The State of Mercury in Jamaica

The Minamata Convention on Mercury is the first global agreement specifically designed to address contamination from a heavy metal. Opened for signature on October 10, 2013 and entered into force on August 16, 2017, the Convention seeks to address issues related to, inter alia, the use and release of mercury in trade and in industrial processes.

Among the issues addressed under the treaty are: (i) regulation of the major anthropogenic sources of atmospheric emissions and releases of mercury into the environment; (ii) storage and disposal of mercury and mercury compounds; and (iii) the phase-out of specific mercury-added products and processes.

Under the Minamata Convention, each Party is charged with protecting human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. Jamaica ratified the Convention on July 19, 2017. In order to assist the country with the implementation of the Convention, the Government of Jamaica conducted a Minamata Initial Assessment (MIA). The primary activities of the MIA in Jamaica included:

- A review of institutional and capacity needs for implementation of the Convention;
- An assessment of national policies and legislation to support compliance with the obligations under the Convention; and
- An identification of the primary sources of mercury emissions and releases as part of a detailed National Mercury Profile.

The MIA was conducted with financial assistance from the Global Environment Facility and was implemented in collaboration with UN Environment and the Basel Convention Regional Centre for the Caribbean, based in Trinidad and Tobago. This brochure summarizes the major findings of the MIA in Jamaica.

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Findings from the Minamata Initial Assessment

What are the Sources of Mercury?

The source of mercury (Hg) to the environment can be natural (e.g., volcanoes) or anthropogenic (human-caused releases). The major sources of mercury in Jamaica, based on the mercury inventory conducted for the MIA generally using 2016 data (in some cases, 2014 data was used) include the following:

- Alumina production from bauxite (~3,292 kg Hg/yr)
- Use and disposal of mercury-added products such as thermometers, compact fluorescent lamps, and batteries (~448 kg Hg/yr)
- Waste management practices, including waste deposition, landfilling, and waste water treatment (~531 kg Hg/yr)

As a result of the MIA process, the approximate magnitude and distribution of these anthropogenic releases into air, water, and land are now quantified for Jamaica. Based on the MIA findings, the extraction and refinery process of alumina is a major source of mercury emissions in the country. Additionally, the disposal of mercury-added products through burning, landfilling, and waste water treatment produce significant releases into the environment. Based on the UN Environment Toolkit Level 2 approach (UN Environment 2017), the total calculated mercury input to society in Jamaica is ~4,500 kg Hg/yr.

How are People Exposed to Mercury?

Exposure to elemental mercury, which is found in some manufactured products such as those referred to above, is not necessarily toxic to humans. Exceptions may include dental amalgam and some cosmetics, but these products are still under scientific investigation, so their potential harm is not yet fully characterized.

Methylmercury, the organic form of mercury, is toxic to humans because it can biomagnify in food webs and bioaccumulate over time in organisms that may be frequently consumed. A neurotoxin, methylmercury can cause physiological harm and behavioral disorders in people.

Fish from the sea or freshwater systems can be a major source of methylmercury exposure to humans. In general, fish species that are small, short-lived, and forage low in the food web contain less methylmercury, while predatory species that are long-lived and grow larger can contain higher levels of methylmercury.

Published mercury concentrations from tissues in fish and marine mammals in the Caribbean Sea indicate regular exceedance of various thresholds used by American and International entities (e.g., 0.22 ppm*, ww** by the Great Lakes Consortium for the U.S. and Canada; 0.30 ppm, ww by the U.S. Environmental Protection Agency; 0.50 ppm, ww by the European Commission and World Health Organization which includes an exemption for large predatory fish species of 1.0 ppm, ww; Evers et al. 2017). Following are examples of seafood choices found in the Caribbean region:

Seafood with lower mercury levels (<0.22 ppm, ww):

- Small grouper, snapper, shrimp, tilapia, oysters, mahi mahi, salmon (market availability)

Seafood with higher mercury levels (>0.22 ppm, ww):

- Atlantic blue marlin, barracuda, large grouper, king mackerel, swordfish, many tuna species, wahoo (peto)

*parts per million; ** wet weight

How Does Mercury Affect Ecological Health?

Recent studies have shown that high mercury concentrations in fish (measured in methylmercury) can have negative impacts on fish growth, behavior, and reproduction. Consequently, fish-eating wildlife are shown to have decreased reproductive success when methylmercury concentrations in fish are high. As a neurotoxin, methylmercury can also have negative affects on behavior such as foraging or nest protection (Scheuhammer et al. 2012).

