all global problems require global solutions, we congratulate everyone that contributed to this new and key step in the progressive development of the International Environmental Law , inspired by the spirit of the UNEP's Montevideo Programme.

Fernando Lugris
Ambassador
Chair of the Intergovernmental Negotiating Committee on mercury

Introduction

Importance of Mercury in Health and Environment

Mercury is a metal characterized by being an odorless liquid at room temperature. It forms alloys (amalgams) with most metals, being those with gold and silver the most relevant. As a liquid metal, it is always in equilibrium with its vapor pressure, and hence, is easily volatilized.

In nature, mercury is associated with other elements such as sulfur, for instance: sulphide class reddish mineral cinnabar, which is 85% mercury and 15% sulfur (mass).

Mercury is released into the environment both from natural sources (fires, faults and volcanic eruptions) and human activities (anthropogenic). Mercury has been used in many applications, including, but not limited to, various production processes where it is used as a catalyst in the chlor-alkali industry and in the production of vinyl chloride, for the extraction of gold, in electrical and electronic equipment and in measuring devices (e.g., thermometers). Mercury can also be non-intentionally released from point sources such as smelting and roasting processes used in the production of non-ferrous metals, coal as a source of power, e.g., in power plants and industrial boilers.

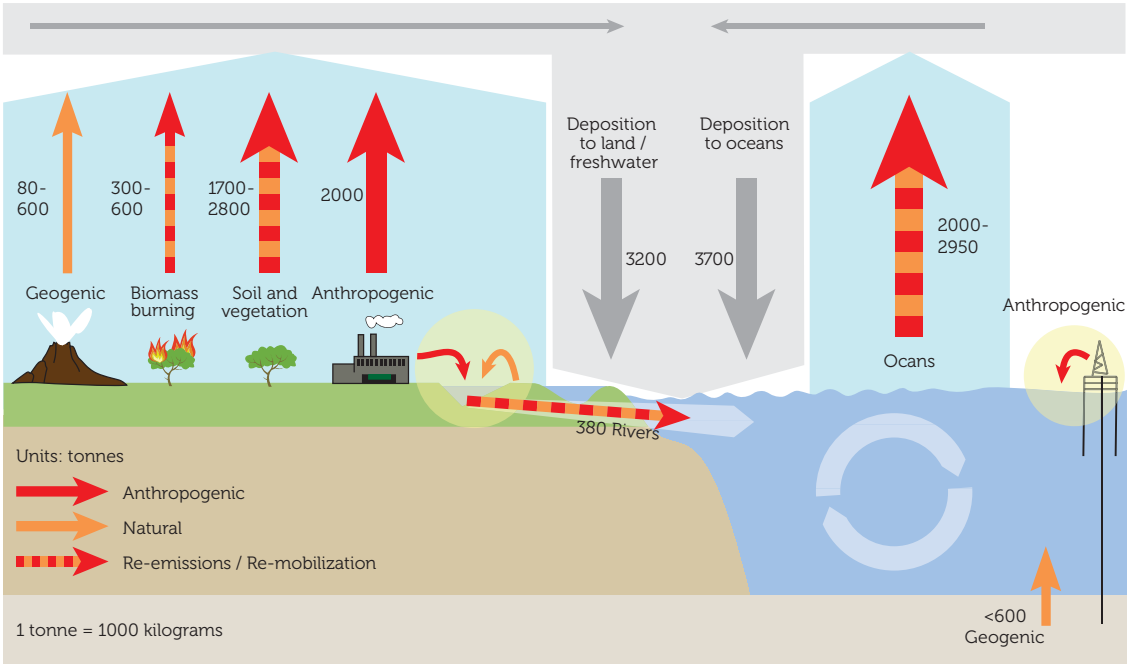
Once mercury enters the environment as a pollutant, it is extremely harmful, given its persistence, mobility (in the atmosphere it can be transported over long distances), its ability to form organic compounds, to bio-accumulate (accumulating in living organisms) and to be bio-magnified (its ability to increase its concentration as it goes up in the food chain), as well as its negative impact on human health.

Damage to health includes: permanent disruptions in the nervous system, with a particularly deleterious effect on the developing nervous system. Because of this, as mercury crosses the placental barrier and can be transferred vertically from mother to child during pregnancy, infants, children and pregnant women are considered to be the most vulnerable populations.

There are many sources of mercury and a complex transport and mobilization processes involved in the **global mercury cycle** (see Figure 1). It is estimated that 30% of the current emissions to the atmosphere are anthropogenic (about 2000 tons), while 10 % come from natural sources, and the remainder (60%) comes from "re-emissions" of mercury historically accumulated in soils and oceans (UNEP, 2013a).

In aquatic systems, atmospheric deposition is one of the most important pathways of introduction of mercury; it is the process whereby chemicals are transferred from the atmosphere to the surface of earth. Mercury deposited in the soil may be partially carried to the local water system (through superficial runoff systems), however a considerable part is retained by plants and soil. Soils and sediments can also be significantly enriched

Figure 1: Mercury cycling



Source: UNEP, 2013a.

in mercury as a result of isolated releases from local industrial facilities and other activities such as metal and gold mining. This mercury in soil and sediments is also a source of contamination of freshwater systems (rivers, lakes, creeks) through soil leaching and erosion, and through sediment suspension.

Globally, it is estimated that in 2010 the atmospheric deposition of mercury was 3,200 tons/year to land and 3,700 tons/year to the oceans. However, much of the mercury deposited both on land and in the oceans is re-emitted to the atmosphere (UNEP, 2013a).

A certain percentage of the mercury released into the aquatic environment is converted by microorganisms to methyl mercury (MeHg), which is more toxic and more easily bioavailable than elemental mercury (Hg), staying in the environment, where it accumulates and biomagnifies in aquatic and terrestrial food chains.

International Action on Mercury

In response to the international concern about mercury, and at the request of at that time UNEP Governing Council, the first global assessment of mercury and its compounds was published in 2002, in cooperation with other members of the Inter-Organization Programme for the Sound Management of Chemicals[1]. As a result of this assessment, the Governing Council agreed that further international action was required to reduce the risks to human health and the environment.

One of the main actions carried out in 2005 was the creation of UNEP's **Global Mercury Partnership.** The Partnership currently includes eight priorities or partnership areas, consistent with the major sources of mercury:

- Reducing mercury in artisanal and small-scale gold mining (ASGM).
- Mercury control from coal combustion.
- Mercury reduction in chlor-alkali.
- Mercury reduction in products.
- Mercury Air Transport and Fate Research Mercury waste management.
- Mercury supply and storage.
- Mercury reduction from cement industry.

Background on the Convention Negotiations

As a result of the various assessments, and given the urgent need for international action, in February 2009 the UNEP Governing Council decided to initiate the negotiation process towards a legally binding instrument on mercury (decision 25/5). The development of this instrument was entrusted to the Intergovernmental Negotiating Committee (INC), with the support of the Chemicals Branch, Division of Technology, Industry and Economics (DTIE), UNEP. All governments were invited to participate in the INC; intergovernmental and non-governmental organizations participated as observers.

The work of the INC was conducted in five sessions over a period of three years. Below is a list of the locations and dates:

- INC 1: 7-11 June 2010, Stockholm, Sweden.
- INC 2: 24-28 January 2011, Chiba, Japan.
- INC 3: 31 October - 4 November 2011, Nairobi, Kenya.
- INC 4: 27 June - 2 July 2012, Punta del Este, Uruguay.
- INC 5: 13-18 January 2013, Geneva, Switzerland.

In the Latin America and Caribbean region, five regional consultations were held to prepare the INC meetings:

- Kingston, Jamaica, 10 -11 March 2010.
- Panama City, Panama, 23-26 November 2010.
- Panama City, Panama, 19-23 September 2011.
- Brasilia, Brazil, 21-25 May 2012.
- Bogota, Colombia, 26-29 November 2012.

[1] Inter-Organization Programme for the Sound Management of Chemicals (IOMC): http://www.who.int/iomc/en/

As a result of the INC meetings, the text of a legally binding instrument on mercury was agreed. It was named the Minamata Convention on Mercury, referring to the episode of mercury contamination that took place in that Japanese town (see Box 1). The text was formally adopted during the **Conference of Plenipotentiaries** held in Kumamoto, Japan, from 10 to 11 October 2013. By December 2013, the Convention had already one Party (USA) and 94 signatures, including many countries of the region of Latin America and the Caribbean[2]. To enter into force, the Convention needs 50 ratifications, this might take place in a timeframe of 2-3 years since its adoption.

Box 1: The Minamata Incident

Minamata Disease is a serious and irreversible neurological syndrome caused by mercury poisoning. Symptoms include ataxia, sensory disturbances in hands and feet, sensory impairment involving sight and hearing, weakness and, in extreme cases, paralysis and death.
Minamata Disease was named after the Japanese city that was the centre of the occurrence of methylmercury poisoning in the early 50s. Forty-six people died in 1956, the year the first cases of the disease were detected.

More than 111 casualties and 400 cases with neurological problems were recorded between 1953 and 1965. Symptom-free mothers gave birth to severely affected children.
In 1968, the Japanese government officially announced that the disease was caused by the intake of fish and seafood contaminated with mercury discharged by Chisso Petrochemical. It is estimated that between 1932 and 1968 - the year the company changed the manufacturing process in Chisso, replacing it by a cleaner process – the petrochemical firm poured 81 tons of mercury into the bay.

Based on the reports issued by the Japanese Ministry of the Environment, by late May 2013, the overall number of patients certified was 2,977, 646 of which were still alive.

