NIWA
Taihoro Nukurangi

Water Resources Update

a quarterly newsletter from the National Centre for Water Resources

No. 1 2002

A centre for collaboration

Water is New Zealand's lifeblood. We need fresh water for drinking, washing, growing food, making electricity, and much, much more. We enjoy water as a focus for picnicking and fishing and just somewhere nice to be. But we are not alone in our need for water. New Zealand's rivers, lakes, wetlands, and groundwater systems are also home to a wonderful variety of ecological communities.

New Zealand faces some complex questions about water resources. Will there be shortages? Do we use water wisely? How do economic activities affect water quality and quantity? How do we balance economic benefits derived from water against social and environmental costs?

To help address these issues, NIWA has established the National Centre for Water Resources. The centre aims to bridge the gap between science and the community in the field of water resources by providing science, technology, and resource management services to New Zealand. The key role of the centre is to communicate.

The National Centre for Water Resources is based around several collaborative projects involving scientists from a growing collection of science organisations and other agencies, such as the Ministry for the Environment and regional and district councils. It will be a "virtual centre", rather than a "bricks and mortar" entity. Principles of operation and objectives for the centre include:

- improving collaboration and cooperation between different organisations;
- using existing personnel, facilities, systems, and equipment;
- improving access to information;
- developing technologies that have simple and practical application (e.g., flood forecast warnings).

We will pay particular attention to issues that can only be addressed by involving a number of other entities (e.g., industry, iwi, councils, Government agencies). This will extend to national and international issues, particularly where there has been limited progress because organisations have been working in isolation.

The National Centre for Water Resources is an exciting new venture for us, and we look forward to working with you.

Rick Pridmore
Deputy Chief Executive
(Strategic Development)

What effects might El Niño have this year?

There are indications that an El Niño will develop by spring. Many of the usual signs for El Niño are now visible in the warming waters of the Pacific Ocean, according to NIWA's National Climate Centre.

During past El Niño events New Zealand has experienced enhanced southwesterly and westerly weather conditions, with low pressure systems centred below the country. As a result, the south and west of New Zealand experienced more frequent and larger storm rainfall events.

In those El Niño events river flows have been lower than normal in the northern North Island (especially Bay of Plenty), higher than normal in Southland and the Southern Alps (including inflows to hydroelectricity reservoirs), and near normal elsewhere. In addition, Hawke's Bay, Canterbury, and Otago have experienced very low river flows in some, but not all, El Niño events.

In the northern, and possibly eastern, parts of New Zealand, where we expect lower flows and fewer floods than normal in an El Niño, water quality is likely to be different too. During an El Niño in those areas we would expect to see higher than average slime levels (i.e., nuisance periphyton) in rivers that have abundant nutrients in the water due to effects of land use, effluent discharges, or geological sources.

Water Resources Update No. 1 2002

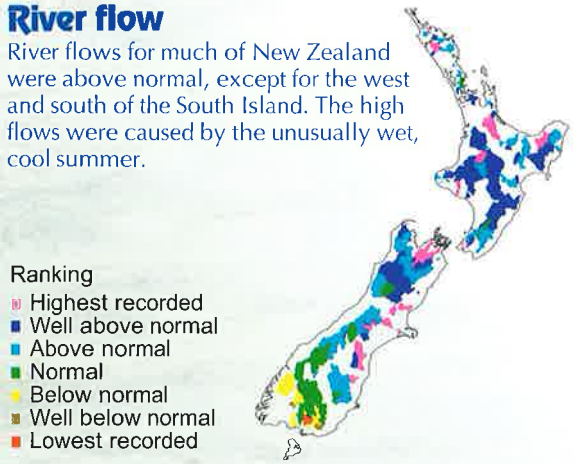
NIWA Taihoro Nukurangi

Water resources in summer 2001–02

(December 2001 to February 2002)

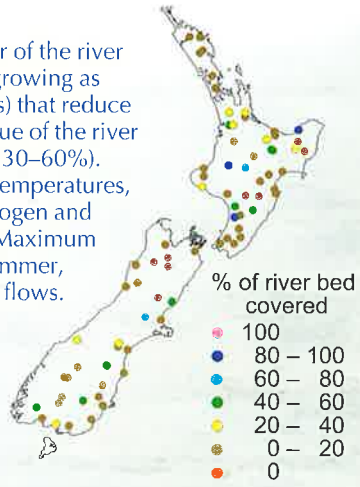
River flow

River flows for much of New Zealand were above normal, except for the west and south of the South Island. The high flows were caused by the unusually wet, cool summer.



Slime index

The slime index records the cover of the river bed by "nuisance" slimes (algae growing as thick mats or filamentous growths) that reduce the recreational and aesthetic value of the river if too prolific (i.e., cover exceeds 30–60%). Slimes are encouraged by warm temperatures, sunlight, nutrients (especially nitrogen and phosphorus), and lack of floods. Maximum values were generally low this summer, probably reflecting unstable river flows.

