FLOW

manatiaki kōawa
rivers GROUP
A joint technical interest group of
Engineering New Zealand & Water NZ

INSIDE THIS ISSUE

NEWSLETTER

Issue 32 | March 2021

FROM THE CHAIR

Heide Friedrich

Welcome to the 13th year of the Rivers Group existence. We were formed in 2009, and 2021 got off to a very exciting start. It was recently announced that the Resource Management Act (RMA) will be reformed, which is a great opportunity to advocate for 'listening to the river' when working on new policy statements, a phrase Dame Anne Salmond and others refer to when we work with river processes to ensure resilient and healthy riverine environments. A few of us have been working on raising awareness to give *Room for the River*, and a collaborative effort by researchers from the University of Auckland, University of Canterbury, Massey University and NIWA has been recently published in The Conversation, and is re-printed in this newsletter. Please get in touch with us if you want to share your experiences.

The Rivers Group management committee had their annual full day face-to-face meeting earlier in February in Wellington, and besides having a fruitful discussions on how we should engage with the RMA reform processes, we also discussed the impact of Te Mana o te Wai on Councils and other parties involved in ensuring appropriate freshwater management processes in their regions. We understand that 'it is up to communities and councils to consider and recognise Te Mana o te Wai in their regions' can be rather widely interpreted, and we want to work with you, this year and in future, to help with any concerns you might have re its interpretation. Again, please get in touch with us to share your stories.

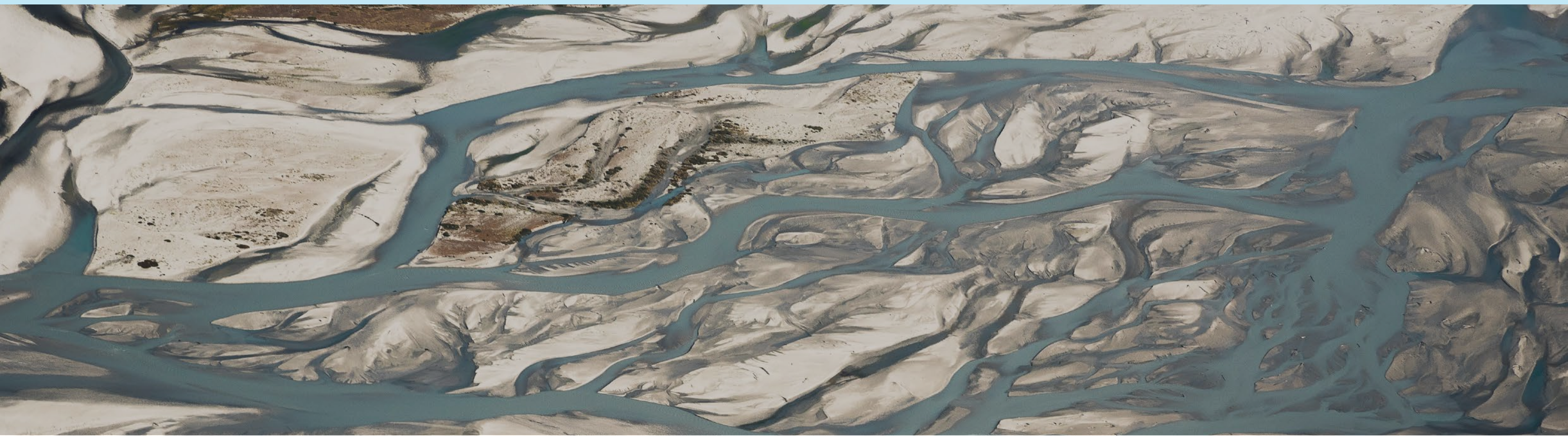
A Rivers Group sub-committee is working on moving forward the organisation of our 2021 Annual Conference, which is dedicated to the *Room for the River*. The conference is scheduled for 17-19 November 2021 in Wellington, please make a note in your calendar, and we aim to share the website with you as soon as we have it set up. We aim to focus on the barriers of implementing *Room for the River* in New Zealand, and welcome any of you to get in touch with us, if you want to be involved in shaping the conference. We also used our February meeting to put the main structure of events in place, which we will bring to you in 2021, being a mix of webinars, workshops and in-person seminars. First off is an exciting 'Picture a Scientist' evening in Tauranga on March 12, which is featuring a documentary and panel discussion on how we can increase our diversity. Especially in the more technical river jobs the number of female colleagues is scaringly low, and it is up to us to make a difference and provide work environments which are supportive for women.

