



# The State of Mercury in The Republic of Seychelles



**T**he Minamata Convention on Mercury is the first global agreement specifically designed to address contamination from a heavy metal. Opened for signature in October 2013, the Convention seeks to address issues related to the use and release of mercury in trade and in industrial processes. The treaty also addresses major sources of atmospheric emissions and releases of mercury into the environment, as well as long-term storage and disposal of mercury and mercury compounds.

Under the Minamata Convention, individual countries are charged with protecting human health and the environment from the risks of mercury exposure by systematically controlling mercury emissions and

releases, including phasing out the use of mercury in certain products and processes. On January 13, 2015, the Seychelles ratified the Minamata Convention on Mercury, less than one year after becoming a signatory of the treaty.

In order to meet its obligations under the treaty, the Seychelles conducted a Minamata Initial Assessment (MIA) to quantitatively and comparatively determine the extent of local mercury pollution. Some findings from the Seychelles MIA and recommendations from the Seychelles mercury team can be found within this brochure.



# Findings from the Minamata Initial Assessment

## What are the Sources of Mercury?

The origin of mercury can be natural (e.g., volcanoes) or anthropogenic (e.g., human-caused releases). There are few direct sources of mercury entering the environment of the Seychelles. Imported products that contain mercury account for the largest source of mercury to the islands, including:

- Compact florescent lights and mercury vapor lights
- Thermometers, manometers, and sphygmomanometers
- Batteries and antifouling paints
- Dental amalgams
- Some skin lightening creams



The anthropogenic release of mercury through the air and water is also of concern. Globally, coal-fired power utilities and artisanal small-scale gold mining produce the highest mercury emissions. However, neither of these sources is of major concern in the Seychelles. Local sources of emissions include: medical waste incineration; contaminated sites including landfills that receive waste products containing mercury; and a used battery facility on Mahe Island. Mercury derived from waste products at disposal sites can flow from terrestrial to aquatic ecosystems.



Coral Reefs

## How are People Exposed to Mercury?

Elemental mercury, which is found in manufactured products, is not necessarily toxic to humans. Exceptions may include dental amalgams and thimerosal, 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. A neurotoxin, methylmercury can cause physiological harm and behavioral disorders in people.

Seafood, an important food source in the Seychelles, can be a major source of methylmercury. In general, fish species that are smaller, short-lived, and forage low on the food web contain less methylmercury, while predatory species that are long-lived and grow larger contain higher levels of the toxin. Many of the fish available in the Seychelles are highly predatory and are high in the food web, however, fish mercury concentrations in the Indian Ocean tend to be lower than in the northern Pacific and Atlantic Oceans.

Seafood with lower mercury levels (*healthier choices*):

- Goatfish, Grouper
- Parrot Fish, Red Snapper, Trevally
- Lobster, Octopus, shellfish

Seafood with higher mercury levels (*riskier choices*):

- Marlin, Sailfish, Swordfish
- Barracuda, Bonito, Tuna, Wahoo



Beaches

## How Does Mercury Affect Ecological Health?

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. These areas generally represent aquatic ecosystems or have an aquatic connection within the food web.

Generally, aquatic ecosystems connected to wetlands, either marine (e.g., estuaries) or freshwater (e.g., lagoons), are prime areas for high methylation rates. Fish and wildlife predators that live in estuaries and lagoons, or that forage in a food web associated with these

habitats (e.g., beaches, coral reefs, and forests), contain elevated mercury levels. The combination of high methylation rates and longer-lived animals higher in the food web creates the greatest risk. It is unknown if the Seychelles have biological mercury hotspots (i.e., where fish and wildlife reproductive success is harmed).

### Habitats of Greatest Risk

- Wetlands, lagoons, estuaries, and aquatic habitats near contaminated sites

### Fish and Wildlife at Greatest Risk

- Tropicbirds, shearwaters, terns, and herons



Lagoons



Forests

## What is the State of Mercury in the Seychelles?

Although the Seychelles represent a relatively unspoiled landscape and waterscape, the impacts of mercury pollution, which can have distant origins, are challenging to identify and to reverse. Mercury can cause significant adverse effects on human and ecological health.

Findings from the Seychelles MIA indicate that the input of mercury into the Seychelles' ecosystem is relatively minor and that, with some effort by the government, key stakeholders, and the general public, those inputs can be further reduced.

The impacts of regional mercury loads in the Indian Ocean and the effect on commercial fisheries, specifically swordfish and tuna, may require broader regional actions—but MIAs

are being undertaken by many countries in the region, which should significantly reduce mercury in the area's landscape and waterscape.

