flow

manatiaki kōawa
rivers
GROUP

A joint technical interest group of Engineering New Zealand & Water NZ

INSIDE THIS ISSUE

NEWSLETTER

Issue 29 | July 2020

FROM THE CHAIR

Heide Friedrich

With the Auckland drought, a lot of attention over the last weeks has been on the discussion to take more water from the Waikato River. The Government has called in a Board of Inquiry for Auckland Council's 2013 application to the Waikato Regional Council to take an extra 200 million litres of water a day. The discussions, which got a lot of airtime in the media, show the complexities and diverse values involved, resulting in the urgent need to investigate other solutions than purely relying on taking more water from rivers.

At around the same time it was announced that the European Union Water Framework Directive, which strives to achieve good qualitative and quantitative status of all water bodies, will not be changed. Instead of allowing to change goal posts – such as Auckland allowing to take more water from the Waikato River - the message is clear that there is a need to focus on supporting implementation and enforcement "without changing the directive". As a result, the law will be kept in its current form and governments are tasked with better implementation.

For not only Auckland, but New Zealand it becomes apparent that investment is needed to investigate longer-term options to ensure water supply, including reducing leaks, alternative methods of treating water, and wastewater treatment.

This year, we also welcomed six new committee members. Jacqui McCord (Morphum, Auckland) is taking over as Secretary. I want to thank Edwin Baynes herewith, who managed to get one of the last flights out of New Zealand, to go home to the UK, where he is starting a new position as lecturer in the Geography and Environment Department at Loughborough University. In this issue of FLOW Edwin is sharing with us some of his NZ experiences, and we are wishing Edwin all the best for his new adventure. Hamish Smith (T+T, Wellington) joins us as Events Coordinator. We are interested to hear from you, if you want to present a topical river-related webinar. Markus Pahlow (University of Canterbury, Christchurch) joins us as FLOW Coordinator. Jennifer Price (MfE, Wellington) is our Central Government Link. Richard Measures (NIWA, Christchurch) joins us as Awards and Scholarship Coordinator – with our Student Research Scholarships open now – application deadline is August 17. And last but not least, we have Ian Fuller (Massey University, Palmerston North) joining us as Academic Coordinator.

We are excited to announce that preparations for the Rivers Group & Hydrological Society Joint Conference in December 2020 are speeding up. The Freshwater Sciences Society is also joining us now, with the joint conference to be held in Invercargill Waihōpai, from 1 – 4 December 2020. Please keep checking updates on the website nzhsrivers2020.co.nz regularly.

A reminder that we are working on sharing relevant news more often with you. We do rely on articles or notifications from our membership for distribution through our 'Fortnightly Reads' emails. Please also consider submitting an article, case study, update or notice for the next issue of FLOW. For our 'Fortnightly Reads' email, you can email us news items, announcements, event details, recognitions, guidelines news – anything of interest to our community. Please email nzriversgroup@gmail.com to submit your FLOW contributions or any news you want to share through our 'Fortnightly Reads' email.

Please remember to check out and connect with us through our Website, Facebook, Twitter and LinkedIn.

Heide Friedrich

Chair

INTRODUCING OUR 2020 COMMITTEE IN DETAIL

You can learn more about the whole committee at riversgroup.org.nz/committee

Ian Fuller, Massey University

Ian is Professor in Physical Geography at Massey University in Palmerston North, where he co-directs the Innovative River Solutions group and has been based since 2003. His research in fluvial geomorphology provides an integrated understanding of river systems at multiple spatial and temporal scales. He has completed numerous projects for stakeholders in river management and worked in catchments throughout New Zealand, as well as the UK and Europe. Prior to arriving in New Zealand, Ian completed his PhD at the University of Wales, Aberystwyth in 1996, which was followed by a lectureship in Physical Geography at Northumbria University. He is passionate about educating students in NZ's rivers and linking geomorphology with river management.

Markus Pahlow, University of Canterbury

Markus is a lecturer in the Department of Civil and Natural Resources Engineering at University of Canterbury. Before joining UC Markus has worked in the Netherlands, Germany, USA and Ireland, both in academia and the industry. His teaching covers hydrology, hydraulics, water resources engineering and integrated engineering design. His research aims at developing and maintaining resilient and sustainable water resources systems.

Jennifer Price, Ministry for the Environment

Jen is a Senior Analyst at the Ministry for the Environment where she spends her time working across science, policy and implementation. She started out her career as a freshwater ecologist, gaining a MSc and PhD from the University of Waikato in freshwater fish ecology. After that, she spent five years wading around in rivers, conducting assessments of environmental effects and working on construction projects as a consultant ecologist. Jen is interested in how we can bring together different values and systems of knowledge to put the rights of rivers first in decision-making.