The company responsible for the discharges continues to pay large sums for compensations, while the Japanese government is still implementing extensive measures to mitigate the sequels of this pollution, including, but not limited to, the uninterrupted subsidies to pay for the victims' health care expenditures, and agreement-based compensation of victims as certified under the specific regulations.

[2] During the Conference of Plenipotenciaries the Convention was signed by seventeen LAC countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Guyana, Jamaica, Mexico, Nicaragua, Panama, Peru, Dominican Republic, Uruguay and Venezuela. In February 2014 Paraguay also signed the treaty. The current status of signatures and ratifications is available at the website of the Convention: **www.mercuryconvention.org**.

The **Minamata Convention** on Mercury in the **Latin America and Caribbean** region

Introduction to the Convention

This section addresses several aspects related to mercury in Latin America and the Caribbean (LAC)[3] on the basis of the key items of the Minamata Convention on Mercury. The text of the Convention is organized in 35 articles and five annexes approaching the mercury life cycle from its generation, marketing, products and processes where mercury is used, to its final fate as waste, as shown in Table 1.

Table 1: Table of Contents of the Minamata Convention on Mercury

Article 1	Objective
Article 2	Definitions
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 6	Exemptions available to a Party upon request
Article 7	Artisanal and small-scale gold mining
Article 8	Emissions
Article 9	Releases
Article 10	Environmentally sound interim storage of mercury, other than waste mercury
Article 11	Mercury wastes
Article 12	Contaminated sites
Article 13	Financial resources and mechanism
Article 14	Capacity-building, technical assistance and technology transfer
Article 15	Implementation and Compliance Committee
Article 16	Health aspects
Article 17	Information exchange
Article 18	Public information, awareness and education
Article 19	Research, development and monitoring
Article 20	Implementation Plans
Article 21	Reporting
Article 22	Effectiveness evaluation

[3] For the purpose of this report, some of the results are presented considering three sub-regions: the Caribbean (Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Cuba, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, St. Vincent and Grenadines, St. Pierre, St. kits, St. Lucia, Trinidad and Tobago, Turks and Caicos, Virgin Islands), Mesoamerica (Belize, Costa Rica, El Salvador, Guatemala, Honduras , Mexico, Nicaragua, Panama) and South America (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela).

Article 23	Conference of the Parties
Article 24	Secretariat
Article 25	Settlement of disputes
Article 26	Amendments to the Convention
Article 27	Adoption and amendment of annexes
Article 28	Right to vote
Article 29	Signature
Article 30	Ratification, acceptance, approval or accession
Article 31	Entry into force
Article 32	Reservations
Article 33	Withdrawal
Article 34	Depositary
Article 35	Authentic texts
Annex A	Mercury-added products
Annex B	Manufacturing processes in which mercury or mercury compounds are used
Annex C	Artisanal and small-scale gold mining – National action plans
Annex D	List of point sources of emissions of mercury and mercury compounds to the atmosphere
Annex E	Arbitration and conciliation procedures

In its first Article, the Minamata Convention states that its **objective is to protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds[4].**

Below is a brief description of the contents of the main provisions of the Convention, stating the obligations on the Parties, and trying to contextualize each subject with data and information available in the LAC region. Initiatives and developments that have already been implemented in various countries in the region are also discussed. *It should be noted that this report has an informative function; for further precision and detail on the provisions and scope of the Convention, please see the original text thereof,* available at the official website: **www.mercuryconvention.org.**

[4] As indicated in Article 2 on Definitions, "mercury" refers to elemental mercury (Hg (0), CAS# 7439-97-6), whereas the term "mercury compounds" refers to any substance that consists of mercury atoms and one or more atoms of different chemicals, which may be separated into different components only through chemical reactions.

Mercury supply sources and trade (Art. 3)

For the purposes of Article 3 on Supply and Trade, all references to “mercury” include mixtures of mercury with other substances, including alloys of mercury with a mineral concentration of at least 95% by weight, while “mercury compounds” refers to mercury (I) chloride (also known as calomel), mercury (II) oxide, mercury (II) sulfate, mercury (II) nitrate, cinnabar and mercury sulfide.

The Convention provides for a number of measures to be implemented upon its entry into force:

- New primary mercury mining shall not be allowed.
- Primary mercury mining that was being conducted within its territory at the date of entry into force of the Convention shall only be allowed for a period of up to 15 years.
- During this period, mercury from such mining shall only be used for:
    - Manufacture of products in accordance with Article 4
    - Manufacturing processes in accordance with Article 5
    - Disposal as waste (in accordance with Article 11 of the Convention)

In the case of mercury obtained from the decommissioning of chlor-alkali facilities, such mercury shall be disposed of in accordance with guidelines for environmentally sound management (in accordance with Article 11), and shall not be recovered, recycled, reclaimed or re-used.
The Convention determines that **no Party shall allow the export of mercury,** unless the importing Party has provided written consent and only for a use allowed under the Convention, or for environmentally sound interim storage, or to a non-Party that has provided written consent, certifying a number of specific warranties, such as the adoption of measures to protect human health and the environment, and that mercury will be used only for a use allowed to a Party under the Convention, or for environmentally sound interim storage.

Each Party shall not allow the import of mercury from a non-Party State or organisation to whom it will provide its written consent, unless the non-Party S**tate or organisation** has provided certification that the mercury is not from sources identified as not allowed under the Convention.

Mercury demand

Table 2 below presents the estimates of the global demand for mercury in 2005 for the main uses, such as artisanal and small scale gold mining, production of vinyl chloride monomers and chlor-alkali. Those estimates are compared with the estimated global mercury demand for such uses in 2015. According to these estimates, there would be a reduction in the demand for mercury in all uses, except for artisanal and small-scale gold mining, which would be maintained.

Table 2: Comparison of mercury demand for products / activities in 2005 and 2015.

Global demand for mercury (tons)	2005	"Status Quo" 2015 Scenario
Artisanal and small-scale gold mining	650-1000	no changes
Production of vinyl chloride monomers	715-825	1250
Chlor-alkali production	450-550	315-385
Batteries	260-450	130-178
Dental amalgams	300-400	270-360
Measuring devices	300-350	165-193
Electrical and electronic equipment	170-210	102-126
Lighting	120-150	108-135
Others	200-420	170-357
Total	**3165-4355**	**2160-3984**

Source: UNEP, 2013c

Note: The above-mentioned "Demand" can also be called "gross consumption", and it is defined as the overall annual production of mercury for each of these sectors. It should be noted, however, that in each of these sectors mercury recycling takes place, which implies the recovery of mercury from the products or waste. Therefore, the "net consumption" of mercury in some of these sectors (especially VCM and chlor-alkali) may be significantly less than the "gross consumption".

Sources of supply

In 2012, the global mining production of mercury was estimated at 1,600 tons (USGS, 2013), with 1,290 tons being produced by China and 150 tons by Kyrgyzstan. According to the same source, in Latin America and the Caribbean, a secondary production of mercury was estimated as a byproduct from large-scale gold mining in Chile and Peru, with 90 and 35 tons respectively, while in Mexico the secondary production was reported to be 21 tons[5] of mercury from historical waste (tailings) of silver mining (USGS, 2013). In the case of Mexico too, an average annual production of 13 tons has also been estimated during the 2007-2009 period, from informal primary mercury mining (CEC, 2013)[6].

In general, the mercury supply sources are not activities present in most of LAC countries.

[5] Data estimated by the USGS (USGS, 2013). However, the export of commodity mercury may be less, as mining companies store it until they have a sufficient volume to export it, not as a commodity, but as waste, for its safe long-term storage. For example, according to data from the Peruvian Customs Office, the commercial export of mercury dropped to 16.6 tons in 2012.

[6] This information was obtained considering the secondary production officially reported, the estimated domestic consumption, and imports and exports statistics, and may have increased significantly since 2009, given the export trends reported by the Tariff Information System of the Ministry of Economy of Mexico (SIAVI).

Trade (imports - exports)

According to the data obtained from the penta-transaction database[7] (database that compiles the national statistics on foreign trade), in recent years (2010-2012) in the LAC region there has been a reduction of the total imports of elemental mercury, from about 345 to 290 tons (see Figure 1), thus reverting the upward trend that had been observed until 2009, when the imports of more than 450 tons had been reported (UNEP, 2010). On the other hand, exports during the same period continued to rise as compared to previous years, going from about 350 tons to 562 tons between 2010 and 2012.

