

THE WATERWAYS CENTRE FOR FRESHWATER MANAGEMENT

J.G. Webster-Brown,

Waterways Centre for Freshwater Management, University of Canterbury and Lincoln University, Christchurch, New Zealand

ABSTRACT

Fresh water is coming under increasing pressure globally from the conflicting demands which are placed upon this limited resource. The Canterbury region is one of the driest in New Zealand, and conflicts have arisen over the use of water for irrigation, and the preservation of iconic braided rivers, aquatic habitats, recreational waterways and community water supplies. The Waterways Centre for Freshwater Management was established in 2009 as a joint centre between the University of Canterbury and Lincoln University, to act as a focal point for improving knowledge-driven sustainable management of freshwater resources in Canterbury, and in New Zealand; recognizing that sustainable management requires that the needs of the whole community must be addressed, the life supporting capacity of the water maintained, and the cultural, aesthetic and recreational values protected for current and future generations. The Centre involves 50 academic staff across both universities, and will work with stakeholders in the water industry, regulation and research sectors to improve tertiary education and professional development opportunities in the water management field. It will also lead and coordinate research in freshwater resource management at both universities, and contribute to water-related debate. Immediate priorities for education and research are described, and goals with respect to community engagement and professional development are discussed.

KEYWORDS

Education, Water Resource Management, interdisciplinary

1 INTRODUCTION

In New Zealand, as overseas, fresh water is a resource which is coming under increasing pressure from a wide range of users. This is certainly the case in the Canterbury region, which has most of New Zealand's existing irrigated land, and most of the remaining potentially irrigable area, and where irrigation water is supplied from a large complex aquifer system and iconic braided rivers. The aquifer also supplies the population of Christchurch, New Zealand's second largest city, with a good quality untreated drinking water supply; a supply which is vulnerable to upstream water use and contamination.

Options for national governance and management of New Zealand's freshwater resources have been debated more intensely in the last 5 yrs (e.g., NZNP, 2006), but many of the critical issues remain unresolved. Government initiatives include the Sustainable Water Programme of Action and the proposed National Policy Statement for Freshwater Management (e.g., MfE 2004, and updated documents). It is widely recognized that further capability development of the workforce will be required before such can be effectively implemented. A Water Domain review by the Foundation for Research Science and Technology (FRST 2007) particularly highlighted social research and environmental economics capability as weakness in current national research capabilities for water.

Managing the freshwater resources of Canterbury is a particular challenge, and is becoming a growing pre-occupation for regulatory authorities, businesses and the community. The Canterbury Water Management Strategy (Canterbury Mayoral Forum, 2009) seeks to address some of these management issues, by proposing a

system of local governance for each of 10 catchment-based zones in the Canterbury region. Implementation of this strategy is currently progressing, with the appointment of zone committees, and a regional committee, for whom the challenge will be achieving *sustainable* management of the water resource. To paraphrase the more detailed goals for sustainable water governance of the Turnbull Group, (2009), sustainable water resource management must ensure that the needs of the whole community are addressed, the life supporting capacity of the water is maintained, and cultural, aesthetic and recreational values are protected.

Understanding the factors affecting the quality and quantity of our water resources, and their use, is of paramount importance in sustainable management. This understanding cannot be achieved without a well-educated and informed workforce and community. The need for better training and capability development in this field has been identified by councils, major industries, research organizations and consultancies in Canterbury. Parties such as Environment Canterbury (ECan) and the Canterbury Development Corporation (CDC), together with the Department of Labour's Water Industries Skills Steering Group (composed of Meridian Energy, IrrigationNZ, Enterprise North Canterbury, Canterbury Water Cluster, University of Canterbury, Water Industry Training ITO, ECan and Te Runanga O Ngai Tahu) have individually and collectively identified significant future skills shortages in this field (e.g., DoL, 2009).