Thank you again to the people who sent us their articles to be published in this newsletter. We are always looking for contributions or articles you want to share, please email nzriversgroup@gmail.com to submit your *FLOW* articles or any news, and keep checking for updates and connect with us through our Website, Facebook, Twitter and LinkedIn.

I hope you were able to have an enjoyable summer break with your family and friends, we are looking forward to work with you in 2021.

Heide Friedrich
Chair

RIVER'S GROUP 2020 AGM – CHAIR'S REPORT



Summary

2020 has been overshadowed by the advent of a global pandemic, which led to major changes in how we work and uncertainty re what is ahead. On the rivers front, a $3 billion fund for infrastructure projects was set aside in the 2020 Budget, of this $210 million is for shovel-ready climate resilience and flood protection projects. Regions hard hit with flooding in 2020, such as Northland, Southland and Otago will receive $12.5 million, $25 million and $5 million, respectively, to help combat future flooding events; Environment Canterbury got $15.5 million for flood protection measures, the Bay of Plenty Regional Council will receive up to $23 million for flood protection infrastructure projects.

The National Policy Statement for Freshwater Management came into force on 3 September 2020, providing local authorities with updated direction on how they should manage freshwater under the Resource Management Act 1991. In April 2020, the Ministry for the Environment released their Our Freshwater 2020 report, detailing the state of Aotearoa's lakes, rivers and freshwater, highlighting the challenges our rivers are facing. More recently, Land, Air, Water Aotearoa (LAWA), with data analysis done by the Cawthron Institute, tested rivers across forest, pasture and urban sites, showing that a large percentage of rivers in rural catchments were under pressure. Something that will stay on our radars for the years to come is how to ensure sustainable water supply in Auckland and Wellington. With the recent Auckland draught, a lot of attention in 2020 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. For Wellington, a report shows that in a worst-case scenario, the region will be running out of water as soon as 2026 https:infocouncil.huttcity.govt.nz/Open/2020/11/WWC_25112020_AGN_2820_AT_WEB.htm.

With so much happening in the freshwater and water regulation space, the Rivers Group provided input into Engineering New Zealand's *Water Regulation Brings Challenges & Opportunities* opinion piece https://www.engineeringnz.org/news-insights/government-investment-safe-drinking-water/. We advocate for the need to work closely with iwi, for infrastructure to be resilient in the face of changing climate and for the requirement to consider the needs of our regions. Any water harvesting from rivers that contributes to water supply, as well stormwater going back into our natural waterways needs to be properly monitored and managed. There will also be a lot of demand on educating the skillsets needed, which will require coordination with education providers.

Internally, we continue to have a very active and engaged committee, with having said good bye to some long-standing committee members in 2019, and welcomed six new committee members on board. Jacqui McCord (Morphum, Auckland) took over as Secretary. I want to thank Edwin Baynes again herewith, who managed to get one of the last flights out of New Zealand in March, to go home to the UK, where he started a new position as lecturer in the Geography and Environment Department at Loughborough University. Hamish Smith (T+T, Wellington) joined us as Events Coordinator. Markus Pahlow (University of Canterbury, Christchurch) joined us as FLOW Coordinator. Jennifer Price (MfE, Wellington) is our Central Government Link. Richard Measures (NIWA, Christchurch) handled already the 2020 Awards and Scholarships, liaising with Ian Fuller (Massey University, Palmerston North) as our Academic Coordinator. We are saying good bye at the AGM to Jo Hoyle (NIWA) and Laddie Kuta (e2Environmental Ltd), both will leave a big gap, having been part of the committee for a long time. With both being very busy in their respective work environments, it shows the demand there is for working together to promote good river management.