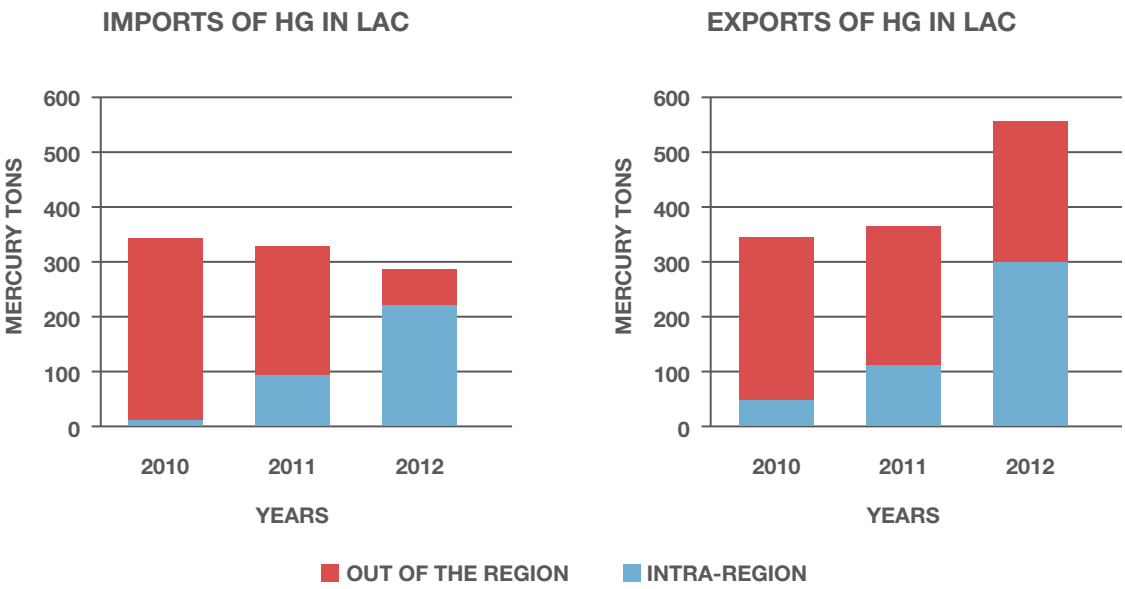
It should be noted that an increasing proportion of these imports and exports responds to intra-regional trade, as shown in Figure 1. In this regard, imports from countries of the LAC region have gone from 3% to 77% of total imports in just three years (2010-2012). This could be related to the recent entry into force of the ban on the export of mercury from the European Union (March 2011) and the United States (January 2013). Thus, with some of the traditional sources of mercury (such as the Almaden Mine in Spain) not being available in the market, according to the statistics provided by the customs, Mexico has become the region's main supplier of mercury to net importing countries such as Bolivia, Colombia, Guyana or Peru (countries with a significant presence of artisanal and small-scale gold).

In addition to Mexico, other countries reporting mercury exports in recent years are Argentina, Chile, and Peru, mainly from large-scale mining activity. Both in the case of Peru and Chile, this secondary mercury has been mainly exported outside the region.

Overall, and regardless of the intra-regional trade, the net balance of trade movements indicates that LAC shifted from being a net importer to exporter of mercury out of the region. However, these data should be viewed with caution, since the statistics of the exporting and importing countries are not always consistent, and certain movements may respond to specific flows of mercury, such as the release of stocks from chlor-alkali facilities.

[7] Database http://www.v4.penta-transaction.com/telematica_v4/login.jsp

Figure 1: Imports - exports of elemental mercury in the LAC region



In preparation to the Minamata Convention, it is very important for countries to have detailed information and reliable data of their current sources of supply, trade flows of mercury, origin and fate, and existence of registration systems, among others. One such example was the assessment made by Mexico under the Commission for Environmental Cooperation (CEC, 2013) - see Box 2.

Box 2: Mercury trade and supply in Mexico.

Mexico conducted an assessment of the market of mercury and its sources of supply, including the primary and secondary production of mercury, surpluses of the chlor-alkali industry, and the mercury potentially derived from mercury products recycling activities (CEC , 2013). This provided a quantitative analysis of the main flows and trends.

Mercury-added products (Art. 4)

Mercury has been used in a range of products because of its unique physico-chemical properties (liquid at room temperature, high density, etc.). The Minamata Convention distinguishes two major categories of mercury-added products:

- Products which have a defined date after which manufacture, import and export are no longer allowed (described in part I of Annex A of the Convention), subject to specific exclusions.
- Products that require the adoption of certain measures (described in Part II of Annex A of the Convention).

Other products may be added to Annex A (either Part I or part II) based on a future decision of the Conference of the Parties.

Banning of the manufacture, imports and exports of the following products listed in part I of Annex A of the Convention after **2020**:

- Batteries, except for button zinc silver oxide batteries with a mercury content < 2% and button zinc air batteries with a mercury content < 2%
- Switches and relays (except very high accuracy capacitance and loss measurement bridges and high frequency radio frequency switches and relays in monitoring and control instruments with a maximum mercury content of 20 mg per bridge)
- Fluorescent lamps with mercury contents over 5 mg per lamp; M Halophosphate phosphor: 40 watts with mercury content exceeding 10 mg per lamp.
- High pressure mercury vapour lamps (HPMV) for general lighting purposes
- Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays, maximum contents based on wave length, the maximum contents of mercury is 13 mg per lamp.
- Cosmetics (with mercury content above 1ppm), including skin lightening soaps and creams, and not including eye area cosmetics where mercury is used as a preservative and no effective and safe substitute preservatives are available.
- Pesticides, biocides and topical antiseptics.
- Non-electronic measuring devices, except non-electronic measuring devices installed in large-scale equipment or those used for high precision measurement, where no suitable mercury-free alternative is available: barometers; hygrometers; manometers; thermometers; sphygmomanometers.

Parties shall take measures with regard mercury-added products included in Part II of Annex A, in accordance with the provisions set out therein.

The only product listed in Part II of Annex A is Dental amalgam. The measures to be taken by the Party to reduce the use of dental amalgam will take into account the Party's own national circumstances and the relevant international guidelines, and they are to include two or more of a list of measures listed in the Annex, such as prevention of

dental caries and health promotion,in order to minimize the need for dental restoration, promotion of the use of cost –effective and clinically effective mercury-free alternatives for dental restoration, encourage representative professional organizations and dental schools to educate and provide training to professional dentists and students on the use of mercury-free alternatives in dental restoration, and promotion of best management practices and promotion of the the use of best environmental practices in dental surgeries to reduce releases of mercury and mercury compounds in water and soil.

The current list of exclusions from Annex A of the Convention is:

- Products essential for civil protection and military uses;
- Products for research, calibration of instrumentation, for use as reference standard;
- Where no feasible mercury-free alternative for replacement is available, switches and relays, cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for electronic displays, and measuring devices;
- Products used in traditional or religious practices; and
- Vaccines containing thiomerosal as preservatives.

Any Party may submit a proposal to the Secretariat for listing a mercury-added product considering updated information about alternatives. No later than five years after the date of entry into force of the Convention, the Conference of the Parties shall review Annex A and may consider **amendments** to that Annex in accordance with Article 27.

Each Party shall take measures to prevent the incorporation into **assembled products** of mercury-added products the manufacture, import and export of which are not allowed for it under Article 4.

Mercury-added products in LAC

Regarding mercury-added products, most of the countries of the LAC region are usually importers, and they often re-export to other countries in the region. In some cases the products are produced in the region, as is the case of Argentina that produces thimerosal / thiomersal (organomercury compounds used as antiseptic and antifungal agents), fluorescent lamps in Brazil and Mexico, or mercury thermometers in Argentina, Brazil, Chile and Mexico, among others (PENTA TRANSACTION[8]).

Overall, it was estimated that in 2010, the LAC region consumed about 10% of the mercury used globally in products (AMAP / UNEP, 2013), i.e., a total of about 147 tons of mercury. As shown in Table 3, the main types of mercury-containing products were dental applications, followed by measuring devices and batteries.

[8] http://www.v4.penta-transaction.com/telematica_v4/login.jsp

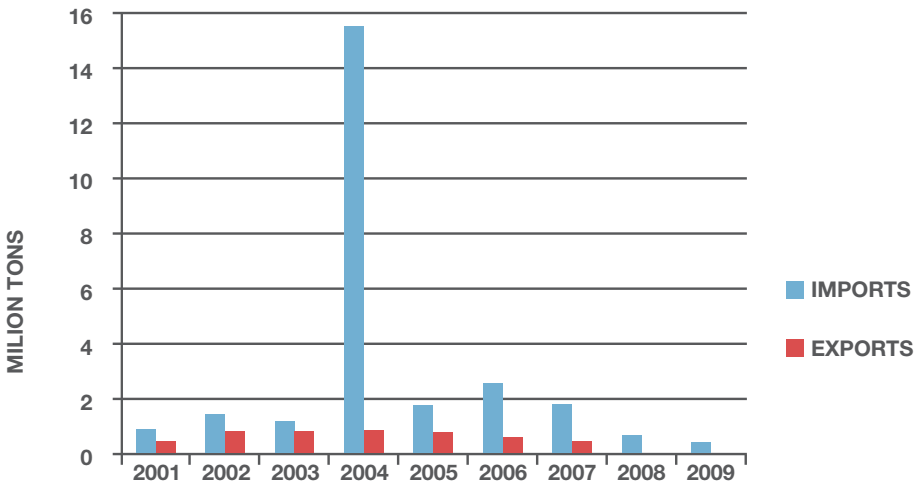
Table 3: Mercury consumed in products (average in tons), 2010.

Products	Global	LAC	%
Batteries	291	20	6.87
Measuring devices	250	28	11.20
Lighting	123	14	11.38
Electrical and electronic equipment	158	15	9.49
Dental applications	306	50	16.34
Other uses	305	20	6.56
Total	**1433**	**147**	**10.27**

Source: AMAP/UNEP, 2013.

Another study was also conducted in the LAC region to estimate the flow of imports and exports of products that may contain mercury (UNEP, 2010). The flow in tons according to data from this study is shown in Figure 2, which shows that during the 2001-2009 period, imports of products that may contain mercury are higher than exports.

Figure 2: Annual imports and exports of mercury-containing products in Latin America and the Caribbean, in Tons, (2001 – 2009) period.



Source: UNEP, 2010.

The total imports in the LAC region were 26 million tons from 2001 to 2009. Table 4 below shows the distribution of the products. It should be noted that these data refer to the total weight of the goods that may contain mercury, not the mercury contained in these products, and that due to the tariff coding system it is often difficult to distinguish products containing mercury from mercury-free products.

Table 4: Mercury-containing products imported in the LAC region in the 2001-2009 period.