The Waterways Centre for Freshwater Management was established in 2009 as a joint partnership between Canterbury and Lincoln universities, to help address both the lack of knowledge regarding freshwater resources and the skills shortage, by providing improved teaching in water resource management and an integrated research effort. The anticipated outcome is an expanded and better qualified workforce of water professionals, and an innovative water sector, with a stronger ability to adapt and manage future water problems. Ongoing engagement with water organizations and industries will be critical to the improvement of skills, knowledge, and awareness in the water sector.

2 DEVELOPMENT OF THE WATERWAYS CENTRE

The Waterways Centre for Freshwater Management is funded through its establishment phase (three years) by the Tertiary Education Commission (TEC). The Centre is made up of the 50 academic staff and postdoctoral students, across both University of Canterbury and Lincoln University, who are actively engaged in water-related teaching and research, and are collectively referred to as the Joint Working Group. Through 2009, the Centre was administered by an interim management committee of academic staff, supported by a 6 member external Advisory Board comprised of individuals from representative external agencies involved in water research and resource management. In January 2010, a Director was appointed and the interim management committee made way for a smaller consultative committee of university staff and a representative from CPIT. The Advisory Board continued in its original form, and has an ongoing role providing guidance and advice to the Director. The Centre was officially launched by the Minister for the Environment in July 2010, and has offices on both the University of Canterbury and Lincoln University campuses.

The principal aims of the Centre are to:

- Enhance and coordinate tertiary educational opportunities in this field, through development of undergraduate career pathways and viable a postgraduate education programme in water management studies.
- Provide professional development training opportunities for upskilling the existing workforce.
- Work with stakeholders in the water industry, regulation and research sectors, to identify specific skills needed in developing capability, and to identify and address current education and research gaps.
- Provide integrated leadership and coordination of university research and resources in the freshwater field.
- Serve as a catalyst for water-related debate, education and research amongst regulatory, public interest, teaching, research and water-user and provider organizations.

- Engage in community education, through regular news releases and media commentary, workshops and public seminars.
- Inform local and national water policy development through engagement with relevant officials and policy processes.

The state of progress for teaching and research initiatives, as well as for stakeholder and community engagement, are described in the following sections.

2.1 TERTIARY TEACHING PROGRAMMES

The Waterways Centre will provide tertiary level courses and qualifications, using the resources of both the University of Canterbury and Lincoln University. A vision of the overall programme to be offered (Figure 1) has been discussed, modified and ultimately generally agreed upon by the Joint Working Group, additional relevant academic staff, and the administration of both universities. Note that although a general consensus has been reached, the courses and qualifications shown in Figure 1 have not yet (August 2010) been finally approved by the required University teaching and academic committees, or by the national qualification authority.

2.1.1 UNDERGRADUATE (BACHELOR) DEGREE

Two courses would be offered at undergraduate level, which could be incorporated into a range of different bachelor degrees. These courses aim to provide students with a context for water issues, giving them an understanding of water resource characteristics, limitations, legislation and management strategies. As graduates they would use this knowledge in their careers. Such graduates would be likely be employed as technicians, scientists, lawyers, teachers, accountants, economists, field officers, technologists, and sales agents, or could progress onto postgraduate study in Water Resources (Figure 1) or in the subject of their major.

The two undergraduate-level courses proposed are:

- WATR 201: *Freshwater Resources*. A second year course covering the concept of water as a resource, factors limiting its quantity and quality and how these are assessed, and perspectives and values assigned to water (including Maori, economic and ecosystem).
- WATR 301 : *Water Resource Management*. A third year course covering the contestable nature of water resources, and existing and possible legislative, governance and management frameworks for freshwater, as well as future water issues.

