flow

manatiaki kōawa
rivers
GROUP

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

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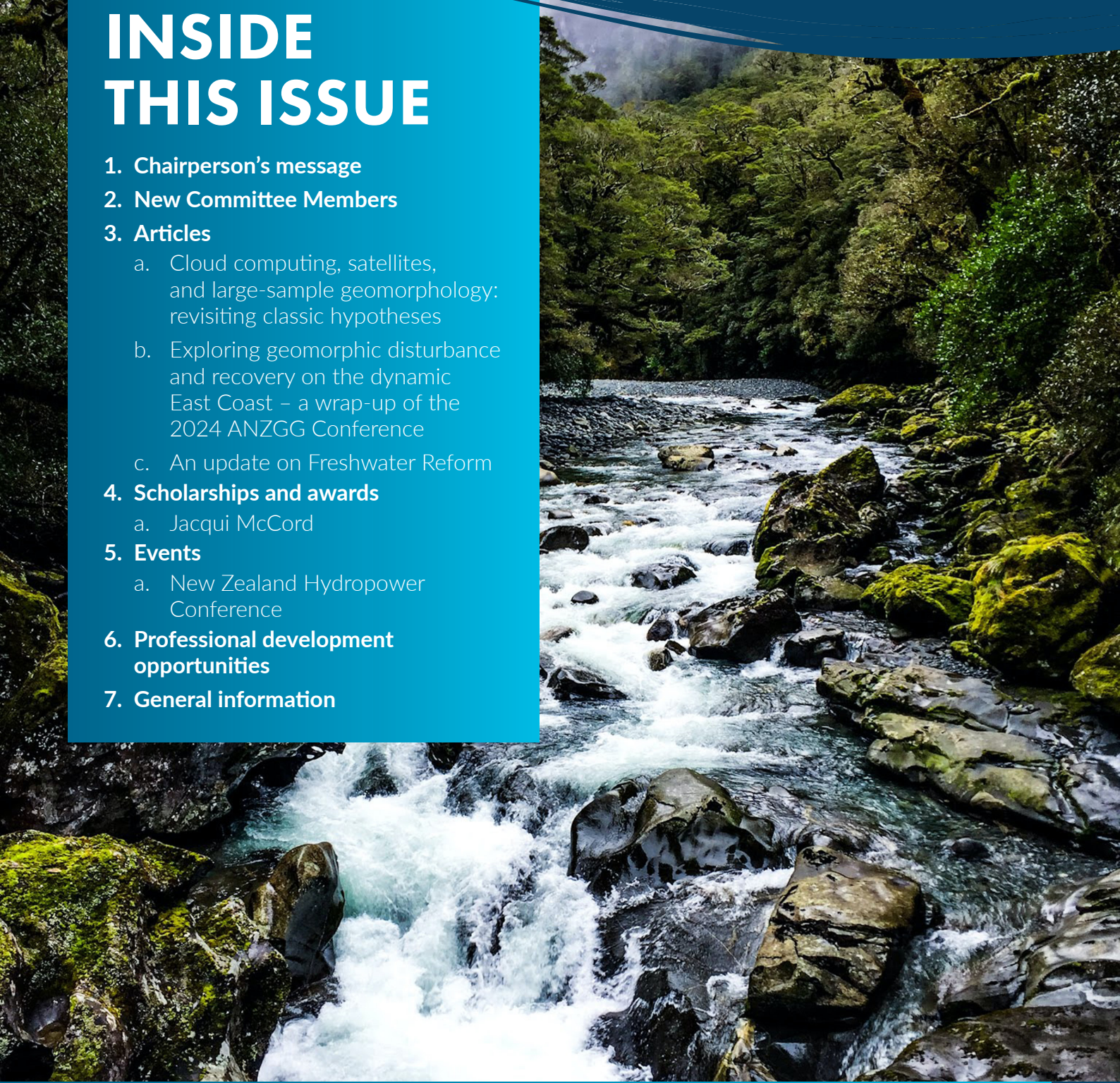

NEWSLETTER

Issue 42 | March 2024

FROM THE CHAIR

Richard Measures

Tēnā koutou katoa,

It seems like a long time since I gave my last update in the December issue of FLOW. I hope everyone managed to get a good break over the Christmas period.