PRODUCTS IMPORTED DURING THE 2001-2009 PERIOD	Weight (thousand tons)	% (in weight)
Electrical and electronic relays, circuits and switches	22502.76	84.28%
Cold cathode lamps and valves and tubes	2117.31	7.93%
Input/ output units (of data-processing equipment), with or without wrapping or carcass	899.79	3.37%
Hot cathode fluorescent lamps	376.47	1.41%
Radio and TV transmitters, television cameras	365.79	1.37%
Cold cathode lamps or photocathode valves and vacuum tubes, vapor, gas, mercury arch valves, TV camera tubes); similar chips, diodes, transistors.	336.42	1.26%
TV Cathode rays tubes, including video monitors	37.38	0.14%
Hygrometers, thermometers, barometers, etc.	34.71	0.13%
Hg or vapor electric discharge lamps (except for UV lamps)	26.70	0.10%
Batteries, mercury oxide	4.27	0.016%
Total of products 26.7 million tons	**26700**	**00%**

Source: UNEP, 2010.

In the case of measuring devices in the health sector, many countries in the region have been working to replace thermometers, manometers and sphygmomanometer for mercury-free devices (see **Box 3** on mercury-free hospitals).

Most countries have banned the imports, production and distribution of mercury-containing pesticides and paint.

Currently, the only mercury-added product that is included in Part II of Annex A of the Convention is dental amalgams. They contain 50% mercury (wt %), and 10% of the global consumption of mercury (from 300 to 400 tons) is devoted annually for their production. Of the total consumption of mercury for dental use, some is emitted to the atmosphere in cremations, and it is estimated that 25% ends up in landfills along with solid waste (AMAP / UNEP, 2013).

There are currently different scientific positions about the effectiveness of mercury-free alternatives for the treatment of caries, including glass ionomers or ceramics; added to their higher cost, just considering the material that replaces mercury (not considering the whole life cycle of both components), it is difficult to reach an international consensus on the removal of amalgams.

The use of thimerosal in vaccines was left out from Annex A. In any case, according to the foreign trade database of penta transaction, the amount of thimerosal both exported and imported has decreased in the LAC region (see Figures 3 and 4).

Box 3: Mercury-free hospitals

Many countries of the region are in the process of removing mercury from health centres. There is a video produced with the support of UNEP that shows how to conduct a proper cleaning and temporary storage of mercury waste from health facilities. (http://www.youtube.com/watch?v=FOpYU945UMc&feature=youtu.be).

With the aim of phasing out the use of mercury in hospitals, the NGO Health Care Without Harm has conducted campaigns in various health centres in the region, for the collection of mercury-containing measuring and control devices and replacing them with mercury-free devices, training of personnel in the field (associated risks, and how to act in mercury spills). In addition, inventories of equipment, kits for the proper handling of spills and waste, as well as guidelines for temporary storage of waste have also been developed.

Regional workshops on mercury removal in the medical area have been conducted in the health sector. Such work was undertaken in several countries, including, but not limited to Argentina, Chile, Costa Rica, Honduras, Mexico, Brazil, Ecuador and Uruguay, in several cases with the support of the United States, Health Care Without Harm, UNEP, the World Health Organization (WHO), professional local / regional healthcare associations, among others. For example, the Ministry of Health of Ecuador with support from the Ministry of the Environment is developing the "Management model for the replacement and phase out of mercury-containing medical devices in public and private health care facilities in Ecuador and Action Plan (2014 - 2020) for its implementation".

Figure 3: Imports of thimerosal

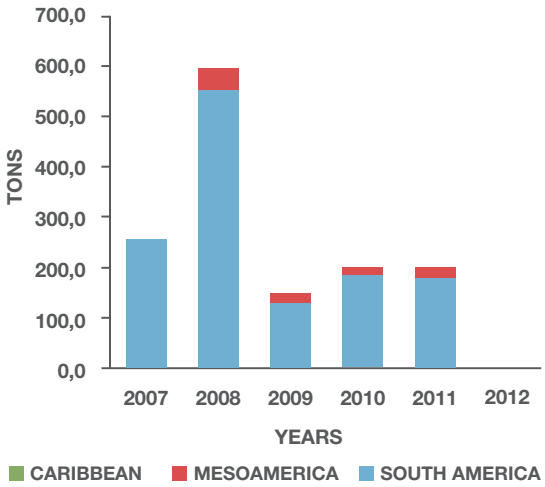
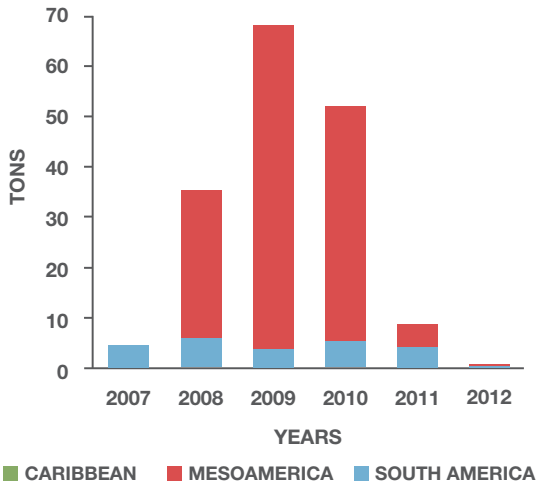


Figure 4: Exports of thimerosal



Data source: penta-transaction[9]

The region has worked in the reduction of the use of mercury in products, and efforts are under way to replace mercury in countries such as Argentina, Brazil, Chile, Costa Rica and Honduras, among others.

[9] http://www.v4.penta-transaction.com/telematica_v4/login.jsp

Manufacturing processes in which mercury or mercury compounds are used (Art. 5)[10]

For the processes in which mercury or mercury compounds are used, the Minamata Convention establishes two categories:

- Processes with a phase-out date (indicated in part I of Annex B).
- Processes for which measures shall be taken to restrict the use of mercury or mercury compounds (indicated in part II of Annex B).

Part I of Annex B currently includes two processes: the chlor-alkali production (with 2025 as a phase-out deadline) and acetaldehyde production, in which mercury or mercury compounds are used as a catalyst (with 2018 as the phase-out deadline).
With regard to the processes included in part II of Annex B, each Party will adopt measures to restrict the use of mercury or mercury compounds, in line with the provisions therein. These processes are:

- Vinyl chloride monomer production
- Sodium or Potassium Methylate or Ethylate
- Production of polyurethane using mercury containing catalysts

Parties that have facilities that use mercury in these processes shall report on the measures taken to reduce emissions and releases.

It also provides that no Party shall permit the use of mercury and mercury compounds in facilities that use manufacturing processes listed in Annex B and did not exist prior to the date of the Convention's entry into force.

Furthermore, the Parties shall discourage the establishment of facilities that did not exist before the date of entry into force of the Convention that use any other manufacturing process in which mercury or mercury compounds are intentionally used, unless the party can demonstrate to the satisfaction of the Conference of the Parties, that the manufacturing process in question results in a significant benefit to the environment and health, and that there are no economically and technically feasible mercury-free alternatives that offer that benefit.

As in the case of products, the Convention provides for the possibility of including new processes in Annex B.

[10] As set forth by the Minamata Convention, manufacturing processes in which mercury or mercury compounds are used shall not include processes using mercury-added products, processes for manufacturing mercury-added products or processes that process mercury-containing waste.

Processes with a phase-out deadline: situation in LAC

Chlor-Alkali production (Phase-out deadline: 2025)

The chlor-alkali production consists of the manufacture of chlorine, caustic soda and/or potash, traditionally using mercury cell technology. According to the last review available of the global inventory of chlor-alkali plants that uses mercury cells (UNEP, 2013d), in 2012 there were 75 plants with an annual production capacity of about 5 million tons of chlorine using mercury cells worldwide, 20% less than the existing capacity in 2010. This reduction is due to the closure of manufacturing plants, or to their conversion to plants operated with mercury-free technology. Other plants had already been progressively closed in the past, such as the plant of Solvay Indupa in Santo Andre, Brazil, which stopped operations in January 2009; its annual capacity was 115 thousand tons of chlorine. Other initiatives for technological conversion or reduction of emissions in the region are described in **Box 4.**

According to UNEP's inventory, in 2012 there were 11 chlor-alkali sites operating mercury cells located in 7 LAC countries, as shown in Table 5. These sites account for about 13% of the world production of chlorine with mercury cells (UNEP, 2013d). This group of plants would be stocking a total of 691 tons of mercury in their facilities that year.

Table 5: Chlor-alkali plants with mercury cells in the LAC region, 2012.

Country	Capacity 1000 t Cl2	Number of facilities	Consumption/ Use kg Hg	Hg at facilities t Hg
Argentina[11]	100	1	1045	74
Brasil	226	4	22947	325
Colombia	24	1		60
Cuba[12]	17	1		
México	154	2	4170	208
Perú	120	1		
Uruguay	14	1	1850	24
Total ALC	**655**	**11**	**30012**	**691**
Total Global	**5046**	**75**	**189543**	**8413**
% ALC	**13%**	**15%**	**16%**	**8%**

Source: Global inventory of chlor-alkali plants with mercury cells (UNEP, 2013d).

Based on the data monitored by the World Chlorine Council (WCC), mercury emissions from chlor-alkali plants have also been reduced over time, from 24.6 t/year in 2002 to 6.2 t/year in 2012 at a global level (WCC, 2012).

For the rest of the processes contemplated in Annex B, indicated earlier, no facilities have been identified in the LAC region.

[11] As reported by Argentina for the purpose of the document herein, in 2012 the country had only one plant with mercury cells, whose conversion to mercury-free technology is planned by 2020.

[12] Although not listed in UNEP's latest inventory, based on the information submited by Cuba for this report, as an average its plant consumes 6 to 7 tons of mercury annually. Stocks of mercury stored at warehouses were 6.4 tons at the end of 2012. The technological conversion of the plant is planned to start in 2012.

