The State of Mercury in the Pacific Region

The Minamata Convention on Mercury is the first global agreement specifically designed to address contamination from a heavy metal. Opened for signature in October 10, 2013 and entering into force on August 16, 2017, 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.

Island nations in the South Pacific are committed to the goals of the Minamata Convention and are participating in the Pacific Regional Minamata Initial Assessment. A chart on page 6 shows the status of the participation of each country. The primary activities of the MIA projects in the South Pacific include:

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

The MIAs are conducted with financial assistance from the Global Environment Facility (GEF) and are implemented by the United Nations Environment Programme (UNEP). A Regional Pacific MIA involving eight Pacific islands is being executed by the Secretariat of the Pacific Regional Environment Programme (SPREP) while a National MIA Project is being co-executed in the Federated States of Micronesia by Department of Environment, Climate Change, and Emergency Management (DECEM) and Biodiversity Research Institute (BRI).

SPREP Secretariat of the Pacific Regional Environment Programme

UN environment programme

gef global environment facility INVESTING IN OUR PLANET

bri

Global Mercury Monitoring

Biodiversity Research Institute (BRI) is working on several fronts to conduct and promote mercury biomonitoring across the globe. Biomonitoring is the process of assessing the health of organisms and ecosystems and tracking changes in mercury risk and exposure over time.

Monitoring mercury exposure to humans will help the global community to meet the requirements of the Minamata Convention on Mercury and will also help identify global biological hotspots that represent elevated levels of mercury exposure that may pose serious threats to both ecosystem and human health.

Mercury Monitoring—South Pacific Region

In coordination with SPREP, BRI has engaged the National Focal Point Agencies within each country to coordinate the development of the National MIAs. The National Focal Points are as follows:

- National Environment Service, **The Cook Islands**
- Environment and Conservation Division, Ministry of Environment Lands and Agricultural Development, **The Republic of Kiribati**
- Republic of the Marshall Islands Environmental Protection Agency, **The Republic of the Marshall Islands**
- Department of Environment, Environment Governance/Biodiversity/Climate Change/Waste Management, Ministry of Natural Resources, **Niue**
- Environmental Quality Protection Board, **The Republic of Palau**
- Ministry of Public Works, Infrastructure, Environment, Labour, Meteorology & Disaster, **Tuvalu**
- Ministry of Climate Change Adaptation, **The Republic of Vanuatu**
- Department of Environment, Climate Change, and Emergency Management (DECEM), **The Federated States of Micronesia** (conducting its MIA in co-execution with BRI).

Global Mercury Assessment 2018

A key finding listed in the UN's *Global Mercury Assessment 2018* shows that the production of methylmercury (the organic form of mercury) in the oceans is no longer limited by the input of inorganic mercury. Other factors such as climate change, biogeochemistry, and changes in soil processes are playing increasingly important roles in the mercury cycle, affecting the distribution and chemical interactions of mercury in the environment. This is especially critical to island nations that rely on maritime industries as primary economic and food sources.

Top right: Dietary consumption of fish, shellfish, and marine mammals, important protein sources for island nations, can be a major source of mercury exposure (UNEP 2018). Center: Stakeholder meeting between BRI team and local National Focal Point representative from RMI EPA. Bottom: Map Surveys help identify potential mercury hotspots such as a landfill where toxic materials from discarded mercury-added products, can leach into the ground.

Island Habitats at Risk

Mangroves

Creek Bed - Low Tide

Coral Reefs

Reef Flats and Pools

Forest Lands

Lakes and Rivers

Findings from the Minamata Initial Assessments

What are the Sources of Mercury?

Many Pacific countries are currently conducting a national mercury inventory using the UN Environment Programme's *Toolkit for Identification and Quantification of Mercury Releases*. The primary sources of mercury in participating Pacific countries are likely to include:

- Use and disposal of mercury-added products such as compact fluorescent lamps (CFLs), electrical switches and relays with mercury, and mercury-added batteries;
- Preparation, use, and disposal of dental mercury amalgam fillings;
- Waste deposition and incineration;
- Combustion of fossil fuels for power generation and transport.

Small Island Developing States (SIDS), including those in the Pacific, face unique challenges related to the Minamata Convention, as territory size limits options for sound management, storage, and disposal of hazardous waste. Possible solutions to these challenges may include extending manufacturer and distributor responsibility and raising awareness.