SCHOLARSHIP ANNOUNCEMENT

Applications for the NZ Rivers Group Student Research Scholarships are now open!

The NZ Rivers Group is funding up to three $1000 student research scholarships to support postgraduate researchers working on issues related to rivers, flood risk management and the operational and environmental issues of catchments and river systems.

Applications are invited from students pursuing postgraduate research focused on New Zealand's rivers and catchments, including cultural health, water quality, water quantity, flood management, energy generation and environment protection, as well as promoting a multi-disciplinary approach for river management, that reflects cultural and societal diversity in an integrated and holistic manner.

Full details and application form are available at riversgroup.org.nz/new-funding-opportunities.

The closing date for applications is 17 August.

Applicants must be enrolled for a postgraduate degree at a New Zealand institution. During the tenure of the research scholarship the applicant must be an enrolled student and a member of the NZ Rivers Group. Funds may be used for any purpose that supports the applicant's research.

UPDATE FROM A PAST AWARD WINNER

Alex Scott

My name is Alex Scott and I have been interested in Civil Engineering from a young age. I am currently in my final study year towards a BSc(Hons) in Civil Engineering at the University of Canterbury and recently returned from an exchange at the University of British Columbia in Canada. I enjoy Fluid Mechanics because of its practical applications of mathematical and physical theories, as well as its use in different fields of engineering. I most recently held an internship with Waimea Water Ltd working on the Waimea Community Dam. In this position I was able to continue to explore my interest in fluid dynamics and hydrology. I am planning to continue my studies and complete a Master's degree at University of Canterbury.

EVENTS:
REVIEW OF MAY/JUNE WEBINARS

With COVID-19, some events we supported, such as the April 28 2020 NZ Rivers Group & University of Auckland Symposium and the Massey University River Practitioners Workshop scheduled for 16-17 June had to be postponed. Yet thanks to our committee members Kyle Christensen and Jon Bell, we were able to bring you well-attended webinars in May and June, and we are working on more to come, so keep checking the Rivers Group emails.

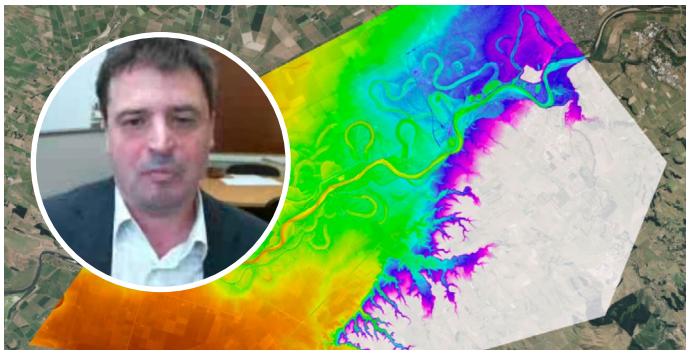
Kyle presented the lessons learnt from the 2017 Rangitāiki River Flood and outlined the factors that contributed to the failure of the floodwall at Edgecumbe in the 2017 flood. Jon gave a fascinating presentation on the challenge of providing flood protection to the Manawatu, exploring the history of the river and how it has shaped the area around it. We learnt how humans have attempted to train and contain the river over the years and the engineering history associated with those efforts.

The common theme for both presentation was: what can we learn from the past, and how to integrate lessons and observations into the future flood and river management?

If you are working or have been working on case studies or river-related processes that would be interesting for our community to know more about, and want to share with us as part of a webinar, please contact our events coordinator Hamish Smith (HSmith@tonkintaylor.co.nz). We'd love to hear from you.