Initially these papers would be offered within the Bachelor of Science (BSc) degrees at both Universities, and within the Bachelor of Environmental Management and Planning (BEMP) and Bachelor of Agriculture (BAG) and/or Agricultural Science (BAGSci) at Lincoln University. However, the intention is that these courses would later be able to credited to other degrees, particularly the Engineering (BE) and Law (BLLB) degrees at Canterbury University, and the Commerce (BCom) degrees at both universities, and ultimately to degrees in Teaching and Learning, and Arts, and to the Engineering Technology degree offered by CPIT. In all cases, the Waterways Centre would provide advice to students regarding the water-related or other relevant courses within their major subject (or elsewhere) that compliment water resources learning. Examples include courses on natural resource law, Maori science and indigenous knowledge, the Treaty of Waitangi, and environmental management.

Stepwise implementation of undergraduate courses is planned. WATR 201 would be introduced in 2011, if approved by the academic committees currently considering these courses for the University of Canterbury and Lincoln University. Approval for the WATR 301 course, and inclusion in other degree structures, as noted above, will be sought for 2012.

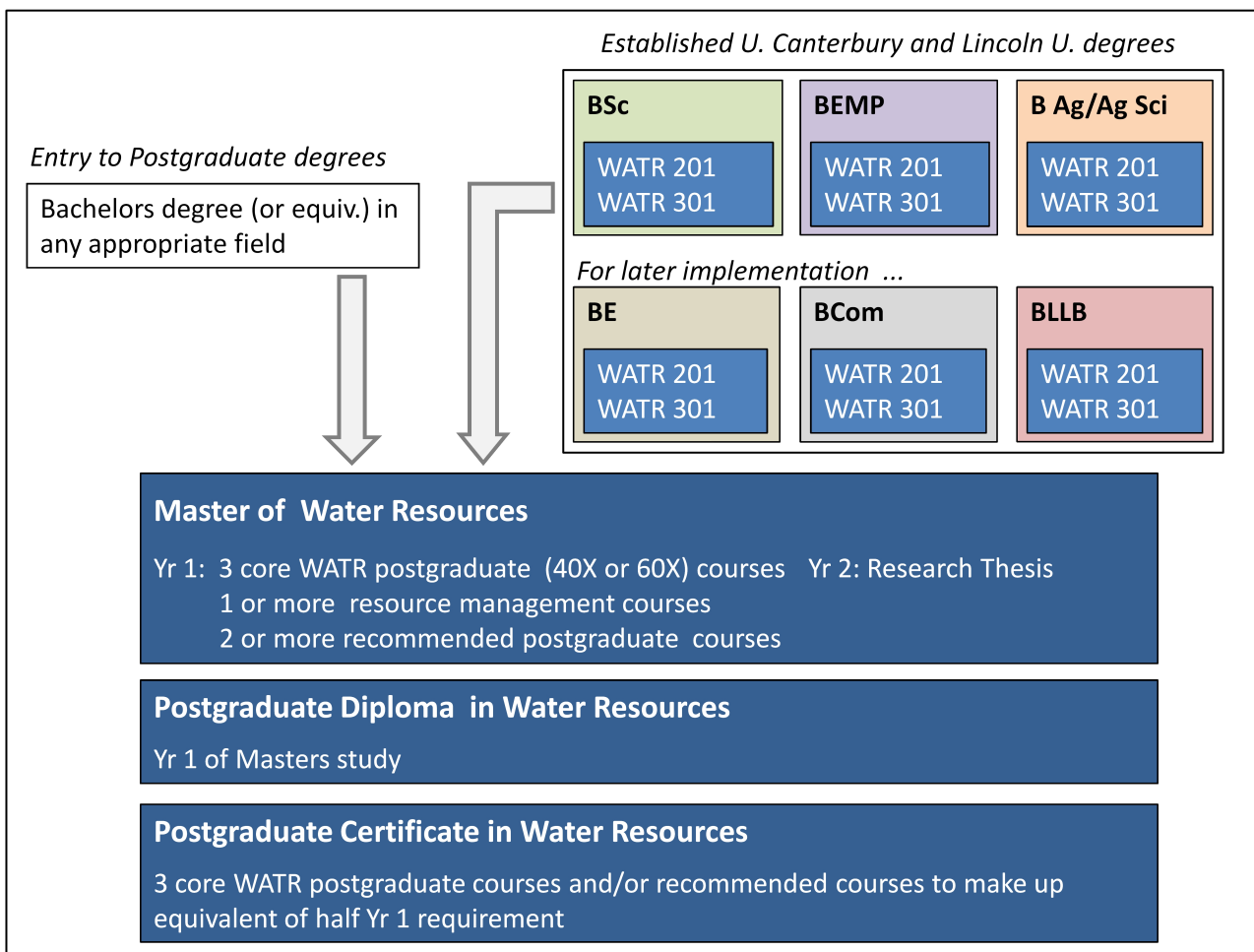


Figure 1: Proposed course structure for Water Resource Management teaching at the University of Canterbury and Lincoln University.

2.1.2 POSTGRADUATE TEACHING PROGRAMME

The aim of the postgraduate teaching programme will be to give graduate students, from a variety of disciplinary backgrounds, the knowledge and experience to work effectively as water resource management and research professionals. Careers would include engineers, research scientists and technicians, field officers, infrastructure planners, resource managers (e.g., for iwi or councils), resource economists, consultants, policy developers and planners, educators and lawyers. The programme would also prepare students for further research, in the form of a PhD.

The first step in planning this teaching programme was to consult with the stakeholders who would be employing graduates. The first Postgraduate Teaching workshop with stakeholders was held in November 2009, and was attended by representatives from Solid Energy, Lincoln Ventures Ltd, CDC, IrrigationNZ, ECan, WaterNZ, NIWA, MWH Global, OPUS, Ngai Tahu, Solid Energy, ESR, Tasman District Council and Forest & Bird, as well as members of the Joint Working Group of the Waterways Centre. Another workshop was held specifically with Ngai Tahu in January 2010 (reports outlining the outcomes of both workshops can be accessed from the Waterways Centre's website: <http://waterways.ac.nz>). Further stakeholder input to the development of teaching programmes, has occurred through specific meetings and jointly attended forums.

