

# When pure turns poor

## Living with contaminated rivers

Water pollution is recognised as a major issue and a problem that demands ongoing evaluation and revision of water resource policy at all levels of government around the world.

**Alan Titchall** reviews the situation at home with our river water quality.

**W**ater pollution is not just a major issue among developing countries. A decade ago, the Environmental Protection Agency in the US wrote a report for the US Congress called the ‘National Water Quality Inventory’. It starts off saying: “About 44 percent of assessed stream miles, 64 percent of assessed lake acres, and 30 percent of assessed bay and estuarine square miles were not clean enough to support uses such as fishing and swimming. Leading causes of impairment included pathogens, mercury, nutrients, and organic enrichment/low dissolved oxygen. Top sources of impairment included atmospheric deposition, agriculture, hydrologic modifications, and unknown or unspecified sources.”

Less than 30 percent of waters in the US were assessed for this report at the time, so one can only imagine the situation now.

Closer to home it has been a hell of a year for water quality news with the Havelock North fiasco standing out as a bad example of quality management. In reality though, it has been a hell of a century for water quality in this country.

Remember when in 2004 *didymosphenia geminate* (didymo) was discovered in Southland – the first time it had been found in the Southern Hemisphere?

A decade later, this algae blooms in over 150 rivers in the South Island where nutrient concentrations (nitrogen and phosphorus) are low. Ironic, when you consider many of our North Island rivers and water sources have an excess ‘nutrient’ problem.

A decade on and research by NIWA demonstrates that concentration of ‘dissolved reactive phosphorus’ (DRP) has an immediate effect on didymo blooms. Visible didymo has not been observed at sites when long-term DRP concentrations (eg, one to two year average) are more than about two parts per billion (ppb), leading to the conclusion that the blooms are caused by low phosphorus concentrations. The algae have not been found in the North Island because dissolved phosphorus concentrations in rivers are too high (greater than an average of two ppb, as a result of phosphorus-rich catchment geology).

NIWA is convinced the algae were ‘introduced’ from Northern Europe. “There are no historical records of didymo in the South Island, and only one (highly likely a case of mistaken identity) from the North Island,” it says.

“A likely scenario is that didymo arrived following the transformation of didymo in the Northern Hemisphere from a rare species with only occasional blooms in some locations to a common species with widespread blooms. In an age of increasing tourism and air travel, the transfer of cells to remote locations like the South Island – which also happened to have rivers with perfect conditions for blooms – was almost inevitable.”

Didymo eradication is considered unlikely, but chemical and biological methods can be used to control it in areas where it is a problem.

Warnings about boiling drinking water taken directly from rivers and lakes have been standard since the giardiasis parasite was found through our waterways. Also likely spread by tourists, this waterborne microscopic parasite is now common in our lakes, rivers, streams, roof water, municipal water supplies, swimming pools, whirlpool spas and wells. *Giardia* infection is the leading cause of human gastrointestinal illnesses globally and is the most commonly notified waterborne disease in New Zealand. The national incidence rate is said to be 46.6 per 100,000 and is considered one of the highest among developed countries. The parasite has a tough outer shell that makes it resistant to chlorinated water. There’s no drug or vaccine to prevent giardia infection, so commonsense hygiene precautions are relied on to inhibit infections.

Last year information released to the Green Party by regional councils and unitary authorities showed 66 percent of 160 monitored river swimming spots around the country had a Suitability For Recreational Grade (SFRG) of either poor, or very poor during the 2013/14 summer.

The data covered all of the country’s monitored rivers except for those in Auckland, Waikato, Northland and the West Coast, where councils did not use SFRG indicators in the period. However, the Land, Air, Water Aotearoa (LAWA) website launched in 2014 provides an overview of water quality by region and shows that median river bacteria (*E.coli*) levels in the Auckland region are in the worst 25 percent of sites in the country, while Waikato’s median bacteria levels were in the worst 50 percent.

