



The State of Mercury in

Nepal



The Minamata Convention on Mercury is a 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 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, which involves systematically controlling mercury emissions and releases, including phasing out the use of mercury in certain products and processes.

Nepal signed the Minamata Convention on October 10, 2013. In order to assist with preparations for the ratification and implementation of the Convention, the government of Nepal

conducted a Minamata Initial Assessment (MIA). The primary activities of the MIA included:

- A review of institutional and capacity needs for implementation of the Convention;
- An assessment of national institutions, policies, and legislations 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 MIA was conducted with financial assistance from the Global Environment Facility and was implemented in collaboration with the United Nations Industrial Development Organization (UNIDO). This brochure summarizes the primary mercury sources and risks identified through the MIA project in Nepal.



Findings from the Minamata Initial Assessment

What Are the Sources of Mercury?

The origin of mercury (Hg) can be natural (e.g., volcanoes—though they are not found in Nepal, long distance transfer of mercury takes place from volcanic areas to other places) or anthropogenic (human-caused releases). The major sources of mercury in Nepal, based on the mercury inventory conducted for the MIA, are mostly represented by the following:

- Coal use outside of coal-fired power plants: 150 kg Hg/yr (3%)
- Other fossil fuels – oil and gas: 753 kg Hg/yr (14%)
- Domestic production using raw materials – cement: 389 kg Hg/yr (7%)
- Use and disposal of mercury-added products: 2,476 kg Hg/yr (47%)
- Mercury release from dental amalgam: 114 kg Hg/yr (2%)
- Waste management, including waste incineration, open waste burning and dumping on land and in water: 1,126 kg Hg/yr (22%)

As a result of the MIA process, the approximate magnitude and source distribution of these anthropogenic releases into the air, water, and land are now quantified for Nepal. Based on the MIA findings, the total estimated input to society in Nepal is 5,230 kg Hg/year.

Miscellaneous potential mercury sources present in Nepal

Gold plating (gold-mercury amalgam) is a traditional artisanal craft in Nepal with a history spanning many centuries. In fiscal year 2016-17, a total of 190,212 pieces of gold-plated sculptures having a combined weight of 1255.33 MT were produced, which has led to an estimation of 12,825 kg of mercury used in the plating process.

How Are People Exposed to Mercury?

Fish Consumption: Methylmercury, the organic form of mercury, biomagnifies in food webs and bioaccumulates over time in organisms that may be frequently consumed. Once ingested, this neurotoxin can cause physiological harm and behavioral disorders in humans. Mercury exposure is particularly concerning for children and women of childbearing age as it can damage the nervous system, kidneys, and cardiovascular system. Developing organ systems, such as the fetal nervous system, are the most sensitive to the toxic effects of mercury, although nearly all organs are vulnerable.

Fish can be a major source of dietary 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.

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

- Carp – variety of species

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

- Many species of tuna (imported)



Silver Carp



Occupational Hazards: In Nepal, gold plating of statues is a widely practiced craft. Mercury, used as the solvent for gold, is vaporized in the process, which exposes artisans to serious health risks (*photo left*).

Mercury-added Products: Elemental mercury, which is found in some 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.

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 effects 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, including lakes, rivers and associated wetlands, 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 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 associated with eight Ramsar sites: Beeshazar Tal; Ghodaghodi Tal; Gokyo Lakes; Gosaikunda; Jagdishpur Reservoir; KoshiTappu Wildlife Reserve; Mai Pokhari; and Phoksundo Lake.
- Lakes such as Phewa Lake, which has known high mercury contamination.

Wildlife at Greatest Risk:

- Cranes, crocodiles, egrets, herons, kingfishers, otters, storks



Sarus Crane



Lakes



Marshes



Rivers

What Is the Status of Mercury in Nepal?

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

Findings from the Minamata Initial Assessment in Nepal indicate that the input of mercury into local ecosystems may be elevated in some areas, but with effort by the government, key stakeholders, and the general public, those inputs can be further identified and reduced.

Lifecycle management of mercury-added products also presents a challenge for Nepal. The adoption of national 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 this Himalayan country.