Stakeholders have identified desirable qualities and capabilities in graduates of a postgraduate Water Resources Management programme; capabilities which are currently often missing in graduates being employed across the water sector. A need for both specialist and generalist graduates has been identified, where "specialists" have a focused, deep understanding of a particular water-relevant discipline, and "generalists" (or "integrators") have a broader, interdisciplinary knowledge enabling them to pull together and prioritize diverse information, facilitate

interactions in interdisciplinary teams of specialists, and take on more of a project management role. Gaps in specialist knowledge in the region, such as groundwater modelling and limnology, have also been identified, and the need for specialists to appreciate the role of other disciplines and approaches in water resource management highlighted. Stakeholders emphasized the importance of practical experience as an essential complement to theoretical learning, encouraging fieldwork and contact with practitioners as part of a postgraduate degree. More generally, valuable attributes in graduates include; good communication skills (written and oral), team work, critical thinking and problem solving abilities and an appreciation of the commercial and legal context for water issues. Finally, it has been noted that, as well as grounding in Canterbury water issues, graduates need to have an awareness of national and international water resource concerns.

From the University's perspective it was noted that many existing specialist postgraduate courses, from both Lincoln and Canterbury universities, would be appropriate for inclusion in a water resource management degree. By allowing flexibility in the degree structure, a spectrum of "generalist" to "specialist" training could be given. Other successful interdisciplinary postgraduate qualifications, such as Hazards Management, Antarctic Studies and Business Administration, could be used as models when looking for an initial structure for postgraduate degrees in Water Resources. The universities could source external expertise and practitioners for practical applications of theory and methodology, and internships with industry and other employment groups would also provide good practical experience.