Box 4: Chlor-alkali: conversion to a mercury-free technology.

Of the 11 chlor-alkali sites using mercury-cell technology operating in LAC, the two facilities located in Mexico have expressed interest in converting to mercury-free technologies, expecting to receive appropriate funding. As regards the 4 plants located in Brazil, the national association of chlor-alkali producers (ABICLOR) has expressed the same intention as Mexico. The only plant in Uruguay has improved its practices by implementing the WCC's good practices guide, and plans to convert to mercury-free technology in 2020. The chlor-alkali plant in Colombia is making adjustments in technology to reduce emissions and consumption of mercury. The process of technological adjustments represents an investment of about $ 10 million, and it aims to replace mercury with electrolytes. Thanks to its de-mercurization plant, the site reuses its mercury. In Argentina, the only plant that still uses mercury plans to convert the plant to mercury-free technology in 2020. Cuba will start the reconversion of its plant, moving to mercury-free technology in 2014.

Exemptions (Art. 6)

The Parties may register for **exemptions from the phase-out dates** listed in Annex A (mercury-added products) and Annex B (manufacturing process in which mercury is used), providing due statements explaining the Party's need for the exemption. These exemptions shall expire after five years, and may only be extended for a maximum of five years if approved by the Conference of the Parties. No exemptions shall be allowed after ten years of the date of phase-out for the relevant product or process.

Artisanal and small-scale gold mining (Art. 7)

The Minamata Convention establishes measures (art. 7 and Annex C) for artisanal and small-scale gold mining and processing in which mercury amalgamation is used to extract gold from ore. Parties in whose territory those activities are carried out **shall take steps to reduce and, where feasible eliminate, the use of mercury** and mercury compounds in, and the emissions and releases to the environment of mercury from, such mining and processing.

Parties that determine that in their territories this activity is more than insignificant shall develop and implement a **national action plan** (in accordance with Annex C), to be submitted to the Secretariat no later than three years after the entry into force of the Convention. The Parties may also cooperate with each other and with other organizations to achieve the objectives of the Article herein, including the provision of technical and financial assistance, or the use of information exchange mechanisms.

Use of mercury by artisanal gold miners in Mollehuaca, Peru.
Source: Ministry of the Environment, Peru.

Situation in LAC

The artisanal and small-scale gold mining (ASGM) is present in at least a dozen countries in the region, mainly in the Andes and Amazon basin, including Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Peru, Suriname or Venezuela, but it also occurs in some Central American countries like Honduras or Nicaragua. Although there are no official figures, it is estimated that more than 500,000 artisanal miners would be involved in this activity in the region[13].

This sector represents the **main source of mercury emissions, releases and consumption in Latin America and the Caribbean.** It is estimated that in 2010 the region emitted 29% of the mercury released into the atmosphere by the artisanal and small-scale gold mining sector worldwide (approximately 208 tons of mercury, of the world's 727 tons). At the regional level, the emissions of this activity accounted for 71% of the overall emissions, reaching up to 77% in the region of South America, 23% in Mesoamerica and 14.5% in the Caribbean (see Table 6). Beyond these estimates, a more comprehensive inventory of the activity and its related emissions is needed.

Many of the countries in the LAC region have taken steps to reduce the use of mercury in the sector of artisanal gold mining[14]. For instance, the Alliance for Responsible Mining (ARM)[15], is working with the miners of some cooperatives in Peru, Venezuela, Colombia, Bolivia and Ecuador to minimize the use of mercury and cyanide, by implementing responsible practices and technologies to mitigate the impact on the environment and human health. Many cooperatives are no longer using mercury at all (UNEP, 2010). Some of the region's success stories on this subject are described in Boxes 5 and 6.

[13] Estimation based on the information presented by the countries that participated during the Second Global Forum on Artisanal and Small-Scale Gold Mining held during September 3-5 2013 in Lima, Peru.

[14] During the Andean Forum on Artisanal and Small-Scale Gold Mining (Medellín, Colombia, 20-22 November 2013), about 60 projects currently underway in the Andean countries alone were identified.

[15] Alliance for Responsible Mining (ARM): www.communitymining.org

Table 6: Comparative table of the estimated mercury emissions generated by the sector "Artisanal and small-scale gold mining" and total emissions in 2010.

Region	Emissions of mercury in tons		Sector % emissions of the total
	Sector	Total	
Caribbean	0.225	1.55	14.5
Mesoamerica	6.525	28.09	23.2
South America	201.6	262.56	76.8
Total LAC	**208.35**	**292.2**	**71.3**
Total Global	**727**	**1960**	**37.1**

Data source: AMAP/UNEP, 2013.

Within these initiatives, another legislation that is worth mentioning is the new law passed in Colombia on the use of mercury (Law 1658/2013), which establishes the provisions for the marketing and use of mercury in various industrial activities, and sets the requirements and incentives for the reduction and disposal of mercury. Among other issues, the Act mandates the eradication of its use across the national territory in all industrial and production processes, within a period not to exceed 10 years; in the case of mining eradication needs to be accomplished within a maximum period of five years, thus enabling the country to prepare for the entry into force of the Convention. Since 1989 in Brazil the use of mercury requires a permit, (Decree 97.507), which establishes a range of controls. The Brazilian Institute for Environment (IBAMA) is involved in the permitting and inspection

Box 5: Global Mercury Project (UNIDO) – experience in Tapajos, Brazil.

In 2002, with support from the Global Environment Facility (GEF) and the United Nations Program for Development (UNDP), the United Nations Industrial Development Organization (UNIDO) launched the Global Mercury Project with the aim of promoting techniques and regulations to reduce the use and contamination with mercury in the sector of artisanal and small-scale gold mining. One of the projects was started in the Tapajos region of Brazil, one of the world's largest artisanal mining areas that engages between 60,000 to 90,000 miners in more than 2,000 mining sites.

Actions included training of trainers, who transferred knowledge to 4,200 miners, the promotion of good practices, the construction of demo pilot plants, as well as the organization of workshops and outreach activities. It is estimated that this program led to a 10% reduction in emissions of mercury in the Tapajos region, with the potential to reduce up to 17 tons with future interventions.
Other initiatives under this program have been conducted in Colombia, Ecuador and Venezuela.
For further information visit http://www.globalmercuryproject.org/.

Box 6: Zero Mercury Plan in Ecuador

Since January 2013, the Ministry of the Environment of Ecuador has implemented the Zero Mercury Plan , which aims to phase out the use of mercury and mercury compounds used in a wide range of products and processes, as well as emissions, releases and generation of waste. The said Plan consists of the following programmes: Strengthening the Legal Framework , Raising Awareness and Dissemination, Technical Assistance and Training, Environmental Monitoring and Control, and Waste Management and Remediation.

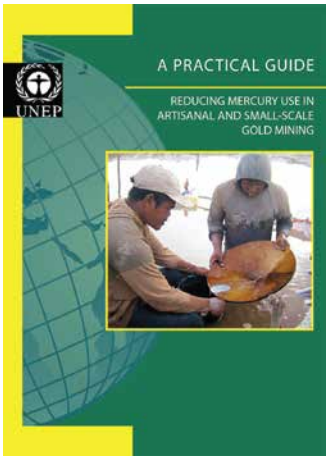
On the 11th of January 2013 the Ministry of the Environment issued the Ministerial Agreement # 003 “List of Hazardous Chemicals with a severely restricted use”. Its articles restrict the formulation, manufacture, sale , storage, use and possession of mercury, sodium cyanide and potassium cyanide nationwide. Restriction mechanisms are to be set forth with the relevant agencies.

The existing Mining Act was amended on the 16th of July 2013, banning the use of mercury in mining operations; it also establishes the Third Transitional Provision of this legal framework, which states that in pursuance of the eradication policies, within the first two years of the entry into force of the law, natural and artificial persons - either domestic or foreign - and holders of mining rights, shall implement alternative methods to phase out this substance, to allow for a successful progressive elimination of the substance from the mineral recovery processes.

There is a draft Regulation currently under review that sets the requirements and procedures for obtaining import licenses and permits for the transfer of metallic mercury, as well as the monitoring and control mechanisms for the management phases of this substance in Ecuador.
The Ministry of the Environment of Ecuador is constantly engaged in the fight against illegal mining through its Ad Hoc Committee Against Illegal Mining (CECMI), by contributing with environmental experts, collecting water and soil samples for surveys, and providing legal advice.
On the other hand, the Research Metallurgical Geological and Mining Institute (INIGEMM) of Ecuador is implementing the project “Improvement of the conditions of Artisanal and Small-Scale Mining”, and in conjunction with UNIDO they are implementing the project" Measures to mitigate the impact of mercury in mining”, which involves processes of awareness, training and research to mitigate impacts, reduce and eliminate the use of mercury in mining communities.

Formalization is another key issue when addressing the ASGM sector's challenges and opportunities. To this end, a good inter-institutional coordination and an integrated and continuous process are needed. For instance, in Suriname an inter-institutional commission for the Ordering of the Gold Sector was created to implement a combination of policy, legal and technical measures to bring the sector into the formalized economy and generate economic benefit for all parties, while mitigating negative social and environmental impacts. As a result, thousands of miners have already been registered and many of them trained with mercury-free alternative techniques. Peru is another example where the government has taken important steps to address formalization of the sector.

Within the framework of the UNEP Global Mercury Partnership, a range of **guidance material and case studies**[16] have been produced on this area, including a practical guide for reducing mercury use in artisanal and small-scale gold mining, a guidance document on developing a National Strategic Plan for the sector, and a comparative analysis of formalization approaches.