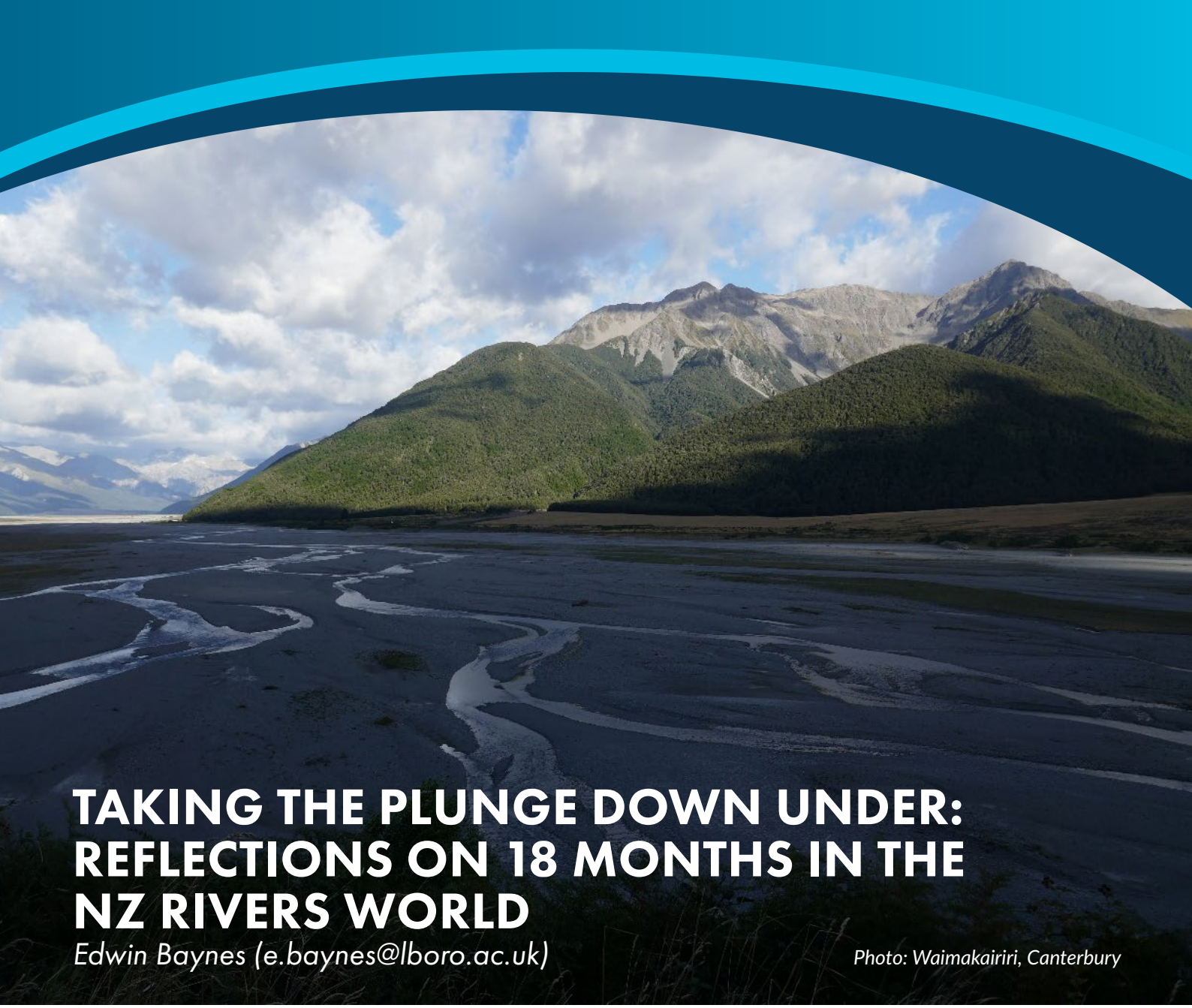
May Webinar

In May Kyle Christensen (Christensen Consulting Ltd) presented on Lessons Learnt from 2017 Rangitāiki River Flood. Kyle was one of the experts engaged to undertake an independent review lead by Sir Michael Cullen. The webinar shared key insights ranging from the immediate sequence of events leading up the failure of the flood wall at Edgecumbe, and context on the wider setting including the history of the Rangitāiki River Flood Scheme. The webinar was well attended with approximately 100 people listening in.



June Webinar

In June, Jon Bell (Horizon's Regional Council) provided an overview of managing the flood risk on the Manawatū River. The Manawatū River has produced some of New Zealand's largest and most damaging floods in recent decades, and includes several notable pieces of infrastructure including the Moutoa Gates. This fascinating river, with its western headlands separated from its eastern floodplains by the Manawatū gorge, is challenging Horizon's staff to come up with approaches to manage sedimentation and environmental drivers alongside flood protection sustainably into the future. The webinar was attended by 140 members and an email link to the recording was made available to members.



TAKING THE PLUNGE DOWN UNDER: REFLECTIONS ON 18 MONTHS IN THE NZ RIVERS WORLD

Edwin Baynes (e.baynes@lboro.ac.uk)

Photo: Waimakairiri, Canterbury

The Source

Iconic rivers, inspiring landscapes, and active geomorphology; I needed little persuasion when the prospect of moving to Auckland appeared for me in 2018. The following 18 months gave me a broad insight into the New Zealand rivers 'space', crossing from fundamental research within academia through to exposure to the applied management practices and requirements through engagement with the Rivers Group.

Multiple Active Threads

With a research background set broadly within fluvial geomorphology, specifically on the role of rivers in landscape evolution, and building a detailed understanding of bedrock erosion and waterfall formation processes, I arrived in New Zealand with endless ideas for research projects and hopes for geo-tourism. Visits to Kitekite, Whangārei, Bridal Veil, Humboldt, Huka and Hunua Falls (the list goes on, and on) did little to dispel these hopes, but narrowing down the research ideas proved harder.