It is on the basis of this input, that a vision for the postgraduate teaching programme has been constructed (Figure 1). The Master in Water Resources would be the highest level qualification (2 year full time study), with the shorter term options of a Postgraduate Diploma (1 year full time study) or a Postgraduate Certificate (half the points requirements of a Diploma) also offered. The Master of Water Resources would involve one year of taught courses, and a one year research thesis, and would be a jointly awarded qualification between University of Canterbury (UC) and Lincoln University (LU). All degrees will be available for full- or part-time study as governed by the usual university regulations.

Four new Water Resources (WATR) courses would form the core component of all degrees:

- WATR 401(UC) or 601(LU) *Advanced Water Resources*. A course covering the contextual issues of resource appreciation, definition, characterization and use, and the impacts of exploitation and their management or mitigation. This first course would bring students from different background up to a similar level of understanding (students who have completed WATR 201 and 301, or similar training in water resource management may be exempt from all or part of this course). Specific topics would include the different perspectives and values associated with water bodies, anthropogenic stresses and their effects on resources, key aquatic and ecosystems processes, methods of characterization and impact assessment, hazards, NZ legislative frameworks relating to water and environmental resource, and catchment management approaches. The course would include a one-day fieldtrip.
- WATR 402/602 *Determinants of Water Availability & Quality*. A course covering the quantification of freshwater water resources, and methods for environmental impact control and mitigation. Specific topics would include measurement of flow, quality and ecosystem health, development and application of national standards, using indicators (including cultural indicators) and guidelines for water quantity and quality, point- and non-point source contaminant characterization, monitoring programme design & implementation, modelling resource change, and drinking/waste water treatment methods. The course would include both field and laboratory experience and may be given in a one week block course format.
- WATR 403/603 *Water Management, Policy and Planning*. A course covering catchment management models, policy and planning, within the context of environmental legislation. Specific topics would include catchment management models for balancing environmental, social, economic and cultural water values, legislative frameworks for water management, including local, regional, national and international policy development and water management strategies, hazard risk assessment and management, professional ethics and projections of future issues, alternative management and legislative strategies.

- WATR 690 *Research Thesis*,. An original piece of research into an aspect of water resource management, supervised or co-supervised by a member of the Joint Working Group of the Waterways Centre.

For the Master of Water Resources, a student would need to take all of these core courses. All will be taught and assessed in such a way as to convey the importance of interdisciplinary teamwork and effective oral and written communication. In addition, in the first year of study, a student would need to include between 1 and 3 courses on general resource management and law (depending on the points value of the course) from a recommended list of courses including topics such as; Resource and Environmental Management, Concepts and Principles of Environmental Science, Advanced Resource Management Law, Mana Kaitiaki (Maori Resource Management), Principles of Environmental Impact Assessment, Environmental Policy, Economics in Environmental Policy, Integrated Environmental Management and Natural Resource and Energy Economics. Further courses to make up the full complement of points for the degree would then be selected from a list of recommended postgraduate papers, for which the student has suitable pre-requisites (including a statistics paper if none has been taken at undergraduate level). As a standard, all taught courses would normally be completed in the first year for study (if fulltime), and the Research Thesis in the second year, but this may be flexible depending on circumstances. The Research Thesis must be on a topic of relevance to improving water resource management, and would ideally be on a topic of interest to an external stakeholder or included within a major funded research initiative within the universities, so that financial support in the form of a scholarship can be offered to the student. Creating and facilitating these opportunities for postgraduate research is a priority for the Waterways Centre.

The Postgraduate Diploma would include the taught courses offered for the Masters degree, but not the thesis component. However, the option of including a short research project as a Dissertation, in place of 1 or 2 taught courses, may be offered to students who have no prior experience in planning or undertaking a research project. As for the Masters degree Research Thesis, topics will ideally be of interest to stakeholders or part of larger research programmes, so that financial support for the research student can be obtained.