During February, I chaired the Rivers Group Committee's annual face-to-face meeting in Christchurch. This meeting differs from our monthly online meetings and is an opportunity for the committee to have a longer discussion on the group's priorities for the upcoming year. Topics we covered included upcoming conferences, advocacy, Māori representation and engagement, regional events and mentoring. I feel proud to be part of such an enthusiastic and engaged committee and I am excited to see us move forwards on these topics.

Advocacy continues to be a focus for the committee, and with the change in government there are a raft of policy changes which affect river management in New Zealand. I'd encourage everyone to read Nicci's update on freshwater reform (contained in this issue of Flow). In February, we wrote a letter to Minister Chris Bishop to outline our concerns regarding some of the proposed changes to freshwater and resource management legislation.

During the face-to-face committee meeting, we discussed the fact that the timelines to make submissions are often too short for the committee to properly consult all members. For this reason, the committee are developing a draft list of advocacy points which we will refine and circulate to members for feedback. The points which are well supported by the wider membership can then be used as a list of agreed positions to be included in our future submissions. This should pop up in your inboxes in the next few weeks and I look forward to your feedback.

Regional in-person events are something which the Rivers Group used to organise semi-regularly, but they dropped off due to covid restrictions and never really re-started. This year, we're keen to try and get these going again. Events could be social get togethers, talks, mini field trips, or anything really. The aim is to foster local communities of people working on rivers. If you have an idea for a local event, or are willing to help organise something, please get in touch. We have some (modest) funding available to support events (catering etc).

I'd also like to mention the ongoing series of webinars organised by Rachael Armstrong through the Resilient River Communities initiative with some support from the Rivers Group. These are all recorded and there is now a huge resource of previous webinars available online. I'd encourage everyone to check out these webinars and let us know if there are other topics or speakers you would like to see in the future.

Please get in touch via any of the committee members, or to rivers.group@engineeringnz.org if you have any suggestions or feedback regarding the group.

Noho ora mai,

Richard Measures
Chair

NEW COMMITTEE MEMBERS

Alex Sims

Alex Sims is a fluvial geomorphologist for Alluvium Consulting and has recently returned home to Dunedin after spending time studying and working in Melbourne, Australia. Alex developed a passion for rivers and the landscapes they shape while studying geography at The University of Otago. After completing a MSc that focused on groundwater movement in the Southern Alps/Kā Tiritiri o te Moana, Alex completed a PhD in fluvial geomorphology at the University of Melbourne. Alex's PhD research focused on understanding how pulses of sediment generated by floods and historic land use practices migrate through river networks, and how the impacts of that sediment can be managed. Alex has spent the past four years working in consulting as a fluvial geomorphologist, concentrating on mapping, modelling, and managing the impacts alluvial rivers have on society and the wider environment.

Nicci Wood

Nicci joined the Water New Zealand team in September 2022. She has 20-plus years' experience in resource and asset planning and strategy across public infrastructure. Her knowledge and background will be an important asset to the organisation and water sector, providing advice into national, regional and local, infrastructure-related, legislation, strategy and policy. Nicci has a BSc in Geology and Master of Catchment Dynamics and Management.Nicci is passionate about the natural environment and spending time out-of-doors, particularly near water. She loves sparkly seas, warm beaches and snowy mountains. She's a yachty and competes offshore racing out of Te Whanganui a Tara. As well as travelling, Nicci loves to read a good book and cook wholesome food.

