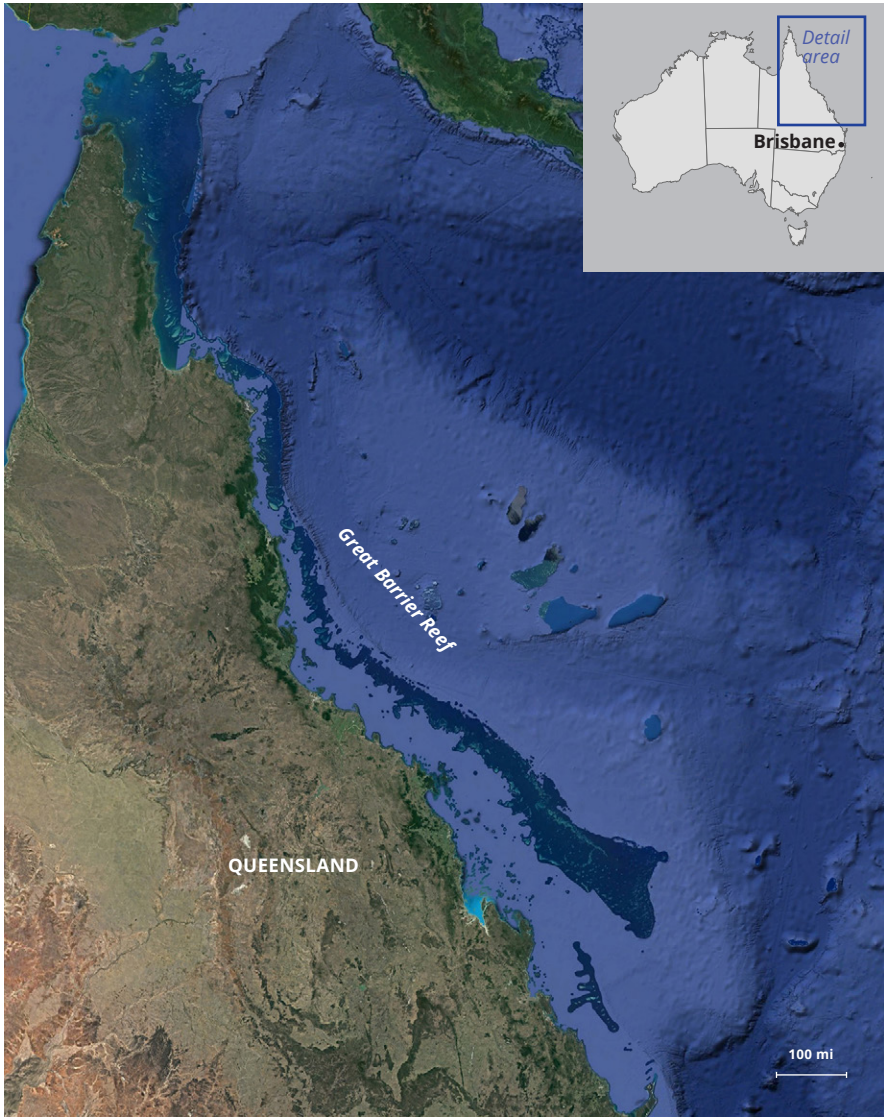
CASE STUDY

Australia

Australia is home to the Great Barrier Reef, which sees over 2.5 million visitors each year. Sewage management and treatment in Australia is heavily regulated and well-funded by government. Chemical pollution from agricultural runoff in Queensland is the greatest threat to water quality on the Great Barrier Reef. Along with the Great Barrier Reef Marine Park Authority (a division of the Australian government), the government of Queensland plays an active role in monitoring the quality of water entering the Great Barrier Reef. The current focus of reef protection in Australia is working to improve land use practices to reduce the harmful impacts of runoff on marine resources.

COUNTRY OVERVIEW

The Great Barrier Reef (GBR) off the coast of Queensland, Australia spans 344,400 square kilometers and consists of over 3,000 individual reef systems. The GBR accounts for 10 percent of all coral reefs globally. Queensland is home to just over 5 million Australians, but over 2.5 million people visit the GBR every year. Tourism and fishing along the GBR generate about $6 billion USD annually and support roughly 69,000 Australian jobs. Chemical pollution and sedimentation from agricultural runoff in Queensland is the greatest threat to water quality on the GBR.



Agriculture, rather than sewage, accounts for the vast majority of pollutants impacting water quality in Australia.