The Postgraduate Certificate qualification is usually a single semester (half year) of study, and so the prescription of courses has to be more flexible to accommodate the availability of courses in any particular semester. However, for this shorter course of study, core courses will be included where possible, and appropriate substitute courses where they are not. A Certificate of Proficiency award is also offered by both universities for students enrolling in a single course, and this will also be available to those enrolling in individual WATR courses.

The workshop with stakeholders will be reconvened in late 2010 to reassess the development of this postgraduate teaching programme, and to seek feedback on specific aspects of the proposal.

2.2 RESEARCH INITIATIVES

2.2.1 RESEARCH COORDINATION

The Waterways Centre has an important role to play coordinating research and researchers across both universities to address particular issues in water resource management, and therefore to enable an appropriate level of increased productivity from the *sustainable* use of New Zealand's water resources. The research emphasis tends to be different for each university, with University of Canterbury favoring strong disciplinary research in the fields of science and engineering, and Lincoln University focusing more on the integration and the application of knowledge from environmental, agricultural and social research. These strengths are complementary and can be used to address multifaceted water management issues.

The Centre also has a mandate to improve the translation of research output into practical operational information and practices that can be adopted by the water sector and community. While the skills offered by the universities are again complementary, Lincoln University has experience in linking research in agriculture, resource management and the land-based sciences, to economic transformations for New Zealand via the

private sector. The achievement of high productivity growth through innovation and economic transformation, while recognizing and valuing environmental sustainability as central key to future prosperity, is a key component of Lincoln University's approach.

In all research initiatives, the Waterways Centre will remain open to research collaboration with other national and international tertiary institutions and research organizations.

2.2.2 LAKE ELLESMERE/TE WAIHORA

Lake Ellesmere/Te Waihora is New Zealand's fifth largest lake in terms of surface area and is recognized for its biodiversity, but is shallow and in a seriously degraded condition. At the time the Waterways Centre was created, an agreement to create a new "Lake Research Centre" had recently been made by Lincoln University and Ngai Tahu. The Lake Research Centre has now been incorporated into the Waterways Centre, and with it the mandate to improve the environment of Lake Ellesmere/Te Waihora through research directed towards developing a better environmental management strategy. A field station in the Selwyn Huts area is also planned, with connection to the high speed KAREN computer network to enable remote access to monitoring data and equipment.

A significant body of research on the lake and its catchment precedes this initiative, embodied in a number of scientific publications and reports, and in the proceedings of the Living Lakes Symposia and Selwyn Science Symposia, held in Christchurch in 2007 and 2009. A detailed assessment of previous research and current state of the environment needs to be made before the contribution the Waterways Centre can make in the restoration of this complex system can become clearly identified. Discussions with those involved in past research and management initiatives are being held to identify the gaps that still exist, and are an obstacle to achieving an improved environment. Some of these are referred to in a synthesis of water management questions for the central Canterbury Plains region, and the science required to address these (CWRSC, 2009). Ongoing communication and collaboration with these researchers will be critical to identifying the best way forward, as will a practical vision of what this lake should be. The Waihora Ellesmere Trust (WET), a charitable trust actively involved in improving this environment through education and better catchment management practices, has crafted a vision as part of a community strategy (WET, 2006). Desirable qualities include healthy and productive water providing for the many users of the lake, while supporting the diversity of plants and wildlife, preserving cultural and historical significance and balancing environmental, customary, commercial, and recreational values for the enjoyment of present and future generations. This vision provides guidance as to what the environment could, and in the view of the community should, be but needs development to become a more rigorous guideline for what needs to be done to achieve this.

Before the end of 2010, the Joint Working Group of the centre will have met to discuss the role that the Waterways Centre can play in this management issue, and preliminary discussions with CRI scientists and critical integral parties such as ECan, Ngai Tahu, local iwi, TeAo Hou and WET are already underway. The first research projects undertaken under the Waterways Centre may begin as early as summer 2010, but will become a major focus in 2011 and 2012.