Tim Dodd

Tim comes from the rivers of Canterbury and Nelson but now lives in Wellington where he works as a stormwater and stream restoration engineer. Since a young age, Tim has been passionate about urban design, water, and the natural environment. He believes in a sustainable future where our urban and rural spaces have a positive and interconnected relationship with Aotearoa's freshwater ecosystems. Tim combines his knowledge of geomorphology, water sensitive design and resource management policy to help achieve this future. The health of the water is the health of the people is the health of the world.

Cloud computing, satellites, and large-sample geomorphology: revisiting classic hypotheses

Dr. Anya Leenman
Victoria University of Wellington

Geomorphologists have long debated the relative importance of disturbance magnitude, duration, and frequency for shaping landscapes. For channel change during individual flood events, studies indicate that either the cumulative hydrograph[1] or the peak flow[2] matters most – but not both. Such studies of flood-induced channel change tend to draw on small datasets, making it difficult to generalise about the geomorphic effectiveness of different hydrograph shapes.

By using satellites to track channel adjustment, it is possible to build a larger dataset of geomorphic-change observations with which to robustly test these classic hypotheses. Along with collaborators at the Universities of Oxford and Liverpool, I've done so in a recent Geophysical Research Letters paper[3]. We combined 7 years of Sentinel-2 satellite imagery with daily stage (water level) data from 34 river reaches in Aotearoa NZ, Brazil, Colombia, and Russia. By applying automated algorithms in Google Earth Engine, we were able to map these river planforms before and after each flood event and to quantify resulting channel change. We ran our algorithms for a few thousand floods and ultimately built a dataset of ~200 floods with enough cloud-free satellite imagery to map channel change.

In our GRL paper, we draw on this dataset to explore how flood hydrograph shape correlates with the channel change observed. In our dataset, flood-induced channel change (specifically, widening) was best correlated with flood duration, followed closely by the cumulative hydrograph and then by the relative peak height (Figure 1). This ranking was supported by a random-forest regression model, which ranked these predictor variables in terms of their "importance". Ultimately, both our linear and random-forest regressions suggested that, in addition to these hydrograph metrics, estimated bedload transport during each flood was in fact the best predictor of geomorphic change.