[16] These guidance material is available in different languages at the Global Mercury Partnership website: http://www.unep.org/chemicalsandwaste/Mercury/PrioritiesforAction/ArtisanalandSmallScaleGoldMining/tabid/3526/Default.aspx

Emissions to air (Art. 8)

Article 8 of the Convention concerns controlling and, where feasible, reducing emissions of mercury and mercury compounds, often expressed as “total mercury”, to the atmosphere through measures to control emissions from the point sources falling within the source categories listed in Annex D, the so-called **relevant sources:**

- Coal-fired power plants;
- Coal-fired industrial boilers;
- Smelting and roasting processes used in the production of non-ferrous metals;
- Waste incineration facilities;
- Cement clinker production facilities.

The Parties with relevant sources s**hall take measures to control emissions** and may prepare a **national plan** setting out the measures to be taken to control emissions and its expected targets, goals and outcomes. Any plan shall be submitted to the Conference of the Parties within four years of the date of entry into force of the Convention for that Party.

For its **new sources,** each Party shall require the use of best available techniques and best environmental practices to control and, where feasible, reduce emissions, as soon as practicable but no later than five years after the date of entry into force of the Convention for that Party. A Party may use emission limit values that are consistent with the application of best available techniques.

For its **existing sources,** each Party shall include in any national plan, and shall implement, one or more of the measures in the Article herein, taking into account its national circumstances, and the economic and technical feasibility and affordability of the measures, as soon as practicable but no more than ten years after the date of entry into force of the Convention.

The Conference of the Parties shall, at its first meeting, adopt guidance on **best available techniques and on best environmental practices,** taking into account any difference between new and existing sources and the need to minimize cross-media effects; and the support for Parties, in particular in determining goals and in setting emission limit values.

Each Party shall establish, as soon as practicable and **no later than five years** after the date of entry into force of the Convention for it, and maintain thereafter, an i**nventory of emissions** from relevant sources.

Mercury emissions in the LAC region

In 2010, when UNEP conducted the last survey of the global emissions of mercury to the atmosphere, the LAC region produced 15% of the global anthropogenic emissions, versus 48% in Asia, 17% in Africa, 11% in Europe, 3% in North America (AMAP/UNEP, 2013). Overall, 292 tons were emitted in LAC, (see Table 7), and about 263 tons (90%) of them were emitted in South America.

Table 7: Anthropogenic estimated emissions of mercury released to the atmosphere in 2010 globally and by sub-region of LAC.

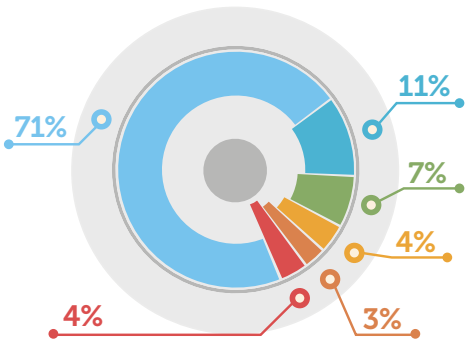
Region	Emissions, tons	%
Caribbean	1.55	0.08
Mesoamerica	28.09	1.4
South America	262.65	13.4
Total in the LAC region	**292.2**	**15**
Total global	**1960**	**100**

Data source: AMAP/UNEP, 2013.

About 37% of global anthropogenic emissions of mercury come from artisanal and small-scale gold mining, 24% from coal burning, 10% come from the production of non-ferrous metals and 9% from cement production. In the LAC region, the distribution changes with respect to the global profile: of the 292 tons of mercury emitted in 2010, 71% come from artisanal and small-scale gold mining, followed by 11% from non-ferrous metals, 7% from large-scale gold production, 4% from the management of waste and 3% from cement production (see Figure 5). Table 8 shows the detail of the distribution of emissions by LAC sub-regions.

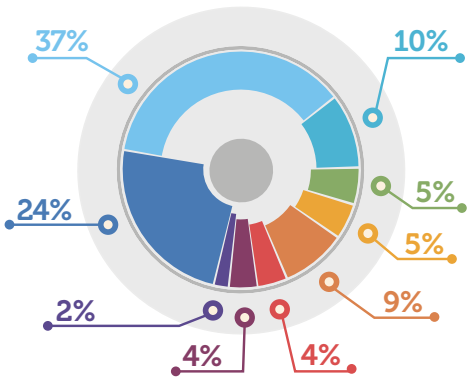
Figure 5: Main sources of mercury emissions to the atmosphere in the LAC region and at a global level.

Distribution of LAC emissions of Hg



- Artisanal and small-scale gold mining
- Production of non-ferrous metals
- Large-scale gold production
- Waste from consumer products
- Cement production

Distribution of global emissions of Hg



- Others
- Contaminated sites
- Production of ferrous metals
- Coal combustion

Table 8: Anthropogenic emissions of mercury from the various sectors and regions to the atmosphere in 2010.

Sector	% global	% ALC	% South America	% Mesoamerica	% Caribbean
For non intentional production or emissions					
Combustion of fossil fuels					
Coal combustion	24	2	<1	12	5
Natural gas and oil combustion	1	<1	<1	1	7
Mining, metal smelters and production					
Primary production of ferrous metals	2	<1	1	1	<1
Primary production of non-ferrous metals	10	11	9	27	<1
(Al, Cu, Pb, Zn)					
Large-scale gold production	5	7	6	12	<1
Mercury production	<1		?	?	?
Cement production	9	3	2	9	31
Oil refining	1	<1	<1	<1	1
Contaminated sites	4	No data	No data	No data	No data
Intentional uses					
Artisanal and small-scale gold mining	37	71	76	23	14
Chlor-alkali industry	1	<1	<1	2	2
Waste from consumer products	5	4	3	9	38
Cremation (dental amalgams)	<1	<1	<1	<1	<1
TOTAL (tons)	**1960**	**292**	**262.6**	**28.1**	**1.6**

Data source: AMAP/UNEP, 2013.

Emissions from the use of mercury in dental amalgam as a result of the cremation of human remains were estimated at 3.6 tons (ranging from 0.9 to 11.9 t) globally in the year 2010. This review does not include mercury emissions associated with leaks during production and preparation of amalgam fillings and during their removal or repair.

The LAC region has worked to identify and quantify anthropogenic mercury emissions. With the internal resources of each country and international technical support, several countries have developed their inventories of mercury emissions, including Argentina, Chile, Costa Rica, Ecuador, Honduras, Mexico, Nicaragua, Panama, Dominican Republic, and Uruguay. To facilitate the development of these inventories, UNEP has developed a calculation tool (see Box 7). However, it is important to note that many of these inventories need to be updated and they include a considerable degree of uncertainty for some sources.

Box 7. The "toolkit" to calculate mercury emissions and releases.

In 2005, UNEP developed a tool for the identification and quantification of mercury emissions and releases (to air, water, land products and wate), the level 1 (basic and simple) and level 2 (more comprehensive and accurate) toolkits, to estimate the main emission sources in each country, and to conduct the work or focus the country's efforts to mitigate them. The toolkit, which considers all potential sources of mercury, including those not regulated by the Minamata Convention, is currently under review.

Moreover, with the support of UNEP, the United Nations Institute for Training and Research (UNITAR), the Strategic Approach to International Chemicals Management (SAICM), and the Basel Regional Centres, several countries in the region have developed their **inventories of Mercury and Risk Management Planning**. Such is the case of Argentina, Chile, Costa Rica, Ecuador, Honduras, Mexico, Nicaragua, Panama, Dominican Republic and Uruguay. Although they have different levels of uncertainty and not comprehensive information, in general terms they have all identified the troublesome issues that demand action.

Releases to water and land (Art. 9)

Article 9 of the Convention concerns controlling and, where feasible, reducing releases of mercury and mercury compounds, often expressed as "total mercury", to land and water from the relevant point sources not addressed in other provisions of the Convention.

Each Party shall, no later than three years after the date of entry into force of the Convention, and on a regular basis thereafter, identify the relevant point source categories.

Parties that have relevant sources shall take measures to control releases, and may prepare a **national plan** setting out the measures to be taken to control releases, as well as the expected targets, goals and outcomes. Those plans shall be submitted to the Conference of the Parties within four years of the date of entry into force of the Convention for that Party.

No later than five years after the date of entry into force of the Convention, each Party shall establish an **inventory** of releases from relevant sources, and will maintain it updated thereafter.

The Conference of the Parties shall, as soon as practicable, adopt **guidance** on best available techniques and on best environmental practices, taking into account any difference between new and existing sources and the need to minimize cross-media effects, and the methodology for preparing inventories of releases.

Mercury releases to water have complex mechanisms; hence, for the purpose of the global emissions inventory (UNEP, 2013a) they were calculated based on data of atmosphere emissions inventories conducted in 2010, using distribution factors. The global results and the results in the LAC region are shown in Table 9, which shows that, with respect air emissions, the main releases come from the artisanal and small-scale gold mining.

Table 9: Estimated mercury releases to the aquatic systems in 2010.

Point Source	Global tons	ALC tons	% by ALC
Oil refinery	0.639	0.016	2.5
Copper production	18.8	4.15	22.07
Lead production	0.95	0.05	5.26
Zinc production	18	2.03	11.28
Aluminium production	3.27	0.21	6.42
Mercury production	2.82	–	0
Gold production	48.7	9.61	19.73
Chlor-alkali production	2.84	0.31	10.92
Wastes	89.4	10.93	12.23
Artisanal and small-scale gold mining	881	319.45	36.26
Total	**1066.42**	**346.76**	**32.52**

Data source: AMAP/UNEP, 2013.