2.2.3 FACILITATING POSTGRADUATE RESEARCH PROJECTS

A useful intermediary role for the Waterways Centre is to connect stakeholders with research projects to be completed, with postgraduate students who can undertake them. This will include a range of research projects, from those suitable for short term study projects, such as dissertations, through to Masters theses (1year), PhD theses (nominally 3 years) and Postdoctoral research programmes (1-4 years). Providing scholarships and/or support in kind for particular topics is a practical way of ensuring that projects are completed, by a dedicated individual, and students have an interesting, relevant topic for research; one which often dictates their next career step.

The ways in which Waterways Centre can facilitate this connection, which can be difficult to set up and administer, are currently being investigated. A standardized scholarship agreement has been clearly identified as desirable, for example. A central repository for potential research topics within the Centre, which interested students can access and follow up on, would raise the profile of external research topic opportunities.

Scholarship administration and overseeing progress reporting by the Centre is also likely to be beneficial to both parties, as well as reducing administration requirements for host departments within the universities.

2.3 OUTREACH & COMMUNICATION

The Waterways Centre aims to serve as a catalyst for water-related debate and research, within regulatory, community interest, and water industry forums, while remaining independent of vested interests. It will seek to inform and influence water related policy development both through direct engagement with relevant officials and through submissions on policy proposals.

It is anticipated that the Centre will become the principal avenue through which interested groups can initiate discussion and collaboration with tertiary-level researchers on water-related issues; through student thesis research projects, through longer term research initiatives or by other avenues. Continuing the communication with stakeholders that has already begun (through consultation and workshops as described above) will be a priority, as will engagement and education of the community and existing workforce.

2.3.1 STAKEHOLDER INTERACTIONS

The importance of working with end users and stakeholders to create a pathway for new knowledge to be taken up and used, to create economic opportunities and better environmental outcomes, has been emphasized from the outset. As noted, private sector groups such as the CDC, the Canterbury Water Cluster, ECan and the Water Industries Skills Steering Group have already influenced many of the Waterways Centre's priorities. Other primary sector groups have also recently formed a partnership in support of their commitment to the sustainable management of the nation's valuable freshwater resources. The Partnership Group consists of Fonterra, Dairy NZ, and the Foundation for Arable Research, Horticulture NZ, Meat and Wool NZ, New Zealand Forest Owners Association, NZ Farm Forestry Association, Irrigation New Zealand, Fertilizer Manufacturers Research Association and Federated Farmers. This Partnership Group has urged central government support for the development of capability in water management. Engagement with this group is currently being initiated.

Various ways of maintaining communication with stakeholders are being considered; some of which have been mentioned already (e.g., seeking research projects from the sector, workshops seeking input to teaching curriculum). Other opportunities occur through scheduled meetings, mutual involvement in interagency groups and conferences, and communications with and through ECan. For some end users, direct interaction with postgraduate students through co-supervision of research and guest lectures on specific topics will be an appropriate way to strengthen communication, particularly with staff of the Crown Research Institutes, ECan and key consultancies in the freshwater resource management field.

An internship programme, placing students with private sector employers for a period of time, is being considered as a way to give students the practical experience they need, while at the same time giving the employer direct contact with, and a role in, the tertiary teaching programme.

2.3.2 COMMUNITY INTERACTIONS

In a report on public opinion on freshwater issues in Canterbury, Cook (2008) noted that the community strongly supported having clean, safe (untreated) water for domestic use and recreation, for themselves and for future generations. It also highlighted concern, but also uncertainty, about other aspects and goals of water management. For example, opinions were divided on whether water quality was currently "good", whether current water management (of lakes, streams, rivers and groundwater) was adequate, the effects of irrigation and dairying on water quality and whether a greater water take should be allowed. The report concluded that more attention should be given to informing and involving the public. The public is also represented in water interest and lobby groups such as the Water Rights Trust (e.g., Rogers, 2009), Our Water Our Vote, NZ Fish

and Game and other aquatic recreational groups, many of which have been very active in the debate over the future of Canterbury's water resources.

