

LIVING WATER

He Puna Wai Ora

Keeping New Zealand informed of the latest developments in water science

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Improving knowledge and understanding of food safety risks associated with mahinga kai



This Vision Mātauranga Placement Scheme will involve the placement of staff from the Institute of Environmental Science and Research (ESR), alongside Te Rūnanga o Ngāi Tahu (TRoNT) and their Ngāi Tahu Papatipu Rūnanga and communities to help improve their knowledge and understanding of food safety risks associated with mahinga kai. The aim of this project is to develop an environmental risk assessment framework which can be used to determine if mahinga kai at specific sites is safe for human consumption.

This framework will build on current water quality data collected by local councils as part of their routine monitoring programmes. It will integrate existing food safety standards for commercial food products, as well as local, historical and cultural knowledge held by rūnanga/hapū/whānau of mahinga kai and environmental factors which influence it. This research will assist in closing the knowledge gap around food safety hazards associated with mahinga kai, to ensure that the gatherers can make informed decisions.

ESR will share their scientific knowledge, while whānau/hapū/rūnanga will share their mātauranga Māori in regards to practices around the collection and preparation of mahinga kai. For each site, the commonly gathered species will be identified and the surrounding environment

will be assessed for relevant risk factors. This will be done from both a mātauranga Māori and western science perspective. This information will then be used to determine any food safety risks associated with the mahinga kai.

The traditions surrounding the gathering of mahinga kai are a vital part of Māori culture and play an important role within whānau/hapū/rūnanga. The outcomes from the project will provide the foundation for the development of resources available to gatherers on the food safety of mahinga kai.

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ESR and the Christchurch City Council: post-quake water quality monitoring

Christchurch suffered unprecedented damage in the earthquakes of 2010 and 2011. Damage to roads, water and wastewater pipelines, bridges and streetscapes was estimated at over \$2.2 billion – the largest infrastructure project in New Zealand's history.

Repairing the city is a huge and exciting task, which at its peak required Christchurch City Council's stakeholder liaison team to deliver over 10,000 work notices per month to the local community.

Infrastructure repairs to date include:

- 562km of sewer pipe
- 70 pump stations
- 60 km of stormwater pipes
- 97km of water mains
- 1,384,236 m² of road
- 141 bridges

As part of these repairs, the water quality of the rivers in Christchurch was monitored closely. ESR in conjunction with Christchurch City Council and Environment Canterbury tested the water for microbial indicators and pathogens. Faecal source tracking techniques were employed to determine the source of any faecal pollution present. We are very happy to report that the rivers have returned to their pre-earthquake state with birds and dogs as the main source of faecal pollution.

Mike Bourke, Christchurch City Council

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International Society of Subsurface Microbiology Conference 2017

The International Society of Subsurface Microbiology (ISSM) is pleased to invite delegates to attend ISSM 2017. This conference is the tenth in a series of international conferences devoted to providing a better understanding of the ecology, microbial community composition and function, and biogeochemistry of the earth's subsurface environments. The Conference is being held in Rotorua, New Zealand, from 6-10 November 2017.

The conference will include a day of excursions, and conference delegates will hear from leading experts in subsurface microbiology and discuss cutting edge developments in this area.

The ISSM is made up of microbiologists, ecologists, geoscientists, and other researchers around the world fascinated by the various aspects of subsurface microbiology, a rapidly expanding field that focuses on microbial life below the surface of the earth. ISSM has organized numerous symposiums on subsurface microbiology in locations as diverse as Germany, Japan, Wyoming, Florida, and England. These symposia are meant to showcase the latest technologies and research in subsurface microbiology, including microbial ecology.

Source: ISSM 2017 conference website
<http://www.subsurfacemicrobiology.com/>

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Groundwater Microbiology Workshop at ISSM 2017

ESR are happy to announce that, in conjunction with the Groundwater Forum Special Interest Group, a one day workshop will be held on Thursday 9th November as part of the ISSM conference. The aim of this workshop is to bring together research scientists and regional council staff to discuss contamination of groundwater by faecal microbes, their transport and fate in groundwater systems and the relevant public health implications. There will be a series of talks from world experts in the field, followed by an opportunity for regional councils to highlight their personal experiences and issues in their region. The workshop will culminate with a panel discussion focusing on future steps for groundwater microbiology in New Zealand.