This year saw another increase in the group's membership and we continued our communication efforts, concentrating on website revamp, Facebook, twitter and Linkedin as our main communication channels, in addition to the newsletter.

Financially, the group is in a very good position, having made a substantial profit from the 2019 conference. The group's finances are administered by Engineering New Zealand. With changes in Engineering New Zealand, we lost control over our finances and access to our Reserves in 2019. We met with Engineering New Zealand in February 2020, and have now re-established visibility of our Reserves, and agreed that Engineering New Zealand will adjust the Group's Reserves balance by the Group's surplus or deficit for that year once the year-end results are finalised and audited. At the end of FY 19/20, our reserves are thus $95,313.86. To access the Reserves, permission needs to be requested to Engineering New Zealand the financial year prior. In 2020 we asked for permission and got approved to use part of the Reserves ($10,000) in 2021 to financially support workshops to develop the National Stream design guidelines, which Engineering New Zealand also already supports https://www.engineeringnz.org/news-insights/creating-national-stream-guideline/ and workshops to develop a 'room for the river' position paper that decision makers can draw on, linking geomorphology with ecology, policies and reframing of the RMA etc.

The committee continues to struggle to meet the demand for regional events, and I want to thank Hamish Smith for coordinating four very successful webinars in 2020. We continue to seek support from the membership for ideas and volunteers to coordinate events, both virtual as well as in person. I'd like to thank Kyle Christensen for having liaised with the 2020 conference organising committee on behalf of the Rivers Group. This year, getting together in person for our conference must be seen as the biggest accomplishment for everyone involved. From the participants to the organisers, all having done a stellar job working amidst the disruptions and uncertainties. Thank you to on-cue, who have worked with us now to bring you events for many years, it is a major effort making this year's conference happening.

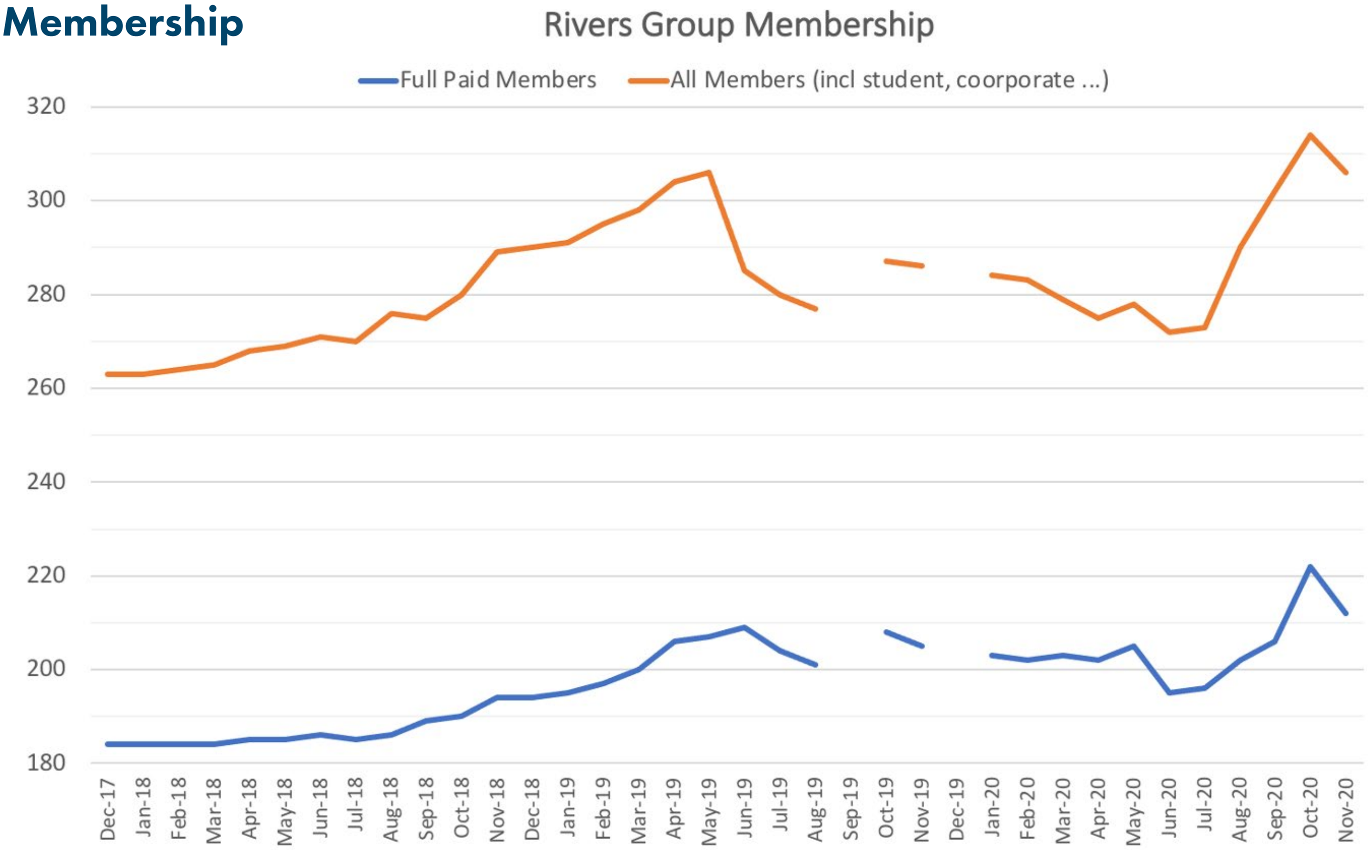
This year everyone in the committee stepped up to help out where needed, last but not least I want to acknowledge the continued support of a passionate, experienced and capable committee.