The Waterways Centre can bring relevant information, as known or generated by affiliated academic staff and postgraduate researchers, to the attention of the public in a form in which it can be understood. Better communication, by distributing technical information through popular media, public lectures, and involvement in community water initiatives, may motivate members of the public to seek greater involvement in water resource management, and/or to influence decisions makers to take action. Currently, confusion and misinformation appear to be major obstacles to engagement for many in the community. Some of the foundations for this type of communication already exist in the form of the University of Canterbury's Community Education programme, and the highly successful water quality and education WaterWatch programme for schools, run by Lincoln University. Some members of the Joint Working Group of Waterways Centre already inform debate through the print media, and these efforts will be continued and encouraged.

2.3.3 PROFESSIONAL DEVELOPMENT PROGRAMMES

The need for professional development training to upskill the existing water management workforce, has been clearly identified. An interdisciplinary field such as water management has many aspects, and individuals assuming new responsibilities will need to acquire new knowledge, as will those working in fields where knowledge and/or systems and protocols are rapidly evolving or, alternatively, there is an absence of information or procedures are being established for the first time. The latter is a particular issue for iwi resource managers, who are formalizing and codifying indigenous values for the first time (David Perenara O'Connell, pers comm).

Short courses on particular aspects of freshwater resource management, to provide support and information for professionals, are planned. Expertise will be sourced from within the universities (i.e., within the Joint Working Group of the Waterways Centre) but also through affiliations to external and stakeholder organizations, for expertise which is relevant but unavailable within the Waterways Centre. Such training is likely to be as important for those working in specialist fields, who seek to update or broaden their knowledge base, as for "generalists" or "integrators", who need to gain a degree of understanding across a range of capabilities.

Feedback is currently being sought from all stakeholders and other interested parties on priority topics for professional development training, and the form such training should take (e.g., day/evening lectures, block courses, web-, field- or lecture-based). Professional development credit for these courses is also being investigated. To have input to this process, interested groups are directed to the website for the Centre (<http://waterways.ac.nz>). The first professional development training course is scheduled for late 2010.

3 CONCLUSIONS

The Waterways Centre for Freshwater Management, initially set up in 2009, is now fully operational and was officially launched in July 2010. The Centre aims to become a focal point for improving knowledge-driven sustainable management of freshwater resources in New Zealand, and has a mandate for both teaching and research. Initially funded by TEC, the Centre will work with stakeholders in the water industry, regulation and research sectors, to enhance and coordinate tertiary educational and professional development opportunities in the water management field, *and* to lead and coordinate university research in freshwater resource management. It will also contribute to water-related debate, engage in community education and to inform local and national water policy development. Currently 50 academic staff across both University of Canterbury and Lincoln University make up the Joint Working Group of the Centre, and are actively undertaking water-related research with their postgraduate students, and teaching in this field.

Immediate plans include commencing teaching undergraduate and postgraduate courses in 2011, and offering a new postgraduate degree, a Master of Water Resources, in 2012. Professional development training and community education and engagement initiatives are planned for late 2010. Research to support the improved

management and environmental quality of Lake Ellesmere/Te Waihora will be a priority for the Centre, building on the foundation of the Lake Research Centre initiative between Lincoln University and Ngai Tahu. Facilitating postgraduate research of relevance in water resource management will be a priority, with plans to simplify and standardize scholarship arrangements between stakeholders sponsoring such research and the postgraduate student involved. Continued close communication with stakeholders in the water sector, as potential employers, research collaborators and in some cases, guest lecturers, will be essential to the success of the Centre.

The Centre will remain independent of vested interests, with an external Board of Advisors representing a balance of water interests to support a neutral position, adhere to the mandate of academic integrity and act as a critic and conscience of society, as is the role of all universities.

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