(facing) Brisbane. iStock / 4FR;
(above) Satellite view of the Great Barrier Reef. Source: Google Earth

POLLUTION SOURCES

Chemical pollution from rural agriculture accounts for the vast majority of pollutants impacting coastal water quality in Australia. During periods of flooding, sediment and farm chemicals run into rivers and are transported to the ocean. Nearly all urban wastewater is treated by sewage treatment plants. Treated wastewater contributes less than four percent of nitrogen loads and minimal amounts of sediment and pesticides to the total runoff from catchments flowing into the GBR. Most stormwater in Queensland is not treated, meaning that oils and chemicals in urban environments are flushed into waterways during storm events. Dredging for port development and other construction is another form of marine pollution in Australia. Dredging churns up sediments and can expose buried contaminants that can prevent plant growth.

WATER QUALITY MONITORING

Australia's GBR Marine Park Authority monitors water quality on the GBR and also oversees the Marine Monitoring Program, which monitors nearshore water quality and seagrass and coral reef condition between mainland Australia and the GBR. Monitoring is conducted by the Australian Institute of Marine Science, James Cook University, Howley Environmental Consulting, The University of Queensland, Queensland Parks and Wildlife Service, Reef Catchments, and community volunteers. The GBR Marine Park Authority monitors water quality of the GBR itself. Water quality indicators monitored include water clarity, chlorophyll *a* (as a proxy for dissolved inorganic nitrogen), suspended solids, particulate nitrogen, particulate phosphorus, sedimentation, temperature, and pesticide concentrations.

The Great Barrier Reef Marine Park Authority is managed by the federal government in partnership with the Government of Queensland. The two governments publish annual reef report cards with the results of the water quality monitoring efforts. The latest available report card (from 2018) shows that pollution to the reef is decreasing but more work is needed to meet the Reef 2050 Water Quality Improvement Targets (see Suggested Resources for more information on this program).

COASTAL WATER QUALITY MANAGEMENT

Most wastewater in Queensland is treated at sewage treatment plants built and operated by local governments. These plants provide tertiary treatment of sewage to remove nitrogen and phosphorous as well as organic waste. All sewage treatment plant operators must be licensed under the Australian Environmental Protection Act of 1994, which sets environmental standards for treated wastewater before it can be discharged into waterways. Sewage treatment is tightly regulated and there has been significant investment in treatment plants since the 1990s in Australia. Between 2000 and 2004, over $600 million AUD was invested in public sewage treatment plants. Between

Dredging is a major source of marine pollution in Australia.

Rural Queensland. Source: iStock Trevor Graham;
Dredging off the Queensland Gold Coast. iStock / John Carnemolla

2014 and 2015, local governments invested $230 million AUD in sewage plant upgrades. Outside of urban areas with built sewers, local governments may require households to install individual sewage treatment systems (e.g., septic tanks).

In 2017, the Australian and Queensland governments launched the Reef 2050 Water Quality Improvement Plan 2017-2022, which seeks to improve the quality of water flowing into the GBR. The plan sets sediment and nutrient load reduction targets for each of the river catchments discharging into the GBR. The plan is a partnership between industry and government, not a binding regulation. The primary focus of the plan is reducing pollution from agriculture, and it focuses on supporting farmers and ranchers to apply best practices and engage in land restoration across Queensland.

In 2019, the Queensland Parliament passed the Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Act of 2019, which mandates new pollution reporting requirements and protection regulations for industrial and agricultural sources of nutrient and sediment pollution. Starting in December 2019, all grazers, sugarcane and banana producers in the Wet Tropics, Burdekin, Mackay Whitsunday, Fitzroy, and Burnett Mary Reef regions of Queensland must keep detailed records of all agricultural chemical and organic inputs applied to land or crops. The Act also establishes "minimum practice agricultural standards" that will be rolled out over the next three years. Starting December 1, 2020, all new, expanded, or intensified industrial development is subject to new discharge standards to prevent increases in nutrient or sediment pollutant loads into waterways.

SUGGESTED RESOURCES

Australian Institute of Marine Sciences. *Water Quality Monitoring*

Great Barrier Reef Marine Park Authority. (2018). *Marine Monitoring Program Quality Assurance and Control Manual 2016-2017*

Great Barrier Reef Marine Park Authority. (2009). *Water Quality Guidelines for the Great Barrier Reef Marine Park Revised Edition 2010*

Great Barrier Reef Marine Park Authority. *Great Barrier Reef tourist numbers*.

Great Barrier Reef Marine Park Authority. *Water quality guidelines for the Great Barrier Reef*.

Qldwater. (2016). *Sewage Treatment Plants in Great Barrier Reef Catchments – Industry Discussion Paper*

Queensland Government. *Great Barrier Reef Innovation Fund*.

Queensland Government. *Reef Protection Regulations*.

Queensland Government. *Reef Water Quality Program Factsheet*.

Great Barrier Reef. Source: Katerina Katopis / Coral Reef Image Bank