We look forward to seeing you there and hearing from you if you have any topics you would like to see addressed at the workshop. Further information about the ISSM 2017 conference can be found at: <http://www.issm2017nz.com/>

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Vision Mātauranga project: Lake Waikare

Measuring the benefits of riparian vegetation restoration on the health and well-being of Lake Waikare for the whānau, hapū, iwi and communities of the lower Waikato region.

The strategic importance of Lake Waikare and the Whangamarino wetland as the lungs and kidneys for the lower Waikato are recognised by local iwi. These areas have multiple cultural, ecological, recreational and economic values. The health and wellbeing of the lake and surrounding catchment is degraded by high inputs of nutrients, sediment, algae and bacteria from farm run-off and removal of the vegetation filtering potential around lake margins. This in turns impacts on the spiritual and social connections of the mana whenua of the lake.

The lake has been the focus of a number of vegetation restoration projects led by Waikato Regional Council (WRC), local iwi and the Waikato River Authority (WRA), but the benefits of this restoration in accordance with kaitiakitanga have never been evaluated.

The Centre for Integrated Biowaste Research (CIBR), Ngā Muka Development Trust, Te Riu o Waikato Ltd, Matahuru Marae/ Nikau Whānau Farm Trust and WRC, will work together, joining western science, Mātauranga Māori and taiao values. We will create a monitoring system that will provide a map or pathway to measure the progress of the return of the lake to the modern day equivalent of the environmental state that it was in when Kiingi



Taawhiao composed his maimai aroha, including waters that are drinkable, swimmable, and fishable, as stated in the Waikato Tainui Environmental Plan.

To develop the monitoring system we will take a multi-generational approach and explore iwi tūpuna connections and relationships with the lake. Linking this Mātauranga Māori with western science will enable us to develop a map to identify ecological, socio-cultural, and spiritual indicators for the assessment of the success of restoration plots.

Dr Maria Gutierrez Gines

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One Health Aotearoa Symposium

The One Health Aotearoa Symposium brings together infectious disease scientists and professionals from the fields of human, animal and environmental health in order to address priority infectious disease issues such as foodborne and waterborne diseases and antibiotic resistance.

The Symposium will be held on Wednesday 13 - Thursday 14 December 2017 in the Nordmeyer Theatre at the University of Otago, Wellington.

Invited speakers include Professor Richard Webby (St Jude Children's Research Hospital, USA), Associate Professor Margot Parkes (University of Northern British Columbia, Canada), Professor Edward Holmes (The University of Sydney, Australia) and Professor Helen Moewaka-Barnes (Massey University, New Zealand).

Please contact one.health@otago.ac.nz for more information.

Alice Milnes, University of Otago

Supporting Next generation Social Investment

Te Rūnanga o Ngāi Tahu continues to move towards evidence-based investment to ensure the desired long-term outcomes for Ngāi Tahu whanau are known and are secured. The ultimate purpose of Ngāi Tahu investment is to create the future we want for our tamariki (children) and mokopuna (grandchildren).

Evidence-based social investment will assist us to achieve maximum impact for positive and long term results for our whanau. Through a series of hui || wananga, Ngāi Tahu senior leaders and policy managers will explore with New Zealand experts and researchers the potential for the principles of systems thinking and next generation social investment to contribute to Ngāi Tahu 2050 tribal development and investment strategies.

A Placement Scheme starting in July 2017 and concluding September 2018 to inform social investment options is timely as input to the 2050 Strategy. The proposed Placement will be led by the Social Systems Group at the Institute of Environmental Science and Research (ESR). The Social Systems Group will co-ordinate a small team with both western and indigenous economic and social expertise.