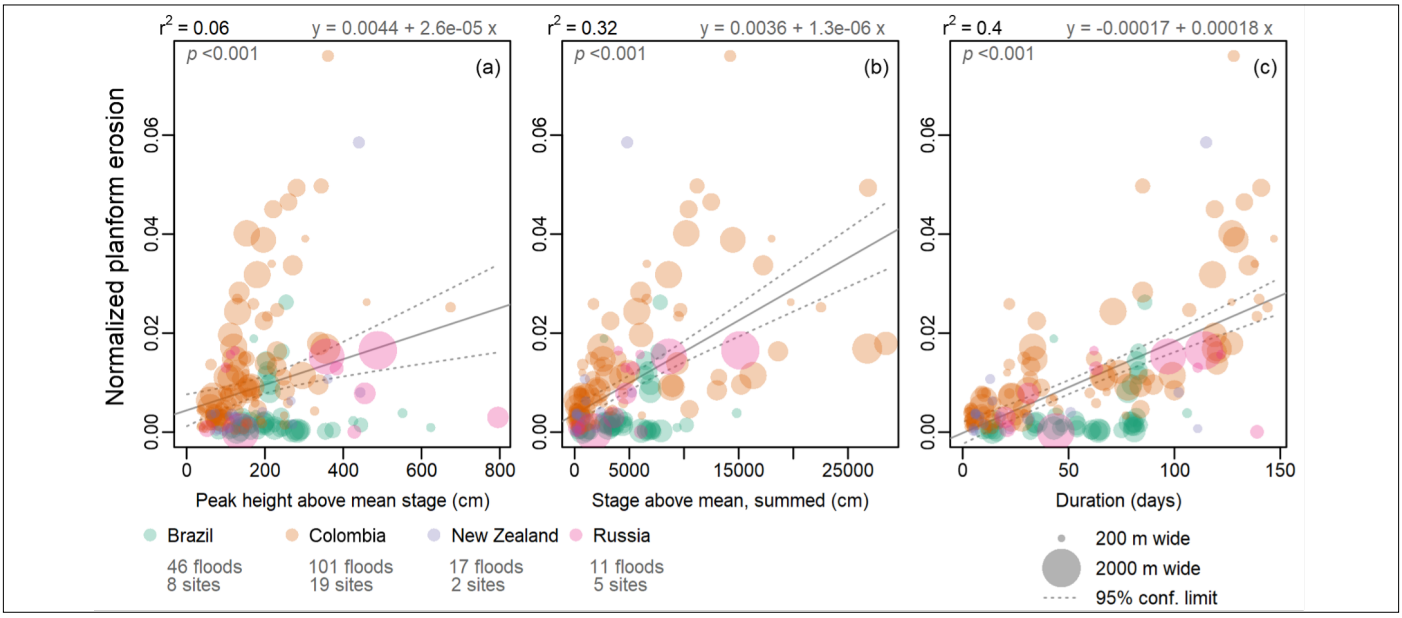

Figure 1: Flood metrics and their relationship to normalized planform erosion during each flood. (a) Flood peak height above the mean daily stage. (b) Cumulative hydrograph (exceeding mean daily stage). (c) Flood duration. Each point represents one event; colours indicate countries; point size scales with pre-flood channel width. Solid grey line: linear regression; dotted lines: 95% confidence limits; regression equations at top-right. r2 and p-values at top left.

A missing "puzzle piece" in this study was the threshold for sediment entrainment. All our hydrograph metrics were expressed relative to the long-term mean daily stage, allowing us to compare between sites. Nonetheless, measuring flood magnitude, total and duration relative to the threshold for sediment entrainment would be more physically meaningful. To get those thresholds for entrainment, we urgently need data on riverbed grain size at each study site.

This brings me to a plea to our community: please send me your riverbed surface grain size data! I am compiling a national database of surface grain size samples. As well as publishing and hosting the database online, I plan to publish a group paper (all who submit data are welcome to collaborate), exploring questions such as: How does surface grain size change over different scales of time and space in Aotearoa's rivers? What are the implications for flow resistance? What are the implications for sediment entrainment and channel stability thresholds? What are the ecological implications? Ultimately, I think this "large-sample" approach in which we pool our data opens up a multitude of additional questions that we can pursue as a community, so please do get in touch.

Get in touch at anya.leenman@vuw.ac.nz or linkedin.com/in/anya-leenman

1 Costa, J. E., & O'Connor, J. E. (1995). Geomorphically effective floods. *Geophysical Monograph-American Geophysical Union*, *89*, 45-56.

2 Middleton, L., Ashmore, P., Leduc, P., & Sjogren, D. (2019). Rates of planimetric change in a proglacial gravel-bed braided river: Field measurement and physical modelling. *Earth Surface Processes and Landforms*, *44*(3), 752-765. doi.org/10.1002/esp.4528

3 Leenman, A. S., Slater, L. J., Dadson, S. J., Wortmann, M., & Boothroyd, R. (2023). *Quantifying the geomorphic effect of floods using satellite observations of river mobility. Geophysical Research Letters*, 50, e2023GL103875. doi.org/10.1029/2023GL103875

Exploring geomorphic disturbance and recovery on the dynamic East Coast – a wrap-up of the 2024 ANZGG Conference

Jacqui McCord
University of Auckland

The 20th biannual Australian and New Zealand Geomorphology Group (ANZGG) conference was held in Tairāwhiti Gisborne from the 12th to 16th February, organised by a team from the University of Auckland, led by Jon Tunnicliffe. Themed 'Geomorphic Disturbance and Recovery', the conference brought together landscape enthusiasts from across Australia and New Zealand, and as far away as the Philippines, USA and Europe, to showcase the latest research and discuss what recovery means in a region that is frequently devastated by disturbance events. As a result of its complex tectonic setting, highly erodible lithology and extensive human alteration of the landcover, the Gisborne region has long been a hotspot for geomorphic research. Impacts of intense rain events from ex-tropical cyclones induce profound landscape change that displaces residents, damages houses and severs vital infrastructure corridors.

