

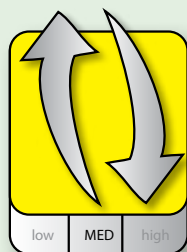
INDICATOR **Freshwater Quality**

PURPOSE

E. coli are indicators of faecal contamination in freshwater bodies and are associated with a range of possible human diseases. High levels of *E. coli* can be associated with cloudy water and decreased dissolved oxygen

DESIRED OUTCOME

E. coli threshold at or below globally accepted standards for drinking and bathing water, which is none detectable per 100 mL for both *E. coli* and total coliforms for drinking water; standards vary for bathing and swimming water

**Status**

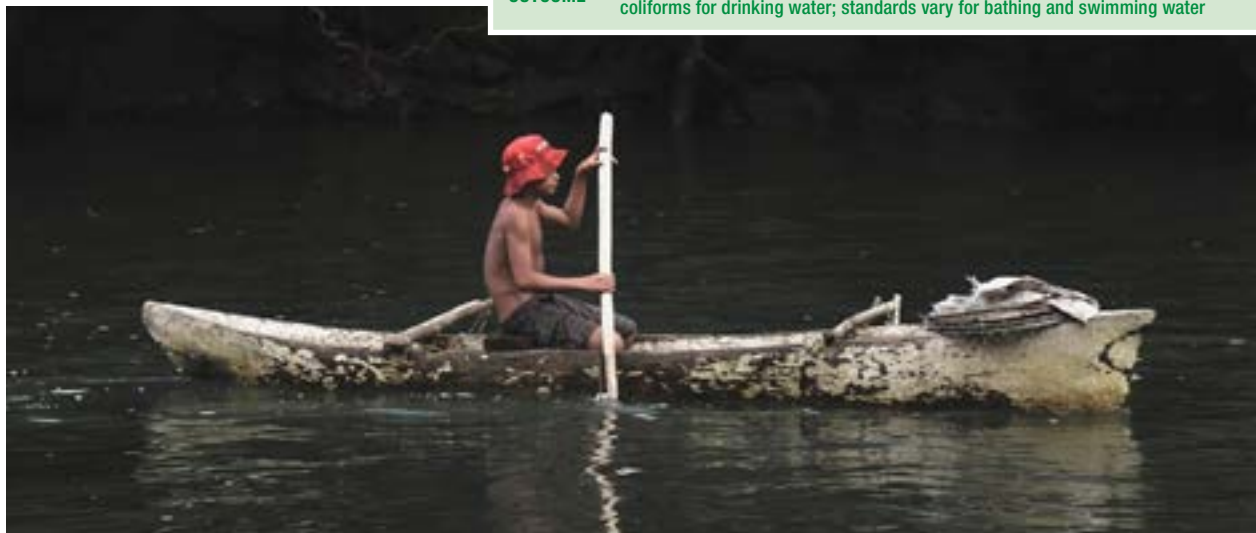
Fair

Trend

Mixed

Data confidence

Medium



Freshwater canoe trip, Samoa. © Charles Netzler

PRESENT STATUS

There are active drinking water or freshwater monitoring programmes in 11 of 14 Pacific countries and 6 of 7 territories. The primary challenge is the regularity and frequency of sampling, the capacity to process samples accurately in country, and the official response process to the findings. There is no regional data collation for this proposed indicator, to date.

Escherichia coli occurs naturally in human and animal intestines and therefore can be used as a proxy for untreated sewage contamination or other pollution.¹

E. coli or general coliform presence has been confirmed in a large number and proportion of samples across many Pacific island countries and territories. Although data are limited (medium confidence), the rates of contamination observed, along with the prevalence of waterborne diseases, imply that the status of this indicator is fair with mixed trends among the Pacific countries and territories.

National standards for drinking water vary or may not be independently defined. Specific tropical standards might help local authorities make well-informed decisions about the presence of naturally occurring coliform bacteria, not all of which are human pathogens.