How are People Exposed to Mercury?

Elemental mercury, which is found in manufactured products, is not necessarily toxic to humans. Exceptions may include dental amalgam and 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. 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. 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. Many of the fish available in the Pacific are safe to eat, although more information is needed about the mercury concentrations to better characterize how mercury is distributed in different species of fish in the waterscape of Pacific nations.

Yellowfin Tuna

Seafood with lower mercury levels (healthier choices):

- Anchovy, Sardines, Skipjack Tuna, Squid

Seafood with medium mercury levels (moderate risk):

- Albacore Tuna, Groupers, Mahi-mahi, Yellowfin Tuna

Seafood with higher mercury levels (riskier choices):

- Barracuda, Blue Marlin, Indo-Pacific King Mackerel, Sailfish, Southern Bluefin Tuna, Swordfish

BRI is currently coordinating with interested National Focal Points to conduct a rapid analysis of mercury in select fish species. Findings will contribute to the development of a regional/global biomonitoring database for future mercury monitoring opportunities. Collaboration with national fisheries agencies to ensure that interests of relevant fisheries-oriented treaties are met will also be sought as needed.

How Does Mercury Affect Ecological Health?

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.

The process of methylation, the conversion of elemental mercury to organic 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.

Aquatic ecosystems, either marine (e.g., beaches and coral reefs) or freshwater (e.g., lakes and rivers), are often prime areas for high methylation rates.

Fish and wildlife predators that live in rivers 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 creates the greatest risk of adverse effects.

Habitats at Greatest Risk:

- Wetlands, mangroves, aquatic habitats near contaminated sites

Wildlife at Greatest Risk:

- Albatrosses, Cormorants, Frigatebirds, Petrels, Shearwaters, Terns

What is the State of Mercury in the Pacific Region?

The impacts of mercury pollution can be challenging to identify and reverse. However, strategies to reduce mercury contamination are important because mercury can cause significant adverse effects to humans and ecological health.

Lifecycle management of mercury-containing products presents the biggest challenge for SIDS. 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 that will help to reduce the overall mercury releases on the islands.

Like many SIDs, regional atmospheric mercury loads may be impacting the region's marine fisheries.

However, with greater collaboration and cooperation across the region, the potential risks associated with mercury in the environment can be reduced.

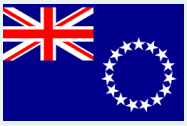
What Can You Do To Help?

- Choose healthier fish options (those with lower mercury levels) as part of your diet.
- Use your buying power—purchase no- or low-mercury product substitutes when possible (See Useful Links on back page for more information).
- Support legislation that helps reduce the impacts of mercury on the environment.

Status of the Minamata Initial Assessments

Regional MIA Project

Executing Agency: Secretariat of the Pacific Regional Environment Programme (SPREP)
Technical Experts: Biodiversity Research Institute (BRI)

Country	Status of MIA Report	Minamata Convention Status
Cook Islands 	Expected late 2023	Actively considering
Kiribati 	Expected late 2023	Party
Marshall Islands 	Expected late 2023	Party
Niue 	Expected late 2023	Actively considering
Palau 	Expected late 2023	Party
Tonga 	To be developed independently	Party
Tuvalu 	Expected late 2023	Party
Vanuatu 	Completed and published	Party

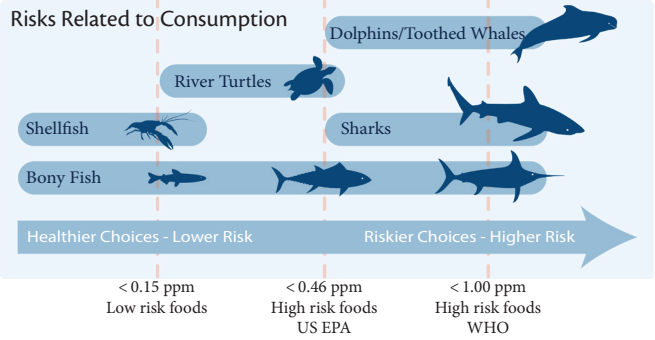
National MIA Project

Co-executing Agencies: Department of Environment, Climate Change, and Emergency Management (DECEM) and Biodiversity Research Institute

	Status of MIA Report	Minamata Convention Status
Federated States of Micronesia 	Expected late 2023	Actively considering