Figure 1: Mid conference fieldtrip at the Mangatu Forest in the Waipaia Catchment.

The conference coincided with the anniversary of Cyclone Gabrielle which devastated the area with flooding and land instability. Tens of thousands of landslides have so far been recorded in the region and river systems have been irrevocably changed by erosion and sedimentation. Applied geomorphic research is helping to characterise process areas, triggering factors, system connectivity and sensitivity, landscape equilibrium and recovery times.

There was a total of 81 oral presentations and 21 posters at the conference, with topics that ranged from the impacts of geomorphic disturbance through to hazard assessment, applied geomorphology, methodological advances, aeolian systems and numerical modelling. Masters and PhD students did an outstanding job presenting their research (including a remarkable river dance that induced cheers and encore requests).

To see the impacts of disturbance events and land use change on the region, the mid conference fieldtrip took delegates on a source to sink tour of the Waipaoa catchment where the Tarndale slip has had a dramatic effect on river aggradation. This was followed by a walk of the Gisborne beach front to explore the coastal processes that have shaped the region.

A community forum hosted as part of the conference was titled 'Managing East Coast Landscapes'. This event provided an opportunity to share with the local community findings from local and international research that has be conducted in the region. The forum focused on lessons learnt post Cyclone Bola and how we can use this knowledge to inform management applications to enact better futures. A panel discussion session was specifically structured to hear the voices of the community, who once again are living the reality of their dynamic landscape.

For those who wanted to explore more of the dramatic landscape of Aotearoa New Zealand, Jon Tunnicliffe and Paul Augustinus ran a preconference fieldtrip that took delegates from Auckland to Gisborne, via the coastal East Coast road, to look at the long-term interaction of river and estuarine systems with tectonic movements. Highlights included the Waiapu River and Tapuaeroa River which have been dramatically affected by mass gully complexes causing high rates of aggradation to the rivers. An overnight stay on a marae at Ruatoria presented an opportunity to share stories and perspectives on realities of living with dynamic landscapes. A post-conference fieldtrip ran by Mark Dickson explored landscapes the Māhia Peninsula, Manawatu coastal dunes and Kapiti Coast.

At the conference dinner, Professor Gary Brierley was the awarded the ANZGG medal. This is awarded to distinguished geomorphologists who have made a significant contribution to the ANZGG.

The conference and fieldtrips were a huge success. We extend our thanks to everyone who helped to make it happen.

Figure 2: Nicole Wheeler (Hydrobiology) discussing her research at Bartons Gully in a tributary of the Tapuaeroa River.

Figure 3: Jon Tunnicliffe giving an overview of the landscape of the Waiapu Catchment.

An update on Freshwater Reform

Nicci Wood
Water New Zealand

The information below is correct to the best of the author's knowledge, at the time of publication

2024 – Rapid repeals, rebalancing and Local Water Done Well
The past number of years have been big for reforms of water services – and resource management – in Aotearoa New Zealand. 2024 looks to be no different.

Many waterbodies across Aotearoa New Zealand are degraded and have been for some time. There is a general community desire and expectation that improvements in aquatic health should and must occur. The calls for beaches to be open post rain events this summer are just one example.

Under the current NPS-FM, there is a regulatory requirement that waterbody degradation will be halted and improvements in health made. The RMA requires engagement with communities and stakeholders at each step of the process, including with tāngata whenua. But over the past summer, 'rapid repeal' legislation went through Parliament as part of the government's 100-day mandate. So where does that leave us, and Aotearoa New Zealand's rivers?