The group at a glance

The Rivers Group is a community of people with a technical interest in river management, which seeks to develop and share its body of knowledge to influence and facilitate better outcomes for New Zealand's rivers.

We are a joint technical group of Engineering New Zealand and Water New Zealand.

Membership



We continue to see a growth in our membership and our aim continues to increase awareness for the group's existence and activates and to grow our membership base. We aim to get students interested in the group, and look after members in that early career phase.

2020 activities

- Weathering the Storm 2020 conference in Invercargill https://www.nzhsrivers2020.co.nz/
- Webinars in May, June, July and August
- Student events and prizes awarded at Massey and Canterbury universities, Auckland event in April was cancelled
- Student contestable fund
- Newsletter x 4
- Further progressed our communication plan with website, facebook, twitter and linkedin refresh and updates, more regular emails to members
- Engineering New Zealand engagement - provided input into Engineering New Zealand's Water Regulation Brings Challenges & Opportunities opinion piece
- Continued relationship building with River Managers group and other Engineering New Zealand branches and groups

Looking ahead

- Working on collaborating with other groups to bring you more events, especially for our regions
- Increasing access to regional events via sharing presentations and videos to all members
- Update and re-run the popular short course on culvert design
- Speaking tour
- Workshops on developing the National Stream design guidelines and a 'room for the river' position paper that decision makers can draw on
- 2021 conference – details TBD

Thank you to the committee for their efforts throughout the year, I'm looking forward to continue to serve the Rivers Group in 2021.