The George Mason Centre for the Natural Environment (GMCNE) at the University of Auckland is a multi-disciplinary research centre that focuses on environmental restoration, conservation and sustainability. Combining my geomorphology background with the expertise in the Water-worked Environments research group, led by Heide Friedrich, and the facilities available in Water Engineering Laboratory led to the successful development of a research project titled 'Our Changing Rivers'. The project aimed to understand the response of river systems to perturbations (i.e., increased sediment input following earthquakes, landslides, storms), and how this understanding may help inform river management approaches following such events.

Humboldt Falls, Southland

Confinement

Following multiple active research strands initially, the project began to narrow down onto two main sets of experiments: (i) sediment evacuation from a single point source in a bedrock constrained canyon, and (ii) response of a braided river system to variable input sediment supply. Both of these sets of experiments were motivated by the 2016 Kaikoura earthquake where many landslides supplied sediment and, in some cases, blocked river channels. Through time, this sediment will be evacuated from the ranges and enter the braided river network on the plains, potentially leading to aggradation and other changes in river behaviour that will be a future challenge for river managers. Being able to develop experiments which had a clear relevance for the challenges that New Zealand rivers face was a priority for the project, and we hope the findings will be useful for wider river practitioners.

A particular highlight of my time in New Zealand was engaging with the local and regional river managers through the Rivers Group as the management committee secretary and attending the Rivers Group events such as the River, Coastal and Estuarine Morphodynamics symposium that was held in Auckland in November 2019. Due it's membership covering multiple disciplines and backgrounds, I feel that the Rivers Group has a unique opportunity to guide and facilitate effective river management through combining the understanding of geomorphic processes with engineering and management needs. I was in the process of organising a local Rivers Group event at the University of Auckland when lockdown struck, but hope these conversations will continue into the future.

Otira River, Westland

Turbulence

As with all of us, plans had to change due to the global pandemic and corresponding lockdown(s). Unfortunately, my time in New Zealand was cut short and I returned to the UK just in time to avoid the worst of the border closures and travel restrictions. While continued engagement with the New Zealand rivers world will now prove harder (my final Rivers Group committee meeting required a 3am alarm!), I'm lucky enough to have found a position within the Geography department at Loughborough University that allows research flexibility. So, I'll be back to work with the New Zealand river community as soon as possible, and in the meantime I will continue to enjoy catching up with the Rivers Group webinar series and the newsletters!

Leading the RCEM field trip, Waiheke Island

Braided river experiments, Water Engineering Laboratory, University of Auckland

Landslide sediment evacuation experiments, Water Engineering Laboratory, University of Auckland