It is important to note that water quality is a complex issue and one indicator alone is insufficient to fully describe the safety and utility of water for all aquatic life and human uses. However, a single indicator can be used as a proxy for other types of contamination that threaten the general health of the waters. Established monitoring series also provide clues about long-term patterns and facilitate additional sampling when resources are available.

Conventional water pollutants are defined by the USA Environmental Protection Agency's Clean Water Act of 1977 as biochemical oxygen demand, total suspended solids, faecal coliform, oil and grease. Additional water quality parameters to consider in water monitoring programmes include temperature, dissolved oxygen, pH, turbidity (cloudiness, a proxy for sediment loads), total nitrogen and/or total phosphorus (which can indicate fertiliser run-off and other pollution), and *Enterococci* (see Regional Indicator: [Lagoon water quality](#)).

REGIONAL WATER AND SANITATION STATISTICS IN THE PACIFIC ISLAND COUNTRIES

As of 2017, the most recent year reported:

- 55% of people have access to at least basic drinking water service
- 30% of people have access to at least basic sanitation services
- 52% of people are served by unimproved sanitation

Source: WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, 2020, <https://washdata.org/>

¹ Some countries measure *Enterococci* bacteria instead of *E. coli* or faecal coliforms. The World Health Organization (WHO) metric of 140 *Enterococci* per 100 millilitres of sampled water corresponds roughly to 250 faecal coliform per 100 mL.



Piula freshwater pool, Samoa. © Charles Netzler

CRITICAL CONNECTIONS

Freshwater quality is an indicator, product, and starting point for human and ecosystem health.

Poor water quality directly harms human health but also threatens food security, with the risk of contaminating crops or seafood while they are growing or during food preparation.

Poor (or the perception of poor) water quality impacts tourism, just as tourism can increase pressure on limited sanitation systems and can increase plastic waste through bottled water consumption. Cooperation is essential for sufficient and safe water supplies.

Freshwater supply and quality and lagoon water quality rely on well-managed native forests and wetlands. Traditional agroforestry and climate-smart agriculture are powerful tools in smart and safe water management. These methods might include taro swamps, shade-grown crops, composting (which can redirect 40% of waste from landfill, on average), and other tools.

Ecosystem-based development solutions can help communities take advantage of the benefits of these complex connections.

PRESSURES AND OPPORTUNITIES

The quality of fresh water on islands is heavily impacted by land-based pollutants through improper sewage disposal, inputs into rivers and streams, and runoff from agriculture. Both human and animal faecal matter, commonly from animals kept near streams or coasts, are hazards for this indicator. In some Pacific countries, mining and industrial waste threaten drinking water and agricultural water resources.

Water limitation is a growing concern under climate change and population growth. Freshwater resources on atolls and coral and limestone islands are generally limited to groundwater, rainwater and surface reservoirs, and countries like Nauru, Niue, Kiribati, Tonga, Tuvalu, and the Republic of the Marshall Islands have no significant surface water resources, relying heavily on rainwater harvesting and desalination. The resilience of both freshwater systems and infrastructure to climate change are of growing importance.

The health of nearshore and terrestrial water resources are closely linked on islands. The common practice of piping untreated sewage outfalls into rivers and nearshore ocean ecosystems can place coastal drinking water sources on land at risk (see Regional Indicator: [Access to and quality of sewage treatment](#)).

E. coli and pathogenic microbes can grow in tropical conditions, threatening stored water supplies such as rainwater tanks. The limited freshwater resource on many islands (SPREP, 2016) and growing demand from larger populations, combined with increasingly variable freshwater replenishment due to climate change and salinization from sea level rise, make the quality and quantity of freshwater resources a management priority.

Access to clean water is essential for basic health and disease prevention, a fact thrown into the spotlight during the COVID-19 pandemic. At the time of writing, the full impacts of the COVID-19 pandemic and its relationship with freshwater and sanitation management in the Pacific islands are not known, but the links between freshwater and health are many. Pacific islands already face significant health challenges that relate to freshwater and sanitation that can add to or supersede the pandemic. Flood events can cause spikes in diarrhoea and other diseases caused by bacteria and viruses transmitted in contaminated water, as already observed in Pacific islands in recent years. The World Health Organisation predicts that diarrhoea and other diseases are likely to be exacerbated by climate change, contributing to an estimated 250,000 additional deaths globally each year between 2030 and 2050 (WHO 2018).

