

# MERCURY (Hg) IN PACIFIC OCEAN ECOSYSTEMS



## KEY POINTS

- Pacific states and territories are affected not only by pollutants produced locally but also by waste transported in by atmospheric deposition, ocean currents, and foreign vessels. Remote, uninhabited island ecosystems show impacts of [marine pollution](#) and physical presence of debris.
- Mercury pollution has broad economic, social and environmental impacts via:
  1. Loss of ecosystem services due to ecosystem and species damage;
  2. Financial burden of waste management and the health impacts of pollution. Pacific island states can be particularly vulnerable to mercury pollution impacts due to financial and institutional challenges in managing waste and health impacts;
  3. Impacts on food safety and seafood supply chains: there is concern about contamination of the food supply through bioaccumulation of mercury up the food chain into human food sources.<sup>1</sup>
- Plastics might adsorb mercury and do adsorb other contaminants, and discarded plastic waste is considered one of the priority marine pollution issues facing the region.
- Improved waste-management capacity and practices, including minimisation of waste generation and industry, resource re-use, and effective waste disposal, are vital. Wastewater and solid waste collection and management are key to preventing pollution and litter entering waterways and the ocean.

## HOW ISSUE LINKS TO/IMPACTS SDGs BEYOND SDG14 LIFE BELOW WATER

- SDG2: sustainable management of our marine resources is vital to achieve food security in the Pacific. Pollution threatens marine food sources for human consumption.
- SDG3: mitigation of marine pollution reduces chemical and pollution impacts on human health.
- SDG10: marine pollution has global impact, but the effects will be more strongly felt by small Pacific states with subsistence economies, which also receive external waste.
- SDG11 and 12: the sustainability of Pacific cities and communities relies on the [minimisation of waste generation](#), reducing costs, energy consumption, and the need for waste disposal.

## BACKGROUND

1. **Sources of mercury in South Pacific waters are primarily from other regions.**<sup>2</sup> The primary sources of mercury waste today are coal burning and gold mining. Also, environmentally unsound management of mercury waste causes mercury emissions and releases into the environment. Mercury is easily transported in the atmosphere, and therefore, mercury loading can occur far from sources.<sup>3</sup>
2. **Mercury levels in commonly eaten marine species exceed safe human health guidelines.** Mercury is a neurotoxicant and mainly causes neurological damage, with other potential effects.<sup>4</sup> The organic form, methylmercury (MeHg), can bioaccumulate: in other words, it builds up in the bodies of animals that eat mercury-contaminated prey. Fish and seafood are one of the primary causes of human exposure to this contaminant. A 2015 study showed mercury levels increasing by ~4% per year in yellowfin tuna.<sup>5</sup>
3. **There is concern that microplastics might adsorb mercury and increase its transmission through the food web.**<sup>6</sup> Some microplastics are purposefully manufactured and some are created by the fragmentation of plastic objects. Microplastics are often mistaken for food by a wide range of marine species, affecting their health and passing accumulated toxins up the food chain upon consumption, including human food sources. Microplastics have been associated with elevated levels of contaminants, including some heavy metals.<sup>6,7</sup> Hull anti-fouling paint is a source of heavy metals in marine environments, although mercury is no longer added as a biocide.

4. **The most prevalent (60–80%) types of marine debris are plastic materials.** Plastics are considered a priority marine pollution issue facing the Pacific region. The potential for mercury accumulation on microplastics, which requires further research, adds to the urgency of addressing marine litter management.
5. **Mercury management globally and/or in Pacific island communities relies on emission prevention.** Pacific countries need to take action to properly manage mercury to prevent damage to human health and the environment from anthropogenic mercury emissions. Many Pacific island countries have no current systematic management plan or system for marine pollution prevention, management, and clean up/recovery.<sup>8</sup>
6. **Mercury impacts biodiversity and human health.** Perhaps the most compelling case against mercury poisoning is Minamata disease, which afflicted thousands of people in Japan. Pollution also affects other life in other regions, from marine phytoplankton to larger animals. Endangered seabirds such as albatross, important in Pacific cultures, show increased levels of mercury that correspond with human input patterns.<sup>9</sup>
7. **The Minamata Convention provides a framework for controlling Hg emissions and releases.** A legally binding agreement, the 2013 Minamata Convention, to control Hg emissions and releases to land and water globally was signed by 128 countries. To date, 36 countries have ratified the Minamata Convention, with 50 countries needed for the convention to come into force. Only two Pacific island countries (Palau and Samoa) are Parties.



- 1 Chen et al. 2016. Connecting mercury science to policy: from sources to seafood. *Rev Environ Health* 31:17–20
- 2 UNEP 2013. *Global Mercury Assessment 2013*. UNEP Chemicals Branch, Geneva, 44 p
- 3 C-MERC 2012. *Sources to Seafood: Mercury Pollution in the Marine Environment*. 2 p
- 4 <https://www.esciencecentral.org/journals/the-role-of-mercury-in-cardiovascular-disease-2329-9517.1000170.php?aid=30773>
- 5 Drevnick et al. 2015. Increase in mercury in Pacific yellowfin tuna. *Environ Toxicol Chem* 34:931–934
- 6 Brennecke et al. 2016. Microplastics as vector for heavy metal contamination from the marine environment. *Estuar Coast Sci* 178:189–195
- 7 Holmes et al. 2012. Adsorption of trace metals to plastic resin pellets in the marine environment. *Environ Poll* 160:42–48
- 8 SPREP, 2016. *Cleaner Pacific 2025: Pacific Regional Waste and Pollution Management Strategy 2016–2025*. Apia, Samoa
- 9 Mercury on the rise in endangered seabirds; and Albatross's survival seriously threatened by mercury and pollutants