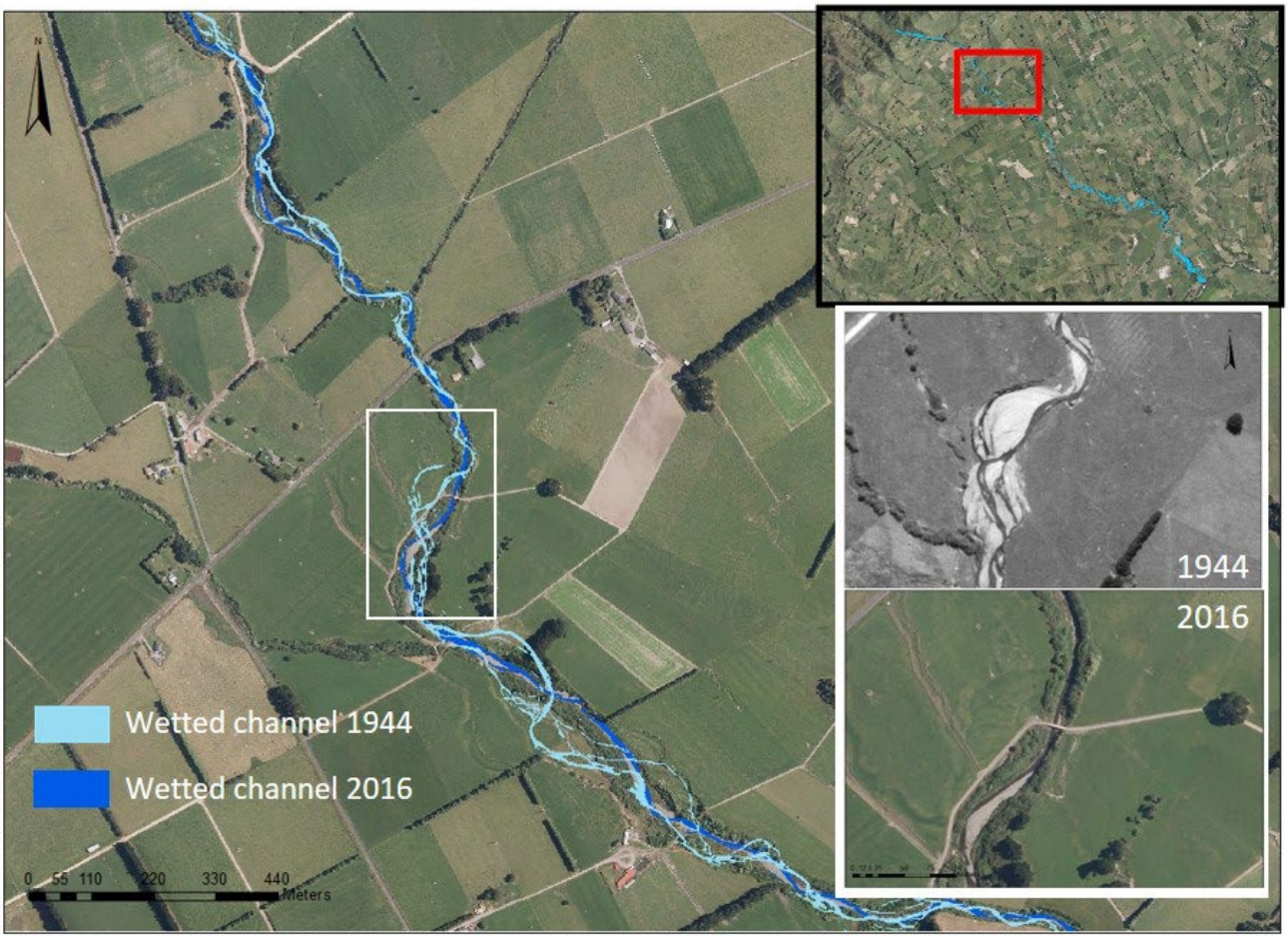
MASSEY UNIVERSITY RIVERS NEWS

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

Despite the challenges of Lockdown, rivers work has progressed… The single greatest achievement in this challenging quarter was Lisanne van de Kleut's completion of a project for Horizons Regional Council on the Oruakeretaki Stream in the SE Ruahines. Following an initial (pre-lockdown) field visit, Lisanne (an intern student visiting from Wageningen University) undertook a desk-based study of river channel and corridor changes in the Oruakeretaki from 1944-2016. Using a series of orthorectified aerial photographs Lisanne's study quantified the change in river character and condition over this period. The primary objective was to quantify the extent of modification in light of the SE Ruahines River Scheme management, which was implemented in the 1980s following significant disruption to these rivers by Cyclone Alison in 1974, and included the advice of one Stanley Schumm. The success of modification was very evident in changes identified, notably reductions in active corridor width and complexity in channel form. Natural Character Index (NCI)* ratios (observed [2016] over expected [1944]) indicate an 80% reduction in gravel area between 1944-2016 in the upper Oruakeretaki Stream.

Lisanne's work will form the basis of a report being drafted for Horizons Regional Council to help inform the future options and direction for river management in the SE Ruahines.

*see Fuller, I.C. *et al.* (2020) An index to assess the extent and success of river and floodplain restoration: Recognising dynamic response trajectories and applying a process-based approach to managing river recovery. *River Research and Applications*, in press. [copies on request from i.c.fuller@massey.ac.nz]