Healthy forests and wetlands naturally filter water and support clean, safe fresh water for island ecosystems and communities. Freshwater ecosystems and species are some of the most under-studied in the Pacific islands region (see Regional Indicator: [IUCN Red List summary](#)).

NATIONAL RESPONSE RECOMMENDATIONS

For bathing water directives, sampling at least monthly is required. Because *E. coli* levels can change rapidly and high values are common after rain events, one high value may not require the closure of an area or water supply source but should start a process of additional sampling or precautionary measures.

An essential element of a strong water quality monitoring programme is the response mechanism. National managers must define the actions required if a high value is observed and the requirements for an area or water source to be deemed acceptable again. Cooperation across sectors can support timely responses for safer communities.

REGIONAL RESPONSE RECOMMENDATIONS

The recommendations made in the Pacific Regional Action Plan on Sustainable Water Management remain valid (WHO, 2016). Along with guidance for finance, technology and training, and other aspects of sustainable water and sanitation systems, the Plan recommends the following actions for water resources management:

- strengthen the capacity of small island countries to conduct water resources assessment and monitoring as a key component of sustainable water resources management;
- implement strategies to use appropriate methods and technologies for water supply and sanitation systems and approaches for rural and peri-urban communities in small islands; and
- implement strategies to improve the management of water resources and surface and groundwater catchments (watersheds) for the benefit of all sectors including local communities, development interests, and the environment.

A GEF-funded Pacific programme has advocated mainstreaming gender into Integrated Water Resources Management (IWRM) with a toolkit and recommendations for the type and nature of engagement, including gender-disaggregated data collection and inclusion during planning because of the intensely gendered nature of water and sanitation management.

From an environmental perspective, regional priorities include efforts to:

- measure freshwater and drinking water quality regularly, building in-country capacity to run analyses and maintain effective laboratory standards;
- plan to monitor and respond to fresh water quality metrics, drawing on multi-sectoral cooperation to respond to samples that exceed the safety threshold;
- enforce protection of freshwater sources and ecosystems through land-use management and community co-operation as well as enforce protection of communities via rapid-response mechanisms to indicators of contamination; and
- partner for sustainable freshwater ecosystem management.

INDICATOR IN ACTION

SDGs 6.3, 6.6 • Basel Convention • United Nations Convention to Combat Desertification • SAMOA Pathway (64–65) • Noumea Convention (Article 7) • Pacific Regional Environment Objectives 2.1, 3.1, 3.4 • Pacific Islands Framework for Nature Conservation Objective 2

FOR MORE INFORMATION

SPREP (2016) State of Conservation in Oceania: regional report. Apia, Samoa: SPREP.

WHO (2016) Sanitation, drinking-water and health in Pacific island countries: 2015 update and future outlook. World Health Organization Regional Office for the Western Pacific, United Nations Children's

Fund (UNICEF), The Pacific Community (SPC) Water and Sanitation Programme, United Nations Human Settlements Programme (UN Habitat).

WHO (2018) Climate change and health. Fact sheet, 1 February 2018. World Health Organization.

Indicator 5 of 31 in *State of Environment and Conservation in the Pacific Islands: 2020 Regional Report*



The Secretariat of the Pacific Regional Environment Programme (SPREP) supports 14 countries and 7 territories in the Pacific to better manage the environment. SPREP member countries and members of the Pacific Roundtable on Nature Conservation (PIRT) have contributed valuable input to the production of this indicator.
www.sprep.org

National and regional environment datasets supporting the analysis above can be accessed through the Pacific Environment Portal.
pacific-data.sprep.org

For protected areas information, please see the Pacific Islands Protected Area Portal.
pipap.sprep.org