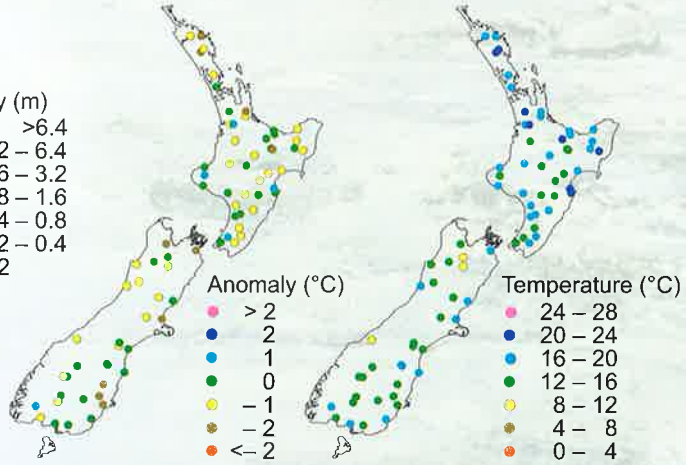


Water clarity

Water clarity was well below normal in many rivers, often as a result of the extra sediment carried by unusually high river flows. Last summer one-third of sites met the recommended level for safe swimming (>1.6 m), whereas typically two-thirds of sites meet this level. (Clarity here is the horizontal distance you can see underwater.)

Water temperatures

Water temperatures were normal or below normal for most sites as a result of the cooler weather and high flows. (The anomaly is the difference between the temperature last summer and the median temperature in all summers since 1989.)



These data are provided by NIWA field teams, regional and district councils, and hydro-power companies. They are preliminary (subject to amendment after quality assurance procedures), and we hope to expand the coverage with contributed measurements using standard methods at long-term sites. For information on hydroelectricity storages, see www.comitfree.co.nz/fta/ftaPage.hydrology

Groundwater levels

Groundwater levels followed the typical pattern of summer declines. Above-normal rainfall from Otago to Northland generally meant good rainfall recharge to groundwater over summer.

Groundwater levels were generally average in North Auckland, Auckland, Waikato, Bay of Plenty, East Coast, Hawke's Bay, Wairarapa, Tasman, and Marlborough when compared with the historical record. Levels in Tasman and Marlborough have improved considerably after the 2000–01 summer, when they approached, or dropped below, historic lows.

Taranaki, Manawatu, and Wellington groundwater levels were higher than the average historical record in the period, because of the high rainfall.

Levels in Otago, Canterbury, West Coast, and Southland were generally below average. In Otago and Canterbury some levels increased over summer and others followed the usual trend of declines. Rainfall recharge recorders have measured recharge in Canterbury since 1994, and summer recharge was recorded this year for the first time. For example, rainfall of 300 mm in inland Canterbury has led to 134 mm of rainfall recharge. Rainfall has probably also led to a decrease in the need for irrigation. This means less pumping from groundwater than in a typical summer.

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Ohinemuri River, Coromandel

Motorists travelling from Waihi to Paeroa are treated to views of sheer bluffs, tumbling rapids with boulders the size of cars, and serene pools as the Ohinemuri River winds through the spectacular Karangahake Gorge. During floods the raging river is an adrenalin thrill for kayakers. On sunny weekends families stroll along the banks, soaking up the river's beauty and the many relics of gold processing plants. But the Ohinemuri has a checkered history as one of the most abused rivers in New Zealand.

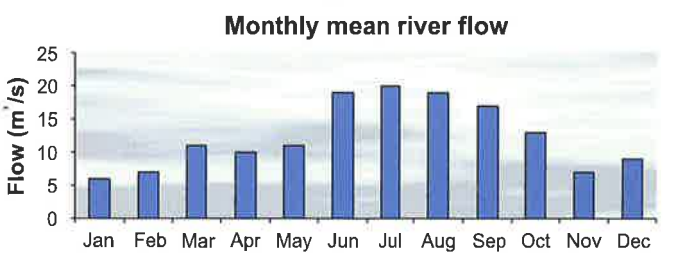
Gold ore processing plant next to the Ohinemuri River in the early 1900s. (Photo: Alexander Turnbull Library)

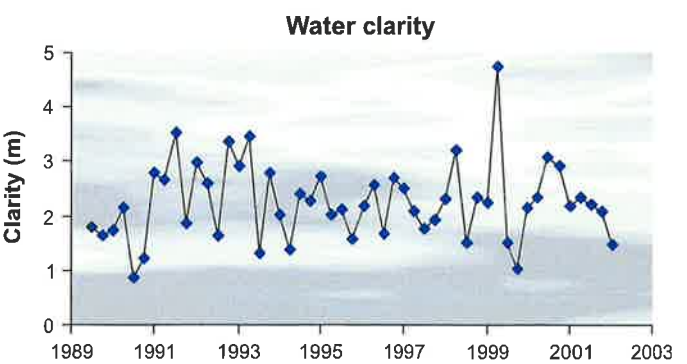
Before European settlement the river drained bush and scrub in the Waihi basin and peat swamps and kahikatea forest in the lower catchment above the confluence with the Waihou River which flows to the Firth of Thames. The Ngati Koi had settlements on the natural levees along the lower river, and eel and whitebait fisheries contributed to their food. European impacts began with forest clearance and wetland drainage for farming from about 1840. Extensive exploitation of the upper catchment began in 1875 when the area was opened up for gold mining. In 1895 the river was declared a sludge channel by the Government, and processed ore from stamping batteries was dumped into the river until 1952 when gold mining first ended at Waihi. The dumping made the river very turbid and silted up the lower reaches, and the sediment and heavy metals would have severely degraded fisheries and other aquatic life.