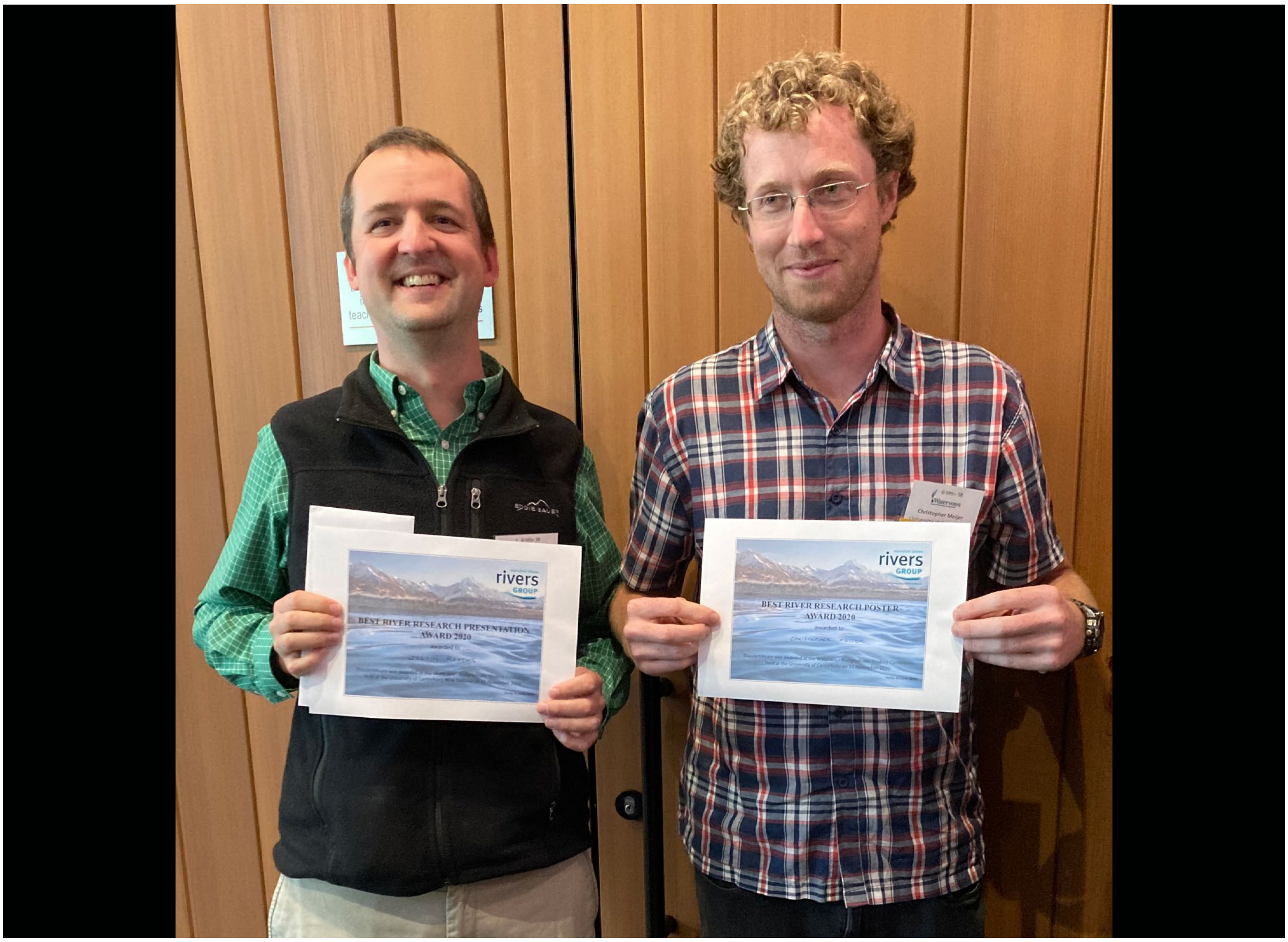
Heide Friedrich, Chair

THE WATERWAYS POSTGRADUATE STUDENT CONFERENCE 2020

In 2020 the conference was held on November 11 in Ta Kauka, Haere-Roa, University of Canterbury, Christchurch, with over 160 attendees from a variety of organisations. The event is free as sponsors provided financial support. The NZ Rivers Group is one of the sponsors of this event.

The Waterways Postgraduate Student Conference allows postgraduate students from the University of Canterbury and Lincoln University to showcase their freshwater related research. The abstract book in pdf format is available here.

Oral and poster presentation prize winners:



Justin Rogers (Justin.rogers@pg.canterbury.ac.nz) (on the left of the phot) for the Rivers oral presentation. Justin's Presentation was titled "Mapping the spatial distribution of fine sediment in large braided rivers – method development in the Rangitata".

Christopher Meijer (Christopher.meijer@pg.canterbury.ac.nz) for the Rivers poster presentation. Chris' Poster Presentation was titled "Investigating the ecology of Inanga (Galaxias maculatus) in Te Waihora".

ARTICLE: REFORMING THE RESOURCE MANAGEMENT SYSTEM

Information provided by the Ministry for the Environment

The Government plans to repeal the Resource Management Act 1991(RMA) and replace it with three new pieces of legislation: the Natural and Built Environments Act, Strategic Planning Act and Climate Change Adaptation Act.