We remain in the RMA regime
Prior to Christmas 2023, the Resource Management (Natural and Built Environment and Spatial Planning Repeal and Interim Fast-track Consenting) Act passed through all committee stages, including royal ascent. Gone are the Natural and Built Environment Act and the Spatial Planning Act; we remain in the RMA regime. The government has indicated there will be an RMA amendment bill introduced in mid-2024. The amendment bill will change the application of the NPS-FM's Te Mana o te Wai hierarchy of obligations to consenting. The government has also indicated that there will be a RMA replacement bill to provide for 'enjoyment of property rights', which is expected to be enacted in late 2026.

At this point in the reform process, it is not clear what the intention is or what the practical effect will be of 'rebalancing' or removing the hierarchy of obligations of Te Mana o te Wai. Without addressing or holistically understanding the water environment during the consent process there is a real risk that the effect of granting a consent will be a further degradation, with associated negative wellbeing impacts.

At the time of going to print, a Fast Track Consenting Bill is expected to be introduced into Parliament.

Local Water Done Well
The Government has been moving quickly to implement its Local Water Done Well policies which retain councils' responsibilities for water infrastructure and services.

In mid-February 2024, the Water Services Acts Repeal Act was passed. The Act repeals all legislation relating to water services entities – Water Services Entities Act 2022 (and its associated legislation) and the Water Services Economic Efficiency and Conservation Act 2023.

All previous legislation related to the provision of water services has been reinstated, including Local Government Act provisions. Councils must include water services in their 2024–34 long-term plans, but they can opt to defer their 2024-2034 long term plan by 12 months.

Other water legislation (Water Services Regulator Act 2020 and the Water Services Act 2021) all remain in place for the time-being. This retains the regulation of water services by Taumata Arowai–the Water Services Regulator.

What that means is that the 67 councils (and other water providers like the Defence Force and rural schools) now face much more stringent enforcement of standards to ensure water is safe to drink, and sewage doesn't contaminate the environment.

The legislation disestablishes the Northland and Auckland Water Services Entity, which had been due to be operational by mid-year. Any residual assets, liabilities, and information of that entity are transferred to the Department of Internal Affairs.

The Water Services Act 2021 definition of Te Mana o te Wai which includes "water in any form while in any pipe, tank, or cistern" remains. Te Mana o te Wai remains in the Water Services Act 2021, however any future water services legislation must be consistent with the RMA provisions and any amendments and replacements.

Two further Local Water Done Well bills to progress through Parliament
The Water Services Acts Repeal Act was the first of three pieces of legislation expected this year to implement Local Water Done Well.

The second bill, covering delivery framework and transitional arrangements, is expected to be introduced and enacted by mid-2024.

These arrangements will include the requirements for the plans for the delivery of water services demonstrating their 'financial sustainability'. This starts the clock ticking on a 12-month deadline for local authorities to submit these plans to Government. These plans will require Ministerial approval.

Provisions to streamline the process establishing council-controlled organisations (CCOs) under the Local Government Act are also expected in this bill. This change is significant. The streamlining and the service delivery plan will give councils the option to separate out their water services into "a new type of financially independent council-controlled organisation", if they want to. Councils can do this before the legislation is enacted.

Information disclosure requirements as the first step towards new economic regulation are also expected in this second bill.

The third bill, to be introduced in December 2024 and passed by the middle of 2025, is likely to contain;

- the detail of the economic regulation regime – what are described as a range of structural and financial tools for councils, including the financially independent CCO
- regulatory backstop powers to be used when required, to ensure effective delivery of financially sustainable or safe water services, to allow crown observers or managers to step in
- Refine water service delivery settings to support the new system, including the water regulator's empowering legislation to ensure the regulatory regime is fit for purpose and standards are "proportionate for different types of drinking water suppliers.

Both pieces of legislation are expected to be passed by mid-2025, in time for the local government elections in October 2025.