The same stretch of river today.

Climate: Warm and wet.
Average annual rainfall is near 2700 mm/y in the north, closer to 1500 mm/y in the south.
Catchment area: 287 km^2.
Mean flow: 12 m^3/s.
Minimum flow: 1.1 m^3/s.
Maximum flood: 1047 m^3/s

Today the river is much improved, but still under stress. The modern mining operations have minimal impact on the river, but leachate legacies from old mines and associated mullock piles and tailings raise heavy-metal levels above guidelines at a few sites, and nutrients from agricultural runoff and treated sewage discharged from Waihi support abundant algal growth. Macroinvertebrate Community Index values have been consistently low since monitoring began in 1989 at the National River Water Quality Network monitoring site at Karangahake. As we enter the 21st century, the worst toxic pollution of the resource-exploitation era has been solved, but the challenges of dealing with nutrients discharged from our settlements and insidious diffuse pollution from agriculture remain.





Ohinemuri

The full name is Te Waitangi-o-Hinemuri: literally "the weeping water of Hinemuri, the youngest daughter". In Maori legend the river and floodplain were formed by the tears of Hinemuri. She was the youngest daughter of the Hauraki chief who turned away her many suitors because her older sisters remained unwed until finally the suitors fell away and she was left alone and disconsolate. Her copious tears formed the river and floodplain.

Water Resources Update No. 1 2002

NIWA Taihoro Nukurangi

Coming to the surface ...

One of the biggest challenges for scientists is effective communication. The National Centre for Water Resources has an important role in making science results available and useful for the wider community. We have two important initiatives in this area, which you can read more about on our webpage, www.niwa.co.nz/ncwr.

Flood forecasting

NIWA's meteorologists and hydrologists can now forecast floods caused by heavy rain with greater lead times, thanks to new research results. NIWA, in collaboration with regional councils, is now implementing this research as an operational forecasting technique. These new forecasts from NIWA will not alter the regional councils' role as the primary source of public flood forecasts. The councils have local knowledge that allows forecasts to be combined with on-the-ground knowledge of flooding and translated into emergency responses by local organisations such as police, civil defence, and district and city councils. The new NIWA forecasts are intended to complement existing forecasting techniques by looking further into the future and providing more warning of damaging floods. A pilot version is planned for release in July 2002.

Alexandra, before and during

Aquatic Information New Zealand

AINZ is a new NIWA service being developed to provide web-based access to aquatic information held by NIWA. The AINZ web page will allow users to browse for information in a map-based system and retrieve it simply by clicking on a river line or site of interest. The AINZ project will be developed in three phases. The first will deliver River Environment Classification information developed over the last 2 years by NIWA with the Ministry for the Environment and regional councils. This will allow the public to retrieve a wide range of information on any section of river in mainland New Zealand. We expect this information to be available online by mid 2003.

Water policy and the Ministry for the Environment

Viewpoint

The manager of any business requires good information about the resources for which they are responsible. The first conclusion of the 1997 report on the State of New Zealand's Environment was that "New Zealand's environmental information needs considerable upgrading if the state of the nation's environment is to be accurately described and trends detected." In response, the Government initiated the Environmental Performance Indicators Programme. The purpose of the EPI Programme is to develop and use indicators to measure and report how well we are looking after our environment. We have worked closely with NIWA and other Crown Research Institutes, Government departments, regional councils, and other agencies to develop an agreed set of indicators.

We have now entered the next phase of reporting environmental information. This issue of *Water Resources Update* marks a significant milestone in the regular reporting of water resource information in New Zealand. NIWA's Rick Pridmore notes that the objectives of the National Centre for Water Resources are to deliver science, technology, and resource management services to New Zealand in the field of water resources, including both water quality and water quantity.

The initial indicators selected by NIWA will provide useful information to water managers and the public alike. NIWA hopes to move beyond reporting environmental quality towards predicting it. That represents a significant challenge! We also need to link this information to that collected and reported by regional councils and other agencies. But we need to ensure that the public are not bombarded by a plethora of data – we face a significant challenge in ensuring that reported information is:

- scientifically defensible
- understandable by the public
- timely
- consistent, so that there is no conflict between reporting agencies.

I'm pleased to see that the National Centre for Water Resources has made a great start and one that the Ministry for the Environment is pleased to support.

Lindsay Gow
Acting Chief Executive

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Water Resources Update is a quarterly newsletter from NIWA's National Centre for Water Resources. Published by NIWA, P O Box 14901, Wellington. It is available on request and via the web.

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