Together this suite of legislation will:

- protect and restore the environment and its capacity to provide for the wellbeing of present and future generations
- better enable development within natural environmental limits
- give proper recognition to the principles of Te Tiriti of Waitangi and provide greater recognition of te ao Māori including mātauranga Māori
- better prepare for adapting to climate change and risks from natural hazards, and better mitigate emissions contributing to climate change
- improve system efficiency and effectiveness, and reduce complexity while retaining appropriate local democratic input.

Between May and September 2021, an exposure draft of the Natural and Built Environment Bill will be agreed by Cabinet and then referred to a special select committee inquiry. The Strategic Planning Bill and Climate Change Adaptation Bill will be developed in a parallel process.

Interested parties are encouraged to participate in the select committee processes. The first one is expected to begin in the middle of this year with the exposure draft of the Natural and Built Environments Act considered by the special select committee inquiry. More information will be provided closer to the time.

Check the MfE website for more info: https://www.mfe.govt.nz/rma/resource-management-system-reform

INSTREAM WOOD AS AN INTEGRAL PART OF THE FLUVIAL SYSTEM

Diego Ravazzolo, PostDoctoral Fellow at the University of Auckland

Rivers are the lifelines of our planet, providing life-sustaining supplies of water and important nutrients for living organisms around the world, including humans, plants, and fish. The main mobile components of a river that control the fluvial processes are water, sediment, and flora and fauna (including instream wood). In relative terms, understanding of processes about water and sediment has increased a great deal, but only recently has instream wood been considered as an integrated part of the fluvial system. The interest on instream wood in rivers has increased only since the 1960s, associating then instream wood with the term “debris”. The term “debris” was first used to refer to wood slash and debris left on the land and in the stream after timber harvest. For this reason, instream wood had a negative reputation to the general public and the early riparian tree and wood management and other management practices on river systems were based on the cleaning of the river corridors, cutting off side channels, and removing the wood from the rivers.

However, like water and sediment, wood supplied to, stored within, and transported by rivers is a fundamental driver of river condition. It can affect water quality, habitat, aquatic and riparian communities and stream stability. For these reasons, over the last few decades, there has been an increasing emphasis on developing river management practices and managers have recently focused on reintroducing wood as engineered structures. However, while an increase in instream wood can be a positive aspect (Figure 1), it can also turn into negative factor when it is transported during flood events. Over recent years, global climate change has increased the frequency and magnitude of extreme weather events, and flood events are the natural hazard determining high impact in term of economic damage in New Zealand and elsewhere. For example, in 2018, an event occurred in Gisborne, New Zealand, when about 40,000 m^3 of wood were transported, clogging channels and covered beaches. Also, in Switzerland in 2005, almost 30,000 tonnes of transported wood caused numerous problems along the channel network. In Chile in 2017, a flash flood event triggered a wood-laden flow, causing the evacuation of several villages, and the loss of one life.

Given the important positive and negative effects of wood in rivers, the quantification of the variations in spatial and temporal terms of instream wood (i.e., wood budget) is essential. This would be concerned with contrast in input, output, and decay of wood, which depend on the interactions between riparian characteristics and fluvial processes governing the instream wood dynamics (Figure 2). However, field studies on instream wood transport dynamics during and following floods are largely lacking mainly for inadequacy of applicable technique and methodology. In particular, instream wood transport dynamics, including travelled distance, transport velocity, anchoring mechanisms, trajectories conducted and fate, are essential for understanding wood accumulation formation, population dynamics, instream wood fluxes and infrastructure and navigation risk (Figure 3).

Unfortunately, such information is still poorly understood. Improved understanding of spatial and temporal variability of wood transport conditions are needed to improve large wood transport prediction and assessments of the susceptibility of catchments to produce large wood. Furthermore, studies on instream wood dynamics are necessary for supporting the choice of better river management practices and river ecology application, as wood transport is a possible key process for in-channel wood redistribution playing an important role to increase the number of habitat for different organisms.