Putting the Local in Local
Local Water Done Well focuses on the finances, not solving drinking water or freshwater quality issues. The policy will rely on economic drivers to generate change as opposed to Government direction.

There are still questions around how Local Water Done Well will maintain direct council control whilst allowing balance sheet separation; it needs to be one or the other. CCO's need to be free from the council's debt ceiling to borrow more and for much lower price increases for communities.

Some councils and communities will find themselves facing double-digit rates increases under Local Water Done Well. Councils will have to set up CCOs, invest in infrastructure renewal and upgrades, and meet quality and performance standards. Central government has ruled out financial support for councils for infrastructure needs or service delivery or to underwrite any new borrowing. Another lingering question is whether, given the voluntary nature of the scheme, councils with less money and more leaky pipes, or late adopters, will be left out, unable to join a CCO set up by more financially better off – or more progressive – councils. Minister Brown indicated that this aspect of the policy is still being worked through, but such situations could potentially be a candidate for the Government to step in.

In short, the government has put responsibility of drinking, waste and storm waters back on councils. It is up to councils to determine the rate of change, the scale of change (2 or 3 waters) and the shape of change for water service delivery.

The Government is also leaving it for councils and iwi-Māori to develop approaches to ensuring an authentic voice for Māori in decision-making for water. The co-governance legislation may have been repealed, but there's nothing stopping these important relationships and values informing water services delivery. We do strongly encourage local and central government to support iwi/hapū/Rūnanga in policy development, weaving together mātauranga, science, community and tāngata whenua aspirations, and the requirements of national direction. This will ensure that local plans and services consider local kaupapa Māori solutions and deliver better decision-making structures for local communities.

After all, "ka ora te wai, ka ora te whenua, ka ora ngā tāngata | If the water is healthy, the land is healthy, the people are healthy". The prioritisation of the health of water and community needs in decision making remains essential.

Water NZ is a national not-for-profit organisation which promotes the sustainable management and development of New Zealand's three waters (drinking water, wastewater and stormwater). Water NZ is the country's largest water industry body, providing leadership and support in the water sector through advocacy, collaboration and professional development. Its ~3,200 members are drawn from all areas of the water management industry including regional councils and territorial authorities, consultants, suppliers, government agencies, academia and scientists.

Water New Zealand focuses on the technical excellence in the delivery of safe and environmentally water infrastructure and services. We will remain actively involved to ensure the legislation framework, policy process and system design is workable to this end.

SCHOLARSHIPS AND AWARDS

Jacqui McCord | University of Auckland

I'm Jacqui McCord, a PhD student in the School of Environment at the University of Auckland. I began my journey as an engineering geologist, with geomorphology mapping being the highlight on any project I worked on. Feeling a pull away from land development and towards environmental protection, I moved to Morphum Environmental as a geomorphologist where I worked on stream erosion remediation projects. The desire to learn more about rivers took me back to university in 2020 where I began my BSc Honours, focussing on everything geomorphology, including my dissertation on the Mōtū River in Gisborne and special topic study on the Kourawhero River, north Auckland. At the completion of my honours work, my journey felt incomplete, so I decided to pursue a PhD under the supervision of Gary Brierley and Jon Tunnicliffe.

As recent events highlight, flooding is a significant hazard for many communities in Aotearoa New Zealand. There have been increasing calls by scientists, river practitioners and consultants to move towards 'living with living rivers' and giving the river 'room-to-move' across the valley floor, to support self-healing mechanisms that enhance geomorphic recovery. Catchment-specific practices must appropriately contextualise and meaningfully translate international experiences in the design and enactment of room-to-move techniques, taking into account our complex tectonic setting, physiographic variation and comparably short but profound history of anthropogenic impacts upon rivers in New Zealand. The aim of my research is to demonstrate how geomorphically informed catchment scale understandings underpin the application of 'room-to-move' and natural flood management practices for the Tarawera, Rangitāiki and Whakatane Rivers of the Rangitāiki Plains.

This research will draw upon my interest in geology and long-term tectonic evolution of landscapes, with how these influence contemporary processes today and the future evolution of river systems. The Eastern Bay of Plenty is a dynamic region where tectonic forces are creating a rift zone into which the Tarawera, Rangitāiki and Whakatane Rivers flow. In this setting, volcanism, cyclonic storms and anthropogenic modifications have had variable impacts on how these rivers adjust in the landscape today. My research allows for comparison of river adjustment in different landscape settings, to highlight the use of geomorphic context in the design and implementation for 'room-to-move' programmes.

I would like to thank Bay of Plenty Regional Council for their financial and logistical support as I undertake this research. I would also like to thank the Rivers Group for their financial support.

Jacqui McCord has just begun her second year of PhD research into the influence of tectonic and anthropogenic impacts on the forms and rates of geomorphic adjustment of the rivers on the Rangitāiki Plains. The grant will be used to collect field data.

Expect to hear more from the grant winner in future editions of FLOW. If you or someone you know is considering student research relating to rivers and/or catchments in New Zealand, then look out for this year's Rivers Group Student Grants.

EVENTS CALENDAR

NZHG Conference 2024

Join us for this must attend event for all of those in the Hydropower industry! Click here to view the Programme, Presentation Summaries & Speaker Bio's. The conference includes:

- a great line up of speakers
- exclusive site visit to Karapiro Hydropower Station
- opportunity to network with your peers and industry experts
- connect with exhibitors
- top it all off with dinner and tour of the world famous Hobbiton

Standard registration remains open until the conference. Register today!

Call for regional events!

The committee is keen to reignite regional events. If you have ideas for events, please contact our events-focused committee members, Rachael Armstrong and Tim Dodd.

Keep an eye out for more information to come on our membership survey and the 2024 Rivers Group conference.

PROFESSIONAL DEVELOPMENT OPPORTUNITIES

A great resource to find information about professional development opportunities is the Resilient Rivers Communities professional development programme webpage. Make sure to visit the Resilient Rivers Communities webpage for the most recent updates and detailed information regarding upcoming workshops and webinars. Note that past professional development programme webinar recordings can also be accessed on their webpage. And recall that past NZ Rivers Group webinars can be accessed in the NZ Rivers Group members area.

For those interested in the flood risk area, various online training opportunities in the form of digital badges are available on the Āpōpō website. There are 3 courses in the flood risk learning framework starting with WM 104 – Introduction to Flood Risk Asset Management, then taking a deeper dive into key areas with WM 240 – Inspection and Performance and WM 241 – Risk Management and Planning.

CALL FOR CONTRIBUTIONS

We are always looking for contributions from our membership for FLOW. Consider submitting an article, case study, update or notice for the next issue of FLOW. News from the different regions are very much appreciated.

The final submission deadlines for 2024 is:

Issue	#	Deadline for contributions
June 2024 issue	#43	Monday 20 May 2024
September 2024 issue	#44	Monday 19 August 2024
December 2024 issue	#45	Monday 18 November 2024

Please format your contribution as follows:

- Length of around 500–1,500 words, preferably in Microsoft Word format (articles should include: title, name of the author(s), affiliation(s), and section headings. Note that illustrations and/or tables are strongly encouraged)
- If possible, attach figures/images/artwork, eg. in .jpg format, at high-resolution separately
- Provide credits and captions for your figures/images/artwork

If you have articles which are longer, please email us and we will work out a way forward together with you.

Email rivers.group@engineeringnz.org to submit your FLOW contributions or any news you want to share. We look forward to receiving your contributions.

RIVERS GROUP MANATIAKI KŌAWA MISSION STATEMENT

The New Zealand Rivers Group Manatiaki Kōawa was formed in 2009 to provide a forum for 'Working with Rivers'. 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 400 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 online

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