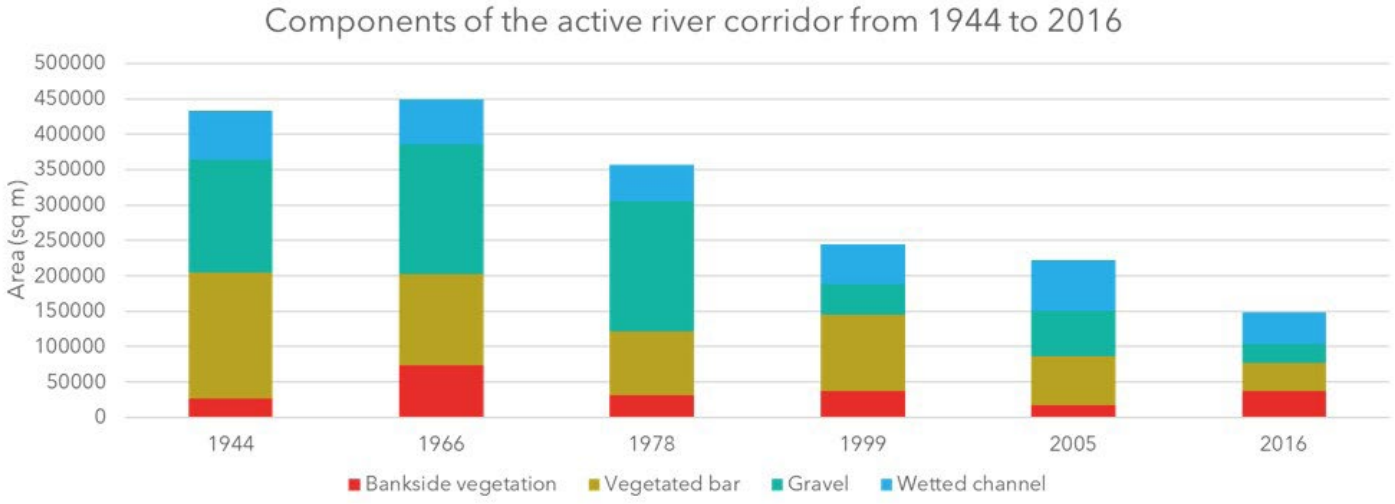


Figure: Oruakeretaki excerpt from upper reaches, showing wetted channel form and alignment in 1944 and 2016. Insert shows extent of morphological simplification. Graph displays modification of key active river corridor constituents 1944 – 2016.

MASTER THESIS RESEARCH AT UNIVERSITY OF CANTERBURY & TWENTE

Tim Doornkamp, University of Canterbury

Research in NZ

My name is Tim Doornkamp, 27 years old, and born in the Netherlands. I was given the opportunity to work on a combined research project for my Master studies of Civil Engineering & Management and Corporate Communication at the University of Twente in the Netherlands, and had the privilege of working with Markus Pahlow (Department of Civil and Natural Resources Engineering) and Donald Matheson (Department of Media and Communication) at the University of Canterbury for the duration of about a year.

Figure 1: Example of flood remediation work in the Dudley Creek area

The research I worked on takes a closer look at the influence of flood projects on urban (flood) resilience, in order to enhance and better understand the process of making cities 'future-proof'. While similar studies often approach urban resilience from either an 'engineering' or 'social' perspective, I had the opportunity to apply both to a case study of the Dudley Creek Flood Remediation project in Christchurch. In practice, this means I assessed both the resilience impact of flood measures, and the (social) impact of the project on the adaptive capacity of citizens.

To assess the impact of flood measures, I firstly conducted interviews with Dudley Creek project team members at the Christchurch City Council. A set of six resilience principles was then used to perform the actual assessment in a workshop setting, consisting of six groups of 3 to 4 students and academic staff members of the University of Canterbury. The resilience impact of different flood measures was rated on a scale from 1 (very negative) to 5 (very positive). It was a valuable experience for me, both for the exercise of communicating a difficult topic as resilience, as well as critically reflecting on subjective assessments with others.

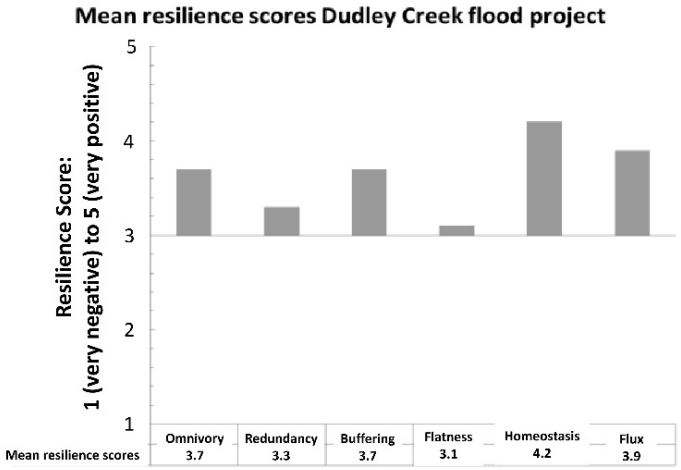


Figure 2: Mean resilience scores of the Dudley Creek Flood Remediation project

To assess the impact of the project on the adaptive capacity of citizens, I went into the case study area, and surveyed 260 individuals by knocking on their front doors. Though this required a lot of evening walks, it was a nice change from working behind the desk. The survey asked individuals about their

flood related knowledge, risk perception, perceived adaptive capacity, and motivation to adapt. Additionally, I conducted ten follow-up interviews for a more in depth/qualitative analysis of the quantitative findings. Both the activity of going door-to-door and the interviews allowed me to talk to the citizens, and find out what was important to them in their everyday lives. I was happy to find that almost everyone (≈ 80%) I came across was willing to participate, and were very positive towards my project in general. Many of the individuals told me they enjoyed talking about/sharing their opinions on the flood related issues in their area, even if it would not necessarily lead to any changes. It was interesting to see how different levels of understanding of the flood (and climate change) related issues, as well as previous experiences with flooding, lead to very different attitudes. As an example, for some that had seen their property flooded multiple times the experience actually reassured them that they we're going to be fine, decreasing their worry. The idea that perceptions can vary so much even within a smaller community is something I will take with me in the future.