Among the worst rated rivers in the 2015 SFRG were the Ruamahanga River in Wairarapa, the Manawatu River and the

Mangatainoka River. A total of 46 river sites, among them the Wharekopae River at the Rere rockslide, a tourist hotspot near Gisborne, were rated as 'very poor'.

At the time Environment Minister Nick Smith played down the report and said it needed to be treated with caution. "Just comparing the results from one year after another does not give a long-term trend on freshwater quality," he said, adding that he didn't think a "narrow data set" was representative of all freshwater bodies in this country.

A year on and the minister is still downplaying water pollution. Recently he presented a state of the environment speech at Lincoln University outlining the Government's objectives towards freshwater management. He suggests "one set of rules" for national water quality control instead of depending on regional councils to police water quality in their own way. The Government is also looking at instant fines on owners who let their animals stray into waterways.

However, he also said he doesn't think a legal requirement for every water body to be swimmable is possible. "Our ambition is for a lot more areas to be swimmable... but we want to be practical."

Smith had been invited to a gathering of our top freshwater ecologists in Palmerston North who were trying to find a simple method of grading and managing the health of our rivers. These scientists came from Massey, Auckland, Canterbury and Waikato universities, NIWA, the Government and regional councils. The results of the two-day workshop will be used in a Government review of the National Objectives Framework for rivers next year.

Currently, most of the information on the water quality of our national rivers comes from monitoring at 77 sites in the National Rivers Water Quality Network (NRWQN) operated by NIWA over the past 25 years. Regional councils also operate a much larger number of water quality sites, though almost all have been running for shorter periods.

According to Dr Rob Davies-Colley, a water quality scientist at NIWA, 'point' pollution from wastewater discharges (entering receiving waters at a point) needs to be distinguished from 'diffuse' pollution arising from land use.

"Improved wastewater treatment over several decades has resulted in water quality in New Zealand being dominated by the diffuse sources – which are much more difficult to manage," he says in his article, 'An overview of the water quality in NZ rivers' published on [www.sciblogs.co.nz](http://www.sciblogs.co.nz) in 2013.

"There are three major categories of diffuse pollution: Fine sediment, the major nutrients (nitrogen and phosphorus), and faecal microbes. Toxic metals may contaminate a small number of river waters within urban centres or downstream of mines."

However, compared with Europe, North America and Asia, river water quality here is "fairly good overall" he notes.

Conditions vary greatly from place to place depending on land use, but water quality is very good (ie, supports most values including habitat for aquatic life) in rivers draining conservation lands, he says. "Conversely, there is widespread diffuse pollution from developed land, particularly pastoral agriculture which degrades rivers with fine sediment

(reducing visual clarity), faecal microbial contamination, and nutrient enrichment."

River water quality in rivers can also vary greatly from one day to the next, he says.

"Even rivers that have good water quality most of the time may be turbid and polluted by faecal microbes during floods or high flows. Typically, diffuse pollutants move mainly during storm flows, in sharp contrast to contaminants from wastewater, which are highest at low flow when dilution in receiving rivers is least."

In general, the water quality of numerous rivers has been declining over the past 25 years, he says, despite a very large expenditure on improved treatment (or diversion from rivers) of city and factory wastewaters.

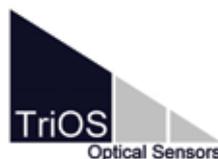
"However, the gains from this point pollution control have been outweighed by steadily increasing diffuse pollution, particularly nitrogen and phosphorus enrichment from intensification of pastoral agriculture.

"Fortunately, there have been encouraging signs of late that river water quality declines can be arrested, or even reversed. Water quality appears to have recently improved in a few polluted rivers in certain catchments and regions where there has been major effort on improved land management (eg, riparian fencing and planting), soil conservation and nutrient controls.

"Continued improvements in river water quality are expected to be an enduring challenge while intensification of pastoral agriculture and urban expansion also continue." **WNZ**

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