

Water Matters

The Annual Report of the Waterways Centre for Freshwater Management – 2015

Postgraduate Seminar Day 2015

The fourth annual Waterways Postgraduate Student Conference, held at Lincoln University on November 17, featured more than 20 presentations on freshwater research being undertaken by postgraduate students at both universities.

Oral and poster presentations focussed on freshwater systems, policies that affect water use and management, and potential solutions to freshwater problems. Students were able to talk to community, industry, economic, regulatory, consultancy and research stakeholders in the freshwater resources of Canterbury and New Zealand, with more than 100 representatives from these sectors attending on the day. The conference was organised by a committee of

Waterways Centre Masters and Doctoral research students, chaired by WRM PhD student Tara McAllister.

Prof Stefanie Rixecker, DVC Scholarship and Research at Lincoln University, opened the conference with a stirring call to solve resource management issues at national and global scales. The first prize for oral presentation went to Waterways Masters student Ashlee Dolamore, for her presentation on “Elevated arsenic in Canterbury groundwaters”. Civil and Natural Resources Engineering UC PhD student Frances Charters took 2nd prize with “Predicting storm water pollution from urban surfaces in Christchurch”, and UC Civil and Natural Engineering PhD student Richard Measures won the IPENZ Rivers Group prize for “Monitoring hapua outlet dynamics”. The first place poster prize was awarded to Dang Duc Thanh, from UC Civil and Natural Resources Engineering, for “Flood regime changes in the Mekong River Floodplain as impacted by future hydropower development”.

Director's Review 2015

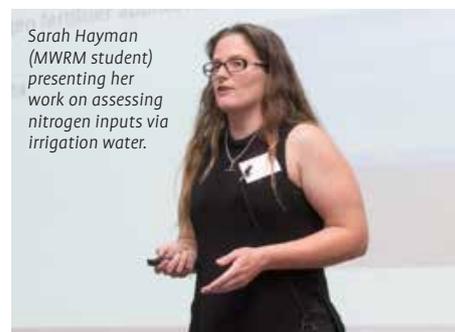
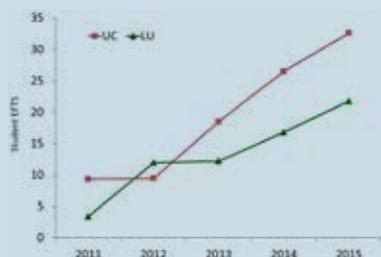
This is our first issue of “Water Matters”, a new format for our annual report, replacing our previous, somewhat dry 6 monthly progress reports with a communication we hope you will find a little more exciting and informative. It is intended for general distribution, so feel free to hand it on to anyone you think may be interested in the progress of the Waterways Centre and its achievements over the last 12 months.

2015 was a year of significant expansion for the Waterways Centre; we increased our footprint at Lincoln University with more laboratory and office space in the NRE building, we increased our core staff by 2 full time positions and our student numbers were up 16% on 2014. Student numbers have more than doubled since our first full year of teaching in 2012, when the original MoU between Lincoln University and University

of Canterbury (which governs our operation at both universities) was signed. While this is all good, it is but a means to an end. The real wins in 2015 were the research accomplishments of our students and staff, in their ongoing efforts to understand and address regional and national (and even international) freshwater management problems. This annual report is a chance to highlight some of these accomplishments, as well as milestones in the Centre's development. However, it can never be the whole story, and I encourage you to look up our website for details of the Waterways Centre outputs, publications and other research and teaching news.

As I write this we are preparing to host an event to celebrate the renewal of our MoU between Lincoln University and the University of Canterbury for the next 5 years. Our respective Vice Chancellor's will be signing the MoU in early February; underpinning the commitment of the senior administration of both universities to the vision of the Waterways Centre. We like to think that that vision is being realised every day in different ways, and we hope you agree.

Jenny Webster-Brown,
Director, Waterways Centre



Sarah Hayman (MWRM student) presenting her work on assessing nitrogen inputs via irrigation water.



MWRM student Emma MacKenzie explaining her poster on factors limiting phytoplankton growth in Te Waihora.



45 WATR 402/602 students measuring flow and water quality, and assessing ecological habitat in Powells drain near Springston.

Teaching

In 2015 the Centre taught one undergraduate (2nd yr) course on Freshwater Resources (WATR 201), and three postgraduate courses; Advanced Water Resources (WATR 401/601), Determinants of Water Availability and Quality (WATR 402/602) and Water Management, Policy and Planning (WATR 403/603).