Potential Recommendations for the Pacific Region

- Create policies that can help facilitate a regulatory framework to comply with the Minamata Convention.
- Through participation in the ongoing GEF-funded programme, *Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (ISLANDS)*, Parties to the Convention will benefit from:
  - The development of draft model legislation to control mercury containing products for use by Pacific SIDS that can be tailored for adoption by each country and;
  - The provision of support for the sound repackaging, shipping, collection, and disposal of mercury waste.
- Continue to reduce the import and use of products that contain mercury by selecting no- or low-mercury product replacements. For example:
  - Replace compact and linear fluorescent lights with LED bulbs.
  - Check the ingredients in skin lightening creams and lotions to avoid products that contain mercury.
  - Choose brands of batteries that do not contain mercury.
- 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 efforts organized by UNEP. May include collection and analysis of:
  - Human hair samples
  - Fish muscle tissue samples
  - Blood, feather, and/or egg samples for birds
  - Blood and/or fur samples for bats



Global Health Trade-off for Mercury and Omega-3 in Seafood

Milligrams of Omega-3 Fatty Acids/4 Ounces of Cooked Fish →

Total Mercury in Muscle Tissue µg/g (ww) ↓

Meal Frequency Recommendations	<500 mg	500-1,000 mg	1,000-2,000 mg	> 2,000 mg
Unrestricted meals (< 0.05 µg/g)	Catfish (temperate waters), Clams, Crab* (most species), Croaker, Haddock, Parrotfish, Scallops, **Seabream**, Shrimp, Tilapia*	Blue Mussels,* Pink Salmon, Sockeye Salmon	Coho Salmon, Oysters	Sardines, Shad (Healthier Choices)
1-2 meals per week (0.05–0.22 µg/g)	Butterfish, Atlantic and Pacific Cod, Grenadier, Hake, Lionfish, Lobster,* Red Fish, Scad, Snapper, Sole	Atlantic Pollock, Bonito **Mahi-mahi**, Mullet, Squid, **Skipjack Tuna**, (light canned tuna)	Atlantic Horse Mackerel, Atlantic and Pacific Mackerel, Chinook Salmon,* European Sea Bass, Rays, Skates, Trout	**Anchovies**,* Atlantic Salmon, Herring
1 meal per month (0.22–0.95 µg/g)	Catfish (tropical waters) Flounder, Grouper, Orange Roughy, Seabream	Amberjack, Barracuda, **Bigeye Tuna**, Bluefish, Croaker, Halibut, Jack, Tilefish, Trevally, **Yellowfin Tuna**, Wahoo, (white canned tuna[1])	**Albacore Tuna**,* **So. Bluefin Tuna**, Blackfin Tuna, Chilean Sea Bass, Spanish Mackerel (white canned tuna[1])	Mercury concentrations vary widely across shark species. To learn more, visit: www.briloon.org/hg-center
No consumption (> 0.95 µg/g)	**King Mackerel** (Riskier Choices)	**Marlin, Sailfish**	Dogfish, Ground, and Mackerel Sharks; Pacific Bluefin Tuna, **Swordfish***	

Seafood important for the Pacific Region are in blue.

*Pictured

[1] White canned tuna can be albacore or yellowfin.

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

Secretariat of the Pacific Regional Environment Programme (SPREP)

The purposes of SPREP are to promote cooperation in the South Pacific Region and to provide assistance in order to protect and improve the environment and to ensure sustainable development for present and future generations.

Minamata Convention on Mercury

www.mercuryconvention.org

SPREP

www.sprep.org

SPREP
Secretariat of the Pacific Regional Environment Programme

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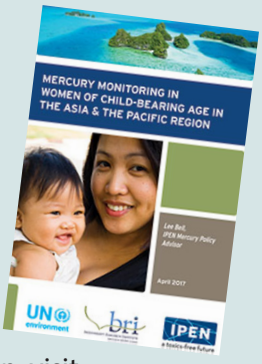
BRI's Mercury Work in the South Pacific

Biodiversity Research Institute has collaborated with its partners to help identify and estimate major mercury sources in the island nations of the Pacific 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 MIAs for all countries except Tonga, which is being conducted separately with aims to incorporate findings with overall Pacific region work.

Other mercury research BRI has completed with global partners in the South Pacific includes:

Mercury monitoring in women of childbearing age in the Asia and the Pacific Region



For more information, visit:

www.briwildlife.org/hgcenter

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