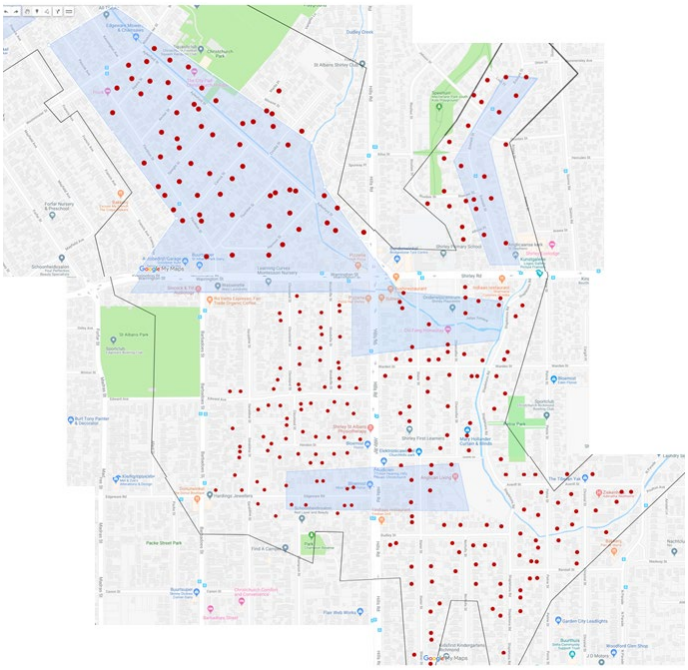


Figure 3: Addresses visited as part of the survey (grey outline indicates the case study area, blue marking indicates flood prone areas)

Experience with Living in NZ

During my time in New Zealand, I had plenty of opportunities to explore, and get involved in other activities. For example, I was involved in an international exchange of Oxford students, and asked to give a lecture for master students on stakeholder engagement. During the weekends I would often go on hikes with friends, which gave me a greater appreciation of what nature can achieve. I met many people working on interesting and often innovative (development) projects, which made me feel more connected to Christchurch as a whole. Overall, I felt very welcome.

Current Work in the Netherlands

Following my graduation, I was asked to work as a junior researcher at the University of Twente (UT), as part of the 'National knowledge and innovation program water and climate' (NKWK). The project I am working on is a collaboration with, amongst others, two of the larger civil engineering companies in the Netherlands, namely Deltares and Arcadis. The aim of the project is to improve the decision making process of regional governments on critical infrastructure protection, leading to climate resilient cities. Our team at the UT has been asked to conduct a state of the art review of existing methods and tools that are used to assess direct and indirect (cascading) impacts of climate change on these structures. In addition, we will assess the governance context(s) in which decisions are made, and determine which elements are supportive or restrictive from a resilience perspective.

Future Plans

For both my bachelor- and master-thesis I traveled overseas to New Zealand, and plan to move back to Christchurch with my fiancée at the end of the year. I will be looking for a job where I can put my knowledge on engineering and communication to good use, and hope to contribute to making New Zealand a great place to live, also in the future.