The latter form the core of the Postgraduate Diploma and Masters in Water Resource Management (WRM). In addition, a Special Topic Paper (WATR 404/605) was developed and run in the first semester. Enrolments in some of the postgraduate WATR core courses were up significantly on 2014 (e.g., 45 students in WATR 402/602 compared to 27 in 2014) which has precipitated a review of how these courses are offered.

Two additional WATR courses were run for the first time, by members outside the core staff of the Centre. WATR 202 (Water on Land) was taken by Dr Nik Lehto in Agricultural and Life Sciences at Lincoln, and WATR 203 (Freshwater Science Field Skills) was taken by Professor Jon Harding in Biological Sciences at University of Canterbury.

There were 13 new enrolments in the Postgraduate Diploma in WRM (5 at Lincoln University) including 2 international (NZAid) students, and 13 new enrolments in the Master of WRM (3 at Lincoln University) including 9 international students. To accommodate the

unexpected high enrolments from international students, the Centre is working with the international student teams to upskill pastoral care for such students, particularly in their first year of study in NZ, and are working to develop an appropriate preparation/orientation workshop.

PhD Student Profile: Sean Waters



Sean has been investigating factors limiting the release of phosphorus from lake sediments in coastal lakes, principally Lake Forsyth (Wairewa) on the Banks Peninsula.

His research has highlighted the important role of redox conditions and lake water pH in controlling phosphorus flux from the sediments into the water column. Phosphorus is considered to be a major factor promoting algal blooms in this eutrophic lake.

Research

The Centre's core staff brought just over \$170,000 external funding in 2015, through a successful MBIE application, the Whakaora Te Waihora initiative, ECan and AntarcticaNZ support for specific research projects, and consultancy.

This funding has largely been channelled directly into postgraduate student research, in the form of scholarships and expense support. 11 new Masters thesis students began their research in 2015, on topics ranging from best practice irrigation servicing and nutrient recycling, to factors controlling the condition of coastal lakes and their tributaries, to urban stream ecology and regional groundwater chemistry.

Our ability to support postgraduate research students was enhanced by UC's decision to devote one UC PhD Scholarship to a Waterways-affiliated student each year (awarded to Phil Clunies-Ross in 2015).

The 2015 Waterways Masters Scholarship was awarded to MWRM student Ashlee Dolamore, for her work on arsenic in Canterbury groundwater, and two fees scholarships were awarded; to Abigail Mark who is researching riparian management policy effectiveness and the implementation gap in agricultural settings, and to Gemma Wadworth for her work on the impacts of anti-microbial compounds in urban waterways receiving sewer overflow.

We are also lucky to have the support of Meadow Mushrooms, which renewed its agreement to provide an annual Masters scholarship for Waterways PG students. The successful applicant in 2015 was Sarah Hayman, MWRM, who is investigating how much nitrogen is added to agricultural land by groundwater via irrigation. We also recognise the contribution of the Ngai Tahu Research Centre, who support PhD WRM students Tara McAllister and Shane Orchard.



Emma McKenzie (LHS) and Tara McAllister (RHS) at the NZ Freshwater Sciences conference dinner at Te Papa (theme – Night at the Museum!), where they were awarded the top student presentation prizes for best oral presentation (Tara) and best poster presentation (Emma).

We were particularly proud of our Waterways postgraduates presentations at the New Zealand Freshwater Sciences Conference in Wellington in November, see photo.

Of our eight PhD WRM students, four commenced their thesis research in 2015; Phil Clunies-Ross working on the ability of glacial suspended sediments to transport nutrients and contaminants, Julie Clarke working on societal responses to water shortages, Tara McAllister working on factors causing *Phormidium* algal blooms, and Marlese Fairgray working on geochemical approaches to ensuring the long term success of mine remediation. Our inaugural PhD WRM students, Sean Waters (factors affecting phosphorus availability in a coastal lake) and Meg Devane (development of improved faecal source tracking tools) plan to submit their theses in February 2016. Qian Hu is mid-way

through his work on macrophyte restoration in Te Waihora, and Shane Orchard has just publicised his initial findings on inland inanga breeding sites as part of his work on resilient shorelines.

Mid-year, the Waterways Centre compiled an application for MBIE funding with the University of Otago, for research to test and optimise the best restoration and rehabilitation methods for coastal lakes and lagoons (ICOLLs). Although well supported by ECan, Environment Southland, DoC, WET and international collaborators, and receiving relatively positive feedback from MBIE, the application was unsuccessful. We plan to resubmit a similar application in 2016.

Further details of research publications, theses and technical reports can be found on the Waterways Centre website.