Gold plating and use of mercury with jewelry making in parts of Asia require further scrutiny to determine how to best reduce human exposure to the toxic effects of mercury. With greater collaboration and cooperation across the region, the potential risks associated with mercury in such occupations and in the environment can be reduced.

STEPS CONSUMERS CAN TAKE TO PROTECT AGAINST MERCURY CONTAMINATION

- Choose healthier dietary fish options (those with lower mercury levels).
- Purchase no- or low-mercury product replacements when possible (See Useful Links on back page).
- Support legislation that helps reduce the impacts of mercury on the environment.

Recommendations from the Nepal Mercury Team

- Ratify the Minamata Convention on Mercury.
- Create legislation that can help facilitate a framework to comply with the Minamata Convention.
- Promote mercury-free alternative consumer products and medical equipment (which are already widespread on the market):
 - Replace compact and linear fluorescent lights with Light Emitting Diodes (LED) bulbs;
 - Choose brands of batteries that do not contain mercury;
 - Replace outdated medical/measuring devices containing mercury with digital alternatives; and
 - Generate greater awareness and education through existing outreach programs; oversee the development distribution of information on mercury to the public, including importers of manufactured products.
- Reduce or ban the use of dental amalgam in children
- Develop proper separation methods for the disposal of mercury-added products both at the household consumer level and in the landfill management procedures.
- Improve public access to environmentally sound facilities/locations that could aid in the disposal process, as well as provide information and guidelines on safe disposal of mercury-added products.
- Implement safety measures for capture and release of mercury emissions during the process of gold plating activities.
- Participate in global mercury database and monitoring programs involving global and regional sampling efforts organized by UN agencies, including:
 - Hair and cosmetic samples for people;
 - Muscle samples for fish;
 - Blood, feather, and egg samples for birds; and
 - Air sampling with passive devices.

BRI's Mercury Work in Nepal

Biodiversity Research Institute (BRI) collaborates with its partners in Nepal to help identify and estimate any major mercury sources in the region. An international advisor on mercury, BRI serves as co-lead of the UN Environment'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 serves as International Technical Expert with the United Nations Development Programme (UNDP) and with UN Environment and as an Executing Agency for the UNIDO.

Useful Links

- Ministry of Forests and Environment: www.mofe.gov.np
- Minamata Convention: www.mercuryconvention.org
- UN Environment: www.unep.org
- UN Industrial Development Organization: www.unido.org/mercury
- BRI publications on mercury: www.briloon.org/hgpubs

Ministries:

- Ministry of Defense
- Ministry of Education, Science and Technology
- Ministry of Energy and Water Resources
- Ministry of Federal Affairs and General Administration
- Ministry of Finance
- Ministry of Forests and Environment
- Ministry of Health and Population
- Ministry of Industry, Commerce, and Supplies
- Ministry of Labour and Employment
- Ministry of Law, Justice, and Parliamentary Affairs
- National Planning Commission

Departments and Government Organizations:

- Department of Ayurvedic and Alternative Medicine
- Department of Commerce Supplies and Protection of Consumer
- Department of Customs
- Department of Drug Administration
- Department of Education
- Department of Environment
- Department of Health Services
- Department of Industry
- Department of Labour
- Department of Mines and Geology
- Department of Water Supply and Sewerage
- Nepal Bureau of Standards and Metrology

Other Organizations:

- Central Department of Chemistry, Tribhuvan University, Kirtipur
- Central Department of Environmental Science, T.U, Kirtipur
- Federation of Handicraft Association
- Federation of Nepal Brick Industries
- Federation of Nepalese Chamber of Commerce and Industry
- Federation of Nepalese Cottage and Small-scale Industries
- Kathmandu University, Kavre
- Nepal Bar Association
- Nepal Cement Association
- Nepal Dental Association
- Nepal Health Research Council
- Nepal Reuse and Recyclable Goods Entrepreneurs' Association
- Singhdurbar Vaidhyakhana

For More Information:

Mr. Bipin Rajbhandari
Environment Standard and Monitoring Section
Ministry of Forests and Environment

www.mofe.gov.np

Telephone: +977-1-4211892, ext. 195

Fax: +977-1-4211838

Email: bipin.rajbhandari@nepal.gov.np