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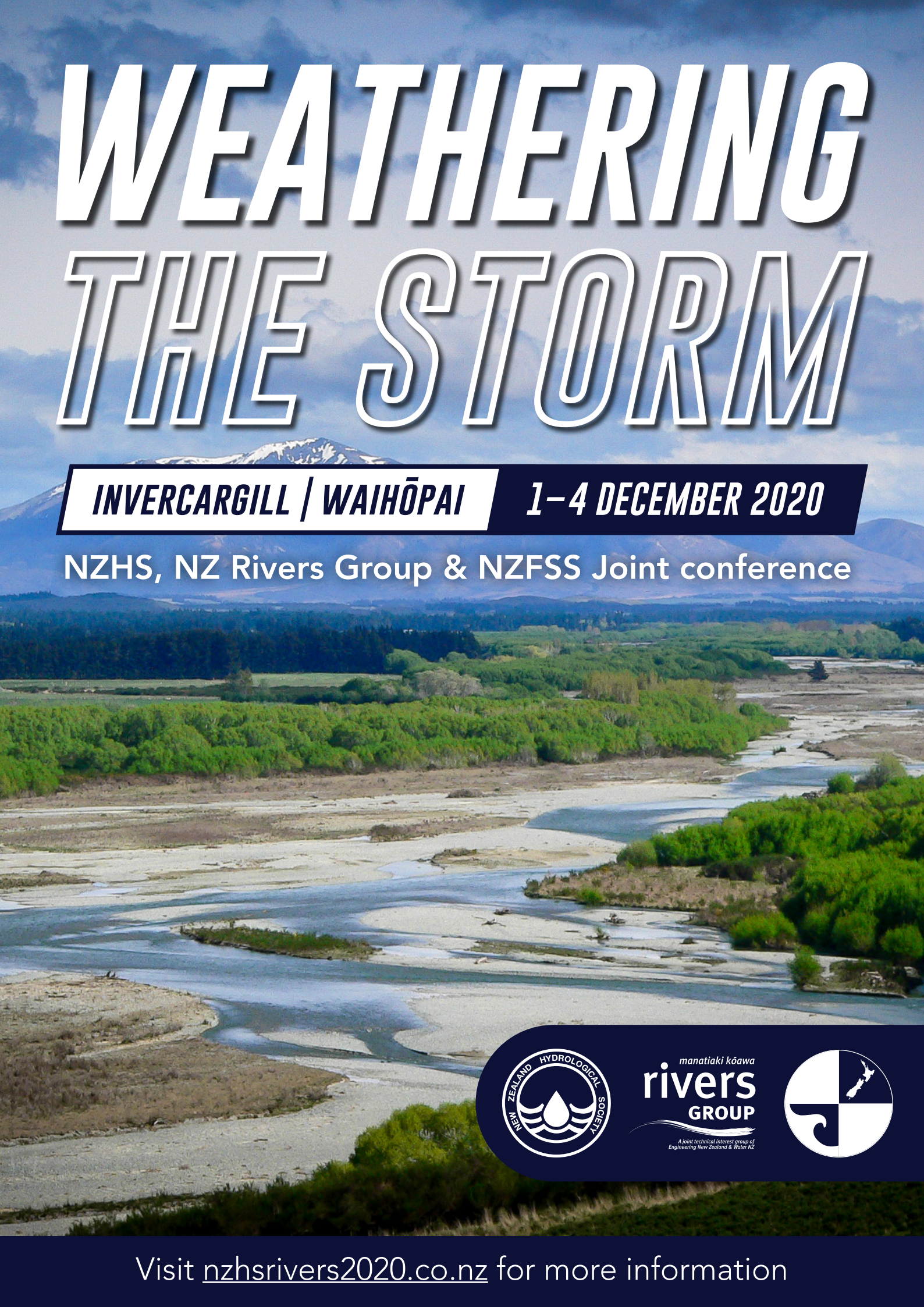
Link to full report: essay.utwente.nl/80684


WEATHERING
THE STORM
INVERCARGILL | WAIHŌPAI
1–4 DECEMBER 2020
NZHS, NZ Rivers Group & NZFSS Joint conference
NEW ZEALAND HYDROLOGICAL SOCIETY
manatiaki kōawa
rivers
GROUP
A joint technical interest group of Engineering New Zealand & Water NZ
Visit nzhsrivers2020.co.nz for more information

CALL FOR CONTRIBUTIONS

For our newsletter FLOW we are always looking for articles from our membership. Please consider submitting an article, case study, update or notice for the next issue of FLOW.

Deadline for article submission is **30th August 2020**, and please format your contribution as follows:

- Length of 500 – 1500 words, in Microsoft word format (Articles should include name of the author(s), affiliation, titles and section headings and illustrations are strongly encouraged)
- Attach images in jpg (file size 300KB-1MB) and at high-resolution separately
- Provide credits and captions for your images

If you have articles which are longer, please email us.

For our 'Fortnightly Reads' email, you can email us News items, announcements, event details, recognitions, guidelines news – anything of interest for our community.

Please email nzriversgroup@gmail.com to submit your FLOW contributions or any news you want to share through our 'Fortnightly Reads' email. We look forward to receiving your contribution.

RIVERS GROUP MANATIAKI KŌAWA MISSION STATEMENT

The New Zealand Rivers Group Manatiaki Kōawa was formed in 2009 to provide a forum for 'Working together to promote good river management'. It is a place for people with an interest in rivers, flood risk management and the operational and environmental issues of catchments and river systems to come together.

We currently have over 250 members, and promote a multi-disciplinary approach to river management, reflecting cultural and societal diversity in an integrated and holistic manner. Our membership reflects this, with our members coming from a wide range of river management, science and engineering, and planning backgrounds - working as consultants, or in local, regional and central government, research institutes and universities.

New members can sign up here riversgroup.org.nz/joining-the-rivers-group/.

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