Besides the UNEP toolkit (see Box 7), one of the tools that countries can also implement to obtain information on their releases of mercury to land and water is that of the Pollutant Release and Transfer Register (PRTR)[17], which has already been developed by some countries in the region, including Chile, Ecuador and Mexico. Brazil has developed a project that would implement a methodology based in the UNEP toolkit to identify mercury sources and related emissions and releases, to address the Minamata Convention. The project will be submitted to the GEF for funding.

[17] A Pollutant Release and Transfer Register (PRTR) is a national or regional environmental inventory or database that collects information of potentially hazardous or polluting chemicals released to air, water and soil and transferred off-site for treatment or disposal. The PRTR registers recommended by the Organization for Economic Cooperation and Development (OECD) are recognized as a useful tool for monitoring and controlling emissions and they are deemed to be an appropriate tool for public disclosure of all such information. For further information, visit: www.prtr.net.

Environmentally sound interim storage of mercury, other than waste mercury (Art. 10)

Article 10 of the Minamata Convention states that each Party shall take measures to ensure that the interim storage of such mercury and mercury compounds intended for a use allowed to a Party under this Convention is undertaken in an **environmentally sound manner.**

The Conference of the Parties shall adopt **guidelines** on the environmentally sound interim storage of such mercury and mercury compounds, taking into account any relevant guidelines developed under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and other relevant guidance. The Conference of the Parties may adopt requirements for interim storage in an additional Annex to this Convention.

Globally there are two main types of practices or concepts related to the storage of mercury; one is at superficial level, in sites specifically conditioned for that purpose, and the other is underground storage in salt mines or granitic rock (long term storage)[18]. In the LAC region there are no facilities designed for environmentally sound storage of elemental mercury; countries may arrange for temporary storage, while national or long-term alternatives are developed.

The concept of storing mercury as a commodity has not been specifically regulated by any country in LAC. Only a few countries have specific regulations or technical standards for the selection of appropriate sites to build and operate a confined site for hazardous waste, including mercury; such is the case of Brazil, Chile and Mexico. Other countries, such as Argentina and Ecuador, contemplate some of these requirements in their legislation on hazardous waste. Mexico is the only country that has a policy for the containment of waste in cavities built by dissolving salt domes with the main objective of storing oil wastes (UNEP, 2010).

Due to its volcanic and seismic activity, much of the region (the Andean and Caribbean zones) is not suitable for long-term storage of mercury. Safe underground disposal of mercury requires not only tectonic stability, but also a geological formation with low permeability. Rocks with low or no permeability are mainly granite and gneiss, and dense sedimentary rock formations such as clay or salt (salt domes or beds). In the LAC region, an in-depth study of the characteristics of the granites and gneisses present in Guyana, Suriname, French Guiana and parts of Venezuela, Colombia and northern Brazil is pending, as those may be suitable places to build safe facilities for the storage of mercury (UNEP, 2010).

[18] Some countries with experience in the interim surface storage of mercury are the United States and Spain, while Germany, the UK and Norway have experience in deep geological storage (UNEP, 2010).

The storage of mercury in abandoned granitic rock mines would entail very high planning costs and significant investment, because this type of work has never been undertaken in LAC countries; it requires detailed site assessment, as it involves the use of specific technologies, building high-cost infrastructure, immobilization of mercury and contingency plans. Mexico has already implemented the underground storage of hydrocarbon in salt domes (UNEP, 2010).

Sites for temporary storage

According to the results of UNEP's project for the storage of mercury conducted in Argentina and Uruguay, Argentina would have four potential sites for the temporary storage of mercury, which are currently approved for the handling of hazardous waste, and which are already receiving mercury waste.

Uruguay has 2 potential sites for the temporary storage of mercury; one is a chlor-alkali plant, with experience in the storage and reception of mercury-containing waste, and the other possibility would be the Safety Landfill designed for industrial waste (public-private partnership) **(UNEP, 2011).**

Similarly, Mexico and Panama have recently worked on the identification of temporary storage sites through a similar project to Argentina and Uruguay. In Mexico facilities for the interim storage of mercury, other than waste, are not available, but two safety landfills are authorized to dispose hazardous waste, including mercury waste. Other options - such as chlor-alkali or salt domes - were discarded. In Panama it was recommended to separate the storage of elemental mercury and the disposal of mercury waste. For the former, Panama was suggested to use the existing 'bunkers' that had been built as defensive structures during the U.S. administration of the Canal Zone, while the adaptation of two potential landfills, the grounds of a university campus, or a private recycling company were identified as potential options for the storage of mercury waste[19].

Exports of mercury to safe storage sites

This can be used as a final solution by any country; it could be an option for countries with unfavorable geological features. Some countries have sent stocks of mercury outside the region, as in the case of the chlor-alkali industry in Brazil.

[19] The reports and results of the workshops associated to these projects are avaialble at UNEP's web site: http://www.unep.org/hazardoussubstances/Mercury/PrioritiesforAction/SupplyandStorage/Activities/tabid/4505/language/en-US/Default.aspx

Mercury wastes (Art. 11)

For the purposes of the Minamata Convention, mercury wastes refers to substances or objects: (a) Consisting of mercury or mercury compounds; (b) Containing mercury or mercury compounds; or (c) Contaminated with mercury or mercury compounds, in a quantity above the relevant thresholds defined by the Conference of the Parties, that are disposed of or are intended to be disposed of or are required to be disposed of as provided by national law or by this Convention.

Each Party shall take appropriate measures so that mercury waste is managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention. The Convention also sets forth that the recovery and recycling activities be destined only for allowed uses, and that the waste shall not be transported across international boundaries, except for its environmentally sound disposal.

In the LAC region there are few countries with specific regulations for the management of mercury wastes, and in those where there is legislation, technology for the treatment and remediation of mercury waste is limited. Some countries do have regulations on the treatment of fluorescent lamps, usually hiring the services of private companies with the resources required to bear the costs.

In general, the costs of purchasing the technologies for waste treatment, decontamination, distillation or stabilization of mercury, are still high[20].

In many LAC countries there are also limitations to the proper final disposal of mercury-containing products and waste, so the latter are frequently deposited with other waste in landfills that are not properly prepared.

Box 8: Environmentally sound management of mercury waste.

Some countries in the region have received technical support from UNEP/DTIE for the minimization and environmentally sound management of mercury waste, temporary and final storage in industrial and health sectors, both public and private. Countries that have worked in that direction include but are not limited to Argentina, Costa Rica, Uruguay and Panama. In Argentina and Uruguay efforts have been focused on the chlor-alkali industry to improve waste management, and in the search for temporary solutions and the long-term storage of mercury.

[20] For instance, the estimated cost of the stabilization of mercury (waste?) with the technology developed by the National Technology Centre for Mercury Decontamination (Spain) is around 3500-4000 EUR / t Hg (including collection, transport, stabilization process and final disposal, in the European Union). Source: http://www.unep.org/hazardoussubstances/Mercury/PrioritiesforAction/SupplyandStorage/Reports/tabid/4508/language/en-US/Default.aspx

As for the reference made in Article 11 to consider the guidelines developed under the Basel Convention, it is to be noted that there is a guide for the environmentally sound management of mercury waste, which is currently under review[21].

Contaminated sites (Art. 12)

Article 12 of the Convention provides that each Party shall endeavour to develop **appropriate strategies for identifying and assessing sites contaminated** by mercury or mercury compounds.

Any actions to reduce the risks posed by such sites shall be performed in an environmentally sound manner incorporating, where appropriate, an assessment of the risks to human health and the environment from the mercury or mercury compounds they contain.

The Convention also foresees that the Conference of the Parties shall adopt technical guidance on managing contaminated sites, while encouraging cooperation between the Parties for the formulation of strategies.

The assessment of contaminated sites is a key challenge in the region due to the fact that the uncontrolled burning of (both industrial and urban) waste and dumping into open dumps without a sound environmental management have been and still are common practices, typically giving rise to acidic leaching, mobilizing mercury in the environment and allowing it to reach and pollute water flows and sediments.

Many LAC countries do not have databases of contaminated sites; however, the region envisages a number of initiatives, such as those carried out by the Latin American Network for the Prevention and Management of Contaminated Sites[22] (RELASC, see Box 9).

Box 9: Actions on contaminated sites in LAC

ReLASC (the Latin American Network for the Prevention and Management of Contaminated Sites) has worked in Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru and Uruguay, with funding from GIZ (the German Cooperation Agency for Development). As a result, several countries have technically strengthened for the management of contaminated sites. The Blacksmith Institute and the Global Restoration Foundation have also worked on this issue in various countries in the region, including the organization of training workshops. Research on contaminated sites conducted in Mexico analyzed several sites where there had been activities that could imply anthropogenic sources of mercury, such as disposal of mining waste, secondary mercury mining, among others.

[21] For further information on the work undertaken to review the guideline: http://www.basel.int/Implementation/TechnicalMatters/Developmentof TechnicalGuidelines/MercuryWaste/tabid/2380/Default.aspx

[22] www.relasc.org

Health-related aspects (Art. 16)

Through Article 16, the Convention agreed to promote the development and implementation of strategies and programmes to identify and protect populations at risk, particularly vulnerable populations, and which may include adopting science-based health guidelines relating to the exposure to mercury and mercury compounds, setting targets for mercury exposure reduction, the development and implementation of science-based educational and preventive programmes on occupational exposure to mercury and mercury compounds, with the participation of public health and other stakeholders.

The Convention also established the promotion of appropriate health-care services for prevention, treatment and care for populations affected by the exposure to mercury or mercury compounds; and the establishment/strengthening of the institutional and health professional capacities for the prevention, diagnosis, treatment and monitoring of health risks related to the exposure to mercury and mercury compounds.