Maria Hepi

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Drugs in wastewater

Knowing where and when drugs are most commonly used is a valuable insight for Police and other agencies to inform and target the activity.

Combining two of ESR's expert capabilities in drug forensics and wastewater science, ESR was commissioned by Police last year to test sites in Auckland and Christchurch to allow authorities to map and monitor drug-use patterns and provide better data than that achieved through self-reporting or drug arrests.

ESR analysed the wastewater in both cities to determine the amount, type and time of illicit drug use. Using a robust sampling protocol and a modified validated extraction method, ESR tested for methamphetamine, heroin, cocaine, alpha PVP (bath salts) and MDMA (ecstasy).

Eight months of sampling to date (seven consecutive days per month) have produced some interesting results over each seven day period.

Methamphetamine use is relatively constant day to day, suggesting habitual use. MDMA shows very distinct usage spikes at the weekends, suggesting recreational use. These patterns are reasonably consistent each month.

No obvious patterns are emerging yet between months, but it is still early days. It would be expected to take years of monitoring before long term trends emerge.

The findings have enabled Police and other agencies, such as Customs, to better understand drug-use patterns in the population and will be used as a baseline for future results.

One good news story has already emerged following very high usage of MDMA in Christchurch. Police and Customs increased resources, targeting MDMA at the airport. Within a few days a shipment was seized.

Wastewater analysis is an emerging science and provides a valuable snapshot of the drug flow through cities. It is the first time such as test has been performed in New Zealand by a government agency.

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Future of Our Water Symposium

On the 1-2 June Ngāti Kahungunu, Hastings District Council (HDC), Hawke's Bay District Health Board (HBDHB) and Hawke's Bay Regional Council (HBRC) partnered to facilitate a community symposium that explored the future of fresh water in the Heretaunga Plains. ESR's Brent Gilpin and Murray Close were part of a comprehensive line-up of speakers covering issues related to managing freshwater. Brent covered microbial risks to groundwater, while Murray focused on nitrate and pesticide risks.

The presentations from each of the speakers, and videos of each of the presentations are available online at this link: <http://www.hastingsdc.govt.nz/future-our-water-live-stream>

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Recent Papers

Study of connectivity of open framework gravel facies in the Canterbury Plains aquifer using smoke as a tracer.

Burbery, Lee F. et al
<https://doi.org/10.1144/SP440.10>

Tracking effluent discharges in undisturbed stony soil and alluvial gravel aquifer using synthetic DNA tracers.

Dr Liping Pang
<http://dx.doi.org/10.1016/j.scitotenv.2017.03.072>

Potential Use of Biosolids to Reforest Degraded Areas with New Zealand Native Vegetation.

<https://dl.sciencesocieties.org/publications/jeq/articles/46/4/906?highlight=&search-result=1>

Potential Environmental Benefits from Blending Biosolids with Other Organic Amendments before Application to Land.

Dharini Paramashivama, Nicholas M. Dickinson, Timothy J. Clougha, Jacqui Horswellc and Brett H. Robinson
<https://dl.sciencesocieties.org/publications/jeq/abstracts/46/3/481>

Concentrations of *Campylobacter* spp., *Escherichia coli*, *Enterococci*, and *Yersinia* spp. in the Feces of Farmed Red Deer in New Zealand.

Isabelle Pattis, Elaine Moriarty,* Craig Billington, Brent Gilpin, Roger Hodson, and Nick Ward
<https://dl.sciencesocieties.org/publications/jeq/pdfs/46/4/819>



There are many organisations that have a responsibility to make sure people can trust the supply and quality of the water they drink, play in and use. ESR works in partnership with key stakeholders, including government, industry, the community and Māori, to improve the safety of freshwater and groundwater resources for human use and the safer use of biowastes.

We support and help health authorities, local and central government, industry and communities by supplying scientific advice and expertise on the management of drinking-water, groundwater, recreational and wastewater.

We report on drinking-water quality, provide scientific advice on health and environment-related public policy, conduct research on quality issues related to drinking water and recreational water and undertake information systems management.

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