Master Part I Student Profiles



George Barbour has a BE (Mechanical Engineering) from the University of Auckland and enrolled in the PG Diploma WRM as a mature student seeking a career change. He is now preparing to undertake Masters thesis research on water harvesting in 2016.

Preston Prince holds an engineering degree (Civil) from the University of Guyana, and enrolled in the Masters of WRM with a NZAid scholarship. He will also be undertaking his research thesis in 2016, on minimising the environmental effects of outdoor toilets.

George Barbour and Preston Prince measuring water clarity on a class fieldtrip.

Out there! Outreach and Communication

Part of the Waterways Centre's mandate is to communicate water management information, to help inform public debate and policy decisions.

In 2015 this included commentary on the Minister for the Environment's June update report on Water Quality in New Zealand, a workshop delivered on Lake Kate Shepherd and an interview on Radio NZ on ECan's report on recreational water quality. In the local newspaper (The Press) there was an article on irrigation and water management in Canterbury, and core staff acted as science advisors for four other stories on water in Canterbury.

Jenny Webster-Brown presented on key questions for Canterbury water management, as part of the Royal Society lecture series, provided an article for IrrigationNZ's newsletter, and delivered the 2015 M J Barnett Memorial lecture to the Canterbury Horticultural Society (on urban water quality). She also sits on the Te Waihora Agencies Group, and the Technical Advisory Group of Environment Southland. Bryan Jenkins delivered lectures and presentations to the University of Otago, Taumutu High School, and attended public meetings in Geraldine and Christchurch, while Ian Hawes served as an expert peer reviewer for Waikato Regional

Council, and is actively consulting with the Cawthron Institute on *Phormidium* blooms. The Waterways Centre also assisted the Waihora Ellesmere Trust plan the 2015 Living Lake Symposium, held in November at Lincoln.



New (and renewed) Staff



In April 2015 John Revell joined us as the Laboratory Manager for the two Waterways water quality laboratories at Lincoln University.

John came to us from Switzerland, where he had been working as an industrial chemist with Autoneum, but is a genuine Kiwi, having previously worked for Plant & Food Research at Lincoln, and for Hill Laboratories in Hamilton. He is involved with field and laboratory work with our postgraduate research students, and is currently developing better systems for managing laboratory and field equipment.



Dr Brian Thomas was appointed as a Lecturer in Groundwater Studies with the Waterways Centre in October 2015, and will take up his position in April 2016.

Brian is currently a Postdoctoral Researcher at the Jet Propulsion Laboratory, California Institute of Technology, in Pasadena, USA. His research investigates watershed-scale groundwater/surface water interactions using recession analysis, statistical hydrology, remote sensing applications (GRACE and SAR) and land surface models to decipher watershed responses. Once in New Zealand, his teaching will include a contribution to the Engineering Geology programmes at UC.



Everyone who has contacted the Waterways Centre will know Suellen Knopick, who has been the Centre's Administrator since 2012.

The fixed-term contract for this position expired in 2015 and it was re-advertised as a continuing, fulltime position. Suellen was reappointed to this position in June – much to the relief and joy of our staff and students!

New Facilities

In 2015 Waterways took over the management of the Water Quality labs at Lincoln, and moved into first floor offices in the Soil and Water Lab Building at Lincoln.

Reorganisation of the space and implementation of lab systems is ongoing for 2016. New paint and lighting on the first floor has made a noticeable difference on the first floor of the Soil and Water lab building, and a printer has been installed in the postgraduate student room there.

The Waterways office space on Level 7 of the Biology Building at UC will be fairly full again in 2016, as we try not to spill over.

Final Administration Notes

The financial operation of the Waterways Centre continues to be through University of Canterbury, where the Centre completed 2015 on budget and in good financial health.

The 15th Advisory Board meeting was held on 9 March 2015 and the subsequent Waterways Centre Consultative Committee meeting held on 21 April 2015. A focus for both meetings was on implementing the goals of the Waterways Centre Strategic Statement and Operational Plan (2014–2019). As members of both groups had been seconded to government advisory roles, new members were invited to join the AB and WCC, and the Terms of Reference revised to include length of service terms. These meetings are now scheduled to be held once a year.

The Waterways Centre for Freshwater Management is a teaching and research centre, jointly supported by the University of Canterbury and Lincoln University. Established in 2009, it aims to improve the knowledge-driven management of freshwater resources by offering a full complement of nationally accredited tertiary courses and actively supporting postgraduate research programmes.

Waterways Centre for Freshwater Management, University of Canterbury, Te Whare Wānanga o Waitaha, Private Bag 4800, Christchurch, New Zealand. T: +64 3 364 2330 W: www.waterways.ac.nz