Habitats at Greatest Risk

The process of methylation, the conversion of mercury to methylmercury, varies widely on the landscape and within the waterscape. Areas that are particularly sensitive to mercury deposition—where methylation rates are highest and biomagnification in the food web is greatest, and where animals experience significant reproductive harm—are called biological mercury hotspots (Evers et al. 2007). These areas generally represent aquatic ecosystems or have an aquatic connection within the food web (Evers et al. 2017; Evers et al. 2016).

Generally, aquatic ecosystems connected to wetlands, either marine (e.g., coral reefs, estuaries) or freshwater (e.g., rivers), are prime areas for high methylation rates. Fish and wildlife predators that live in estuaries and lakes, or that forage in a food web associated with these habitats (e.g., mangroves), often contain elevated mercury levels. The combination of high methylation rates and longer-lived animals higher in the food web (examples below) creates the greatest risk.

Wildlife at Greatest Risk:

- Brown Pelican, Magnificent Frigatebird, Masked and Red-footed Booby, White-tailed Tropicbird, Black-capped Petrel, Audubon's Shearwater, Bridled Tern, Sooty Tern

Brown Pelican

Coral Reefs and Beaches

Rivers and Streams

Wetlands and Mangroves

What is the State of Mercury in Jamaica?

The Minamata Convention addresses the management of mercury and the risks this toxin poses to human health and the environment. Provisions in the Convention provide guidance to countries in developing strategies to reduce mercury contamination.

Findings from the MIA in Jamaica indicate that the input of mercury into ecosystems may be elevated in some areas, but with effort by the government and key stakeholders, those inputs can be further identified and reduced.

Lifecycle management of mercury-added products (e.g., compact fluorescent lamps and dental amalgam) also presents a challenge for Jamaica. The adoption of legislation that limits and restricts the importation of such products will be an important first step towards the successful implementation of the Minamata Convention, which will help to reduce overall mercury releases in the island.

Like many Small Island Developing States, regional atmospheric mercury loads may be impacting Jamaica's marine fisheries. However, with greater collaboration and cooperation across the region, the potential risks associated with mercury in the environment can be reduced.

Steps Consumers Can Take to Protect Against Mercury Contamination?

- Choose fish with lower mercury levels as part of your diet.
- Use your buying power—purchase alternatives to mercury-added products or products with low mercury content (see Useful Links on back page for more information).

Priority Areas for Consideration in the Implementation of the Minamata Convention in Jamaica

- Increase the monitoring and enforcement of the existing standards for mercury and mercury compounds in The Natural Resources Conservation Authority (Air Quality) Regulations, 2006 and The Natural Resources Conservation (Wastewater and Sludge) Regulations, 2013.
- Promote mercury-free alternative consumer products. Increase public awareness on the benefits of using mercury-free alternatives. See World Health Organization's updated list of products on the market (in Useful Links below).
- Develop proper separation methods for the disposal of mercury-added products, both at the consumer level and in landfill management procedures.
- Manage mercury releases from processes such as waste incineration through the implementation of further best available techniques/best environmental practices (BAT/BEP) measures to ensure that maximum control and reduction of mercury emissions and releases (www.mercuryconvention.org). The efficiencies of these measures should be continuously monitored and evaluated. It is also recommended that the locations for development of future industries/processes/disposal sites should be considered with respect to environmentally sensitive areas.
- Generate greater awareness and education through existing outreach programs; oversee the development and distribution of information on mercury to the public, including importers of manufactured products.
- Develop a national database of the major anthropogenic sources of emissions and releases to the Jamaican environment. Participate in global mercury database and monitoring programs and coordinate with global and regional sampling efforts organized by UN agencies.

For More Information:

Basel Convention Regional Centre for
Training and Technology Transfer for the Caribbean
(BCRC-Caribbean)

info@bcrc-caribbean.org

or

Jamaica Ministry of Economic Growth and Job Creation

info@megjc.gov.jm

Basel Convention Regional Centre for Training and Technology Transfer for the Caribbean Region (BCRC–Caribbean)

The BCRC–Caribbean acted as the Executing Agency for the Minamata Initial Assessment for the Caribbean Region (Jamaica, Saint Kitts and Nevis, Saint Lucia and Trinidad and Tobago). For further information, please visit www.bcrc-caribbean.org.

BRI's Mercury Work in Jamaica

Biodiversity Research Institute (BRI) has collaborated with its partners in Jamaica to help identify and estimate major mercury sources in the region. As an International Technical Expert, BRI provided training on the UN Environment's *Toolkit for Identification and Quantification of Mercury Releases* and assisted with the review of primary reports and products developed as part of the MIA.

Useful Links

Minamata Convention:
www.mercuryconvention.org

United Nations Environment:
www.unep.org

BCRC–Caribbean:
www.bcrc-caribbean.org

World Health Organization:
www.who.int/ipcs/assessment/public_health/mercury/en/

BRI publications on mercury:
www.briloon.org/hgpubs

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