### WHAT CAN YOU DO TO HELP?

- Choose healthier fish options (those with lower mercury levels) as part of your diet
- Use your buying power—purchase no- or low- mercury product replacements when possible (e.g., avoid compact fluorescent lights and skin lightening creams that contain mercury. See Useful Links on back page for more information)
- Support legislation that helps reduce the impacts of mercury on the environment

## Recommendations from the Seychelles Mercury Team

- Create legislation that can help facilitate a framework to comply with the Minamata Convention
- Reduce the import and use of products with mercury by selecting no- or low-mercury product replacements
- Properly store waste products with mercury and avoid using landfills by creating proper storage facilities for hazardous waste
- 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
- Participate in global mercury database and monitoring programs and coordinate existing data with global efforts organized by the United Nations Environmental Programme:
  - Use hair samples for people
  - Use muscle samples for billfish and tuna
  - Use blood, feather, and egg samples for seabirds
- Create a technical committee on mercury to make use of relevant stakeholders and to increase capacity and awareness of mercury issues
- Ensure that there are continuous mercury monitoring programs in the Seychelles environment, emphasizing fish that are exported but also those destined for local consumption

## About the Seychelles

The Seychelles is a 115-island archipelago in the Indian Ocean just south of the equator and northeast of Madagascar. Although one of the world's smallest countries (about 300 km<sup>2</sup>), the maritime sovereign territory of Seychelles covers over 1.3 million km<sup>2</sup>. More than 1,000 species of fish and more than 250 species of birds, including 12 endemics, inhabit this territory.

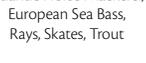
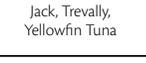
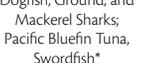
### BRI's Mercury Work in the Seychelles

Biodiversity Research Institute (BRI) collaborates with its partners in the Seychelles to help identify and estimate any major mercury sources in the region. An international advisor on mercury, BRI serves as co-lead of the United Nations Environment Programme's Mercury Air Transport and Fate Research partnership area to assist with the development of a global mercury monitoring and observation system. In addition, BRI is an executing agency for the United Nations Industrial Development Organization and the United Nations Development Programme to conduct MIA activities in several countries.

### Useful Links

- Seychelles Child Development Study (<https://www.urmc.rochester.edu/pediatrics/research/seychelles-child-development-study.aspx>)
- Skin Lightening Creams (<http://www.whiterskin.info>)

## Global Health Trade-Off for Mercury and Omega-3 in Fish

		Milligrams of Omega-3 Fatty Acids/4 Ounces of Cooked Fish →			
MEAL FREQUENCY RECOMMENDATIONS		<500 mg	500-1,000 mg	1,000-2,000 mg	> 2,000 mg
Total Mercury in Muscle Tissue µg/g (ww) ↓	Unrestricted meals (< 0.05 µg/g)	 Catfish, Clams, Crab* (most species), Croaker, Haddock, Scallops, Shrimp, Tilapia*	 Blue Mussels,* Pink Salmon, Sockeye Salmon	 Chinook Salmon,* Coho Salmon, Oysters	 Atlantic Salmon, Sardines, Shad <b>Healthier Choices</b>
	1-2 meals per week (0.05-0.22 µg/g)	 Atlantic and Pacific Cod, Flounder, Grenadier, Hake, Lobster,* Sole	 Atlantic Pollock, Mahi Mahi, Muller, Scad, Squid, Skipjack Tuna, any canned tuna	 Atlantic Horse Mackerel, European Sea Bass, Rays, Skates, Trout	 Anchovies,* Herring
	1 meal per month (0.22-0.95 µg/g)	 Grouper, Orange Roughy, Snapper	 Barracuda, Bigeye Tuna, Bluefish, Halibut, Jack, Trevally, Yellowfin Tuna	 Atlantic and Pacific Mackerel, Albacore Tuna,* Atlantic Bluefin Tuna, Chilean Sea Bass	 Mercury concentrations vary widely across shark species. To learn more, visit: <a href="http://www.briloon.org/hgcenter">www.briloon.org/hgcenter</a>
	No consumption (> 0.95 µg/g)	 King Mackerel <b>Riskier Choices</b>	 Marlin, Sailfish, Tilefish	 Dogfish, Ground, and Mackerel Sharks, Pacific Bluefin Tuna, Swordfish*	

Data Sources: BRI's Global Biotic Mercury Synthesis (GBMS) Database; U.S. Environmental Protection Agency; U.S. Food and Drug Administration

\*Pictured

## MIA Stakeholders

- The Ministry of the Environment, Energy and Climate Change (MEECC)
- Ministry of Health (MoH)
- Ministry of Fisheries and Agriculture
- Seychelles Fishing Authority (SFA)
- Seychelles Agricultural Agency (SAA)
- Seychelles Bureau of Standards (SBS)
- Fish and Boat Owners Association (FBOA)
- Institut de Recherché de la Reunion (IRD)
- Université de La Rochelle and Human Resources
- LUNGOS/CEPS
- University of Seychelles (UniSey)
- Seychelles Chamber of Commerce and Industry
- Programme Coordination Unit
- United Nations Development Programme
- Global Environment Facility (GEF)
- Seychelles Revenue Commission
- AAI Enterprise Pty Ltd
- Metissage Seychelles
- Biodiversity Research Institute

## For More Information:

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