

# WATER & ATMOSPHERE



June 2017

## The freshwater issue

What is happening to New Zealand's freshwater?

### **Raising the bar**

How to measure swimmable rivers

### **Preparing for the worst**

Samoa is tackling hazards head-on

### **Freaky critters**

Surprises at an invertebrate collection

## Solutions

# Water, water, everywhere ... and safe to play in?

For the first time, it may be possible to provide near real-time analysis of water contamination and safety levels to deliver timely public health risk warnings to recreational water users.

A team headed by NIWA's Dr Rebecca Stott and Dr Lucy McKergow are trialling New Zealand's first ColiMinder industrial water testing equipment. This revolutionary piece of equipment provides fast, comprehensive measurements of microbial water contamination, including key indicator bacteria such as *E. coli*.

The ColiMinder can provide an answer within 15 minutes, compared to the 24 hours it takes the tools currently used in New Zealand.

"Typical monitoring of faecal pollution relies on culturing water samples, and takes a considerable amount of time to analyse. The culture-based laboratory methods used

by councils and NIWA, such as the Colilert method or membrane filtration assays, take about 24 hours to culture and quantify *E. coli* bacteria, and that doesn't include the time taken to collect the sample and bring it back for analysis," says Dr Stott.

The ColiMinder uses a different method of analysing bacterial enzymes that delivers an answer within 15 minutes. It can be accessed remotely and can cope with numerous analyses, one after the other. This will allow about 40 measurements to be made in 24 hours. It also has the advantage that it can detect *E. coli* bacteria that are still alive, but that are not readily cultured using conventional methods.



NIWA freshwater scientist Juliet Milne with Dr Clair Conwell from Greater Wellington Regional Council collecting water samples from the Porirua Stream, with the ColiMinder in the foreground. (Dave Allen)

The team took the ColiMinder into the field to test the instrument and calibrate it for freshwater analysis. By chance, a storm hit the Piako River area during the sampling period, and the team was able to get both base flow and flood level measurements.

“It gave us a real chance to see what the ColiMinder was capable of in different conditions,” says Dr Stott. ColiMinder’s high frequency time series data compared favourably with laboratory tests, but also revealed some interesting microbial daily cycles under base flow conditions.

## Applications abound

Having successfully tested the ColiMinder in storm conditions in a rural Waikato River catchment, ColiMinder is currently in use in an urban catchment in Porirua with Greater Wellington Regional Council. High resolution information from ColiMinder is providing more detail on the microbiological quality of the Porirua Stream, which enters the Te Awarua-o-Porirua Harbour near a popular waka ama launching site.

The NIWA team is also looking to apply the instrument in different water environments, including coastal areas and estuaries.

“It is difficult to get measurements for estuarine environments where saline water meets freshwater, so we are working with the ColiMinder manufacturer to establish a unique test for this,” says Dr Stott.

“Once we have a comprehensive body of knowledge across different sites and environments, the ColiMinder research can be applied to a range of water types.

“There are a number of councils interested in using the technology and working with NIWA.

“It could prove invaluable for aquaculture – providing mussel farmers with real-time information on contaminated river plumes coming their way.

“ColiMinder could provide spatial and temporal information for mitigation projects, including the impact of riparian planting intercepting farm runoff and improving waterways.”

With last year’s *Campylobacter* outbreak in Hawke’s Bay still fresh in our minds, tools like ColiMinder have the potential to help understand and provide early warning of health risks from faecal microbial contamination of water supplies.

“A collaborator at Montréal Polytechnique in Canada has three ColiMinder instruments for research on drinking water supplies sourced from a lake. This knowledge could be applied to regions here where raw water is sourced from rivers or lakes,” she says.

With the ColiMinder now part of NIWA’s suite of advanced water monitoring systems, New Zealanders will have more assurance when it is safe to go back in the water.

## NIWA

### enhancing the value of New Zealand's natural resources

NIWA (the National Institute of Water & Atmospheric Research) was established as a Crown Research Institute in 1992. It operates as a stand-alone company with its own Board of Directors, and is wholly owned by the New Zealand Government.

NIWA’s expertise is in:

- Aquaculture
- Atmosphere
- Biodiversity and biosecurity
- Climate
- Coasts
- Renewable energy
- Fisheries
- Freshwater and estuaries
- Māori development
- Natural hazards
- Environmental information
- Oceans
- Pacific rim

NIWA employs 650 scientists, technicians and support staff.

NIWA owns and operates nationally significant scientific infrastructure, including a fleet of research vessels, a high-performance computing facility and unique environmental monitoring networks, databases and collections.



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New Zealand’s natural resources