Most humans are exposed to mercury through diet, mainly by eating certain species of fish; they may also be exposed due to breakage of mercury-added products, or through multidose immunization using vaccines containing thimerosal as a preservative, or because they either live in contaminated sites or ingest water contaminated with mercury. There are also people with occupational exposure, such as artisanal miners, workers of facilities that manufacture mercury-added products, or dentists that place dental amalgams.

In Brazil, children born to mothers with a relative increase in the consumption of fish with Hg (Hg observed in hair), who were evaluated at the age of 6, 36 and 60 months, showed impaired neurological development. When these data were examined applying regression analysis, it became apparent that developmental delays at 6 months were significantly associated with the measurement of exposure to Hg (hair-Hg) (Marques et al., 2009).

In general, the region has not developed enough biomonitoring programmes and raise awareness campaigns to inform population about risks of mercury on health and the environment.

An important source of information on this topic is the World Health Organization (WHO), that has recently released new publications on mercury:
http://www.who.int/ipcs/assessment/public_health/mercury/en/#

Other aspects of the Minamata Convention

The above sections referred to the provisions of the Convention that are more directly related to the various stages of the life cycle of mercury. There are other cross-sectional or procedural provisions that are also of great importance for countries, including those below:

Information exchange (Art 17): the Parties shall facilitate the exchange of scientific, technical, economic and legal information concerning mercury and mercury compounds, including toxicological, ecotoxicological and safety information; information on the reduction or elimination of the production, use, trade, emissions and releases of mercury and mercury compounds; information on technically and economically viable alternatives; epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds.

Public information, awareness and education (Art 18): Each Party shall, within its capabilities, promote and facilitate provision to the public of available information on the health and environmental effects of mercury and mercury compounds; the alternatives to mercury and mercury compounds; results of any research, development and monitoring activities, and the activities envisaged to meet its obligations under the Minamata Convention. The Party shall also promote education, training and public awareness related to the effects of exposure to mercury and mercury compounds on human health and the environment.

Research, development and monitoring (Art 19): Parties shall endeavour to cooperate, taking into account their respective circumstances and capabilities, to develop and improve the inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of mercury and mercury compounds; modelling and geographically representative monitoring of levels of mercury and mercury compounds in vulnerable populations and in environmental media; information on commerce and trade in mercury and mercury compounds and mercury-added products; and the information and research on the technical and economic availability of mercury-free products and processes and on best available techniques and best environmental practices to reduce and monitor emissions and releases of mercury and mercury compounds.

Implementation Plans (Art 20): countries may, following an internal assessment, develop and execute implementation plans, taking into account their domestic circumstances, for meeting the obligations under this Convention.

Reporting (Art 21): each Party shall report on the measures it has taken to implement the provisions of this Convention, on the effectiveness of such measures and the possible challenges in meeting the objectives of the Convention.

When preparing to implement some of the above-mentioned elements agreed in the Convention, the countries in the region should consider that in order to have reliable information they need to have sampling and monitoring equipment, as well as analytic capacity and adequate equipment and human resources. Although it could be said that the LAC region has suitable laboratories, the challenge seems to reside in their sampling capacities, such as sampling of gas emissions, either from diffuse or specific, isolated sources, as well as well as in the measurement of human matrices (indicator of exposure). A more in-depth analysis of this issue requires a diagnosis of the region's technical and analytical capacities.

Final considerations

As to the use and emissions of mercury, it is estimated that while Latin America and the Caribbean account for about 8.5% of the world's population, the region contributes with 15% of the global emissions to the atmosphere, and it accounts for 10% of the consumption of mercury-added products. A significant percentage of these emissions (70%) originate from artisanal and small-scale gold mining; this activity is practiced in many countries in the region, mainly in South America, and it has a significant impact on the current demand and trade of mercury in the region.

This activity is a major challenge for some countries, and requires an integrated approach, to address aspects related to health and environment, as well as social and economic issues. Other challenges related to mercury include phasing it out from certain products and processes, such as dental amalgams, controlling unintentional emissions (e.g. in non-ferrous metal or cement production), surveying and managing contaminated sites, and/or the proper management of mercury surplus and waste of mercury products.

The Minamata Convention is a key tool for the global protection of human health and the environment from contamination by mercury. Once ratified by the countries of the region, and with a suitable financial mechanism, actions towards sustainable development will be catalyzed. To this end, countries will need to strengthen their institutional, technical and legal capacities, in order to properly manage mercury throughout its life cycle, from its generation and use, to the final disposal of its waste.

While the LAC region faces a number of challenges under this scenario, it is also worth highlighting that many countries in the region have carried out important work in relation to mercury, as reflected in the document herein. Numerous cooperation agreements have been signed to help strengthen national and regional capacities to address the problem of mercury. The countries have implemented actions and measures for reducing anthropogenic atmospheric emissions through better management practices, in the pursuit of environmentally sound solutions to manage wastes containing mercury and its compounds, as well as for the storage of mercury.

It is important to maintain and strengthen international and regional cooperation through technical and financial assistance and exchange of information, putting the issue of mercury in the national environment, health and development agendas, ultimately facilitating the implementation of the Minamata Convention in the countries of the region, and thus achieving the countries' objectives.

Below is a list of the key **challenges/objectives** identified in the region:

- Develop or improve the **assessments and inventories** on the use of mercury, emissions and releases, contaminated sites, waste management, etc.

- Prevent, reduce, and where feasible eliminate, the **use of mercury in the artisanal and small-scale gold mining.**

- Regulate the identification of mercury in products (labelling) and their contents (allowed limits), to facilitate the a**dequate prevention, reduction and management of waste containing mercury,** and hence reduce human exposure and environmental pollution.

- Promote and implement the use of the Best Available Techniques (BAT) and the Best Environmental Practices (BEP) both in industrial processes that use mercury or its components as an input, or in those processes that may result from an unintentional emission, such as a poor management of waste, to **prevent, reduce or eliminate the consumption and emissions and releases of mercury** to the environment.

- Adopt protection measures to **minimize or eliminate the exposure of workers** to mercury (occupational exposure of doctors, dentists, workers of the chlor-alkali industry, etc.).

- Increase the technical mercury monitoring and testing capabilities in various environmental matrices and indicators of human exposure.

- Mobilization by governments and regional/international organizations of the necessary **financial resources** to implement the provisions of the Minamata Convention.

All the actions should be undertaken in conjunction with **awareness raising campaigns and information** to the population on the problems of mercury, exposure, use, production, trade, release and final disposal. The use of mercury-free products should be promoted, and dental and medical professionals should especially receive education on the use of mercury-free devices and techniques.

References

AMAP/UNEP, 2013. Technical Background Report for the Global Mercury Assessment 2013. Arctic Monitoring and Assessment Programme, Oslo, Norway/UNEP Chemicals Branch, Geneva, Switzerland. vi + 263 pp.

CEC, 2013. An Assessment of Primary and Secondary Mercury Supplies in Mexico. April 2013. Commission for Environmental Cooperation. 110 pp.

Marques RC, Dórea JG, Bernardi JV, Bastos WR, Malm O., 2009. Prenatal and postnatal mercury exposure, breastfeeding and neurodevelopment during the first 5 years. Cogn Behav Neurol, 2(2):134-41.

UNEP, 2010. Estudio sobre los posibles efectos en la salud humana y el medio ambiente en América Latina y el Caribe del comercio de productos que contienen cadmio, plomo y mercurio. Programa de las Naciones Unidas para el Medio Ambiente, Noviembre 2010.

UNEP, 2009. Excess Mercury Supply in Latin America and the Caribbean, 2010-2050. Assessment Report. UNEP Chemicals, July 2009.

UNEP, 2010. Options Analysis and Feasibility Study for the Long-Term Storage of Mercury in Latin America and the Caribbean. Final Report. Laboratorio Tecnológico del Uruguay – LATU / UNEP Chemicals, 2010.

UNEP, 2011. Proyecto de almacenamiento y disposición de mercurio en dos países de la región del LAC.
http://www.ccbasilea-crestocolmo.org.uy/es/mercurio/proyecto-de-almacenamiento-y-disposicion-de-mercurio-en-dos-paises-de-la-region-de-america-latina-y-el-caribe/

UNEP, 2013a. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport. UNEP Chemicals Branch, Geneva, Switzerland.

UNEP, 2013b. Mercury: Time to Act. UNEP Chemicals Branch, Geneva, Switzerland.

UNEP, 2013c. Mercury-containing products partnership area. Business plan June 28, 2013.

UNEP, 2013d. Global Inventory of Mercury-Cell Chlor-Alkali Facilities:
http://www.unep.org/hazardoussubstances/Mercury/PrioritiesforAction/ChloralkaliSector/Reports/tabid/4495/language/en-US/Default.aspx

USGS, 2013. U.S. Geological Survey, Mineral Commodity Summaries, January 2013.
WCC, 2012. www.**worldchlorine**.org/

Acronyms

BAT	Best Available Techniques
BEP	Best Environmental Practices
CEC	Commission for Environmental Cooperation (North America)
CCFL	Cold Cathode Fluorescent Lamps
EEFL	External Electrode Fluorescent Lamps
GEF	Global Environmental Fund
HPMV	High Pressure Mercury Vapour Lamps
IOMC	Inter-Organisation Programme For the Sound Management of Chemicals
LAC	Latin American and Caribbean
INC	Intergovernmental Negotiating Committee
PRTR	Pollutant Release and Transfer Registry
SAICM	Strategic Approach to International Chemicals Management
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
USGS	United States Geological Survey
WCC	World Chlorine Council
WHO	World Health Organization