Figure 1. Fish around instream wood, with wood providing a healthy micro-ecosystem

Figure 2. Instream wood resprouting

Figure 3. Instream wood accumulation at a bridge after a flood event occur in Gisborne, New Zealand (A); Instream wood deposited along channel bars and potential source of wood from the riparian area in Piave River, Italy (B).

By Diego Ravazzolo, PostDoctoral Fellow at the University of Auckland (diego.ravazzolo@auckland.ac.nz)

BENEFITS OF FINE SEDIMENT FOR RIVER RESTORATION

Andy Feng and Jamie Culpan; supported by Diego Ravazzolo

We were fortunate to have the opportunity to receive a summer research scholarship at the University of Auckland. This meant spending 10 weeks working with Diego Ravazzolo and Heide Friedrich on their research into riverbeds. In rivers, processes associated with the delivery of fine sediment frequently occur. This may be the result of natural processes from episodic events (e.g., landslides and bank erosion), or anthropogenic events such as from land use in watersheds, gravel mining, sediment release following dam removal, or reservoir flushing. For this reason, the research conducted was focused on understanding the processes that occur when fine sediment is supplied during flood events in a gravel bed river. Particularly, how sand infiltration influences the sediment transport dynamics during flood events.

At the beginning, we had the opportunity to be involved in the design of the experiment setup, which consisted of determining the timing, shape, and magnitude of the flood events to simulate the type of sediment mixtures used, as well as the calibrating the sand supply in proportion to the flow. This process provided invaluable insight for us to understand what really goes into the design of an experiment, there is a lot to take into account. The parameters of the experiment were constantly changed to accommodate the tools we had, but we were eventually able to overcome our problems (Figure 1, flume setup). Overall, 18 runs were conducted, which consisted of over 100 hours of experiments.

Sand infiltration, a vital component of the study, was observed throughout the experiment using GoPros and video cameras. In Figure 2, we show the three phases of the experiment, before sand supply, the peak, and at the end of the flood event. Sediment transport during flood events was collected using a sediment trap close to the flume outlet. This required a lot of sieving, both to remove the sand from the sediment, as well as obtaining the grain size distribution after the sediment had dried.

The laboratory work was cut out for us, and after wheelbarrowing and sieving through hundreds of kilos of sand, we were finally able to see the fruition of our hard work. While the average day at the lab could become repetitive, it was nonetheless fascinating and interesting to observe in small scale the processes that generally occur in natural rivers. A microcosm of the real-world river environment right before our eyes every day. Overall, it was a tough but satisfying experience and has helped us to gain insight into what a research study really entails, and the amount of problem solving that goes into it, something we can take with us, whether we continue the research route or venture into industry.

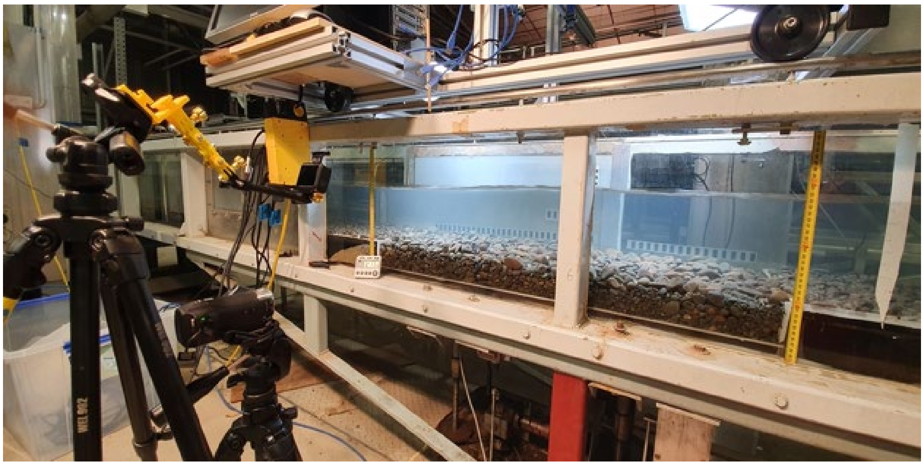


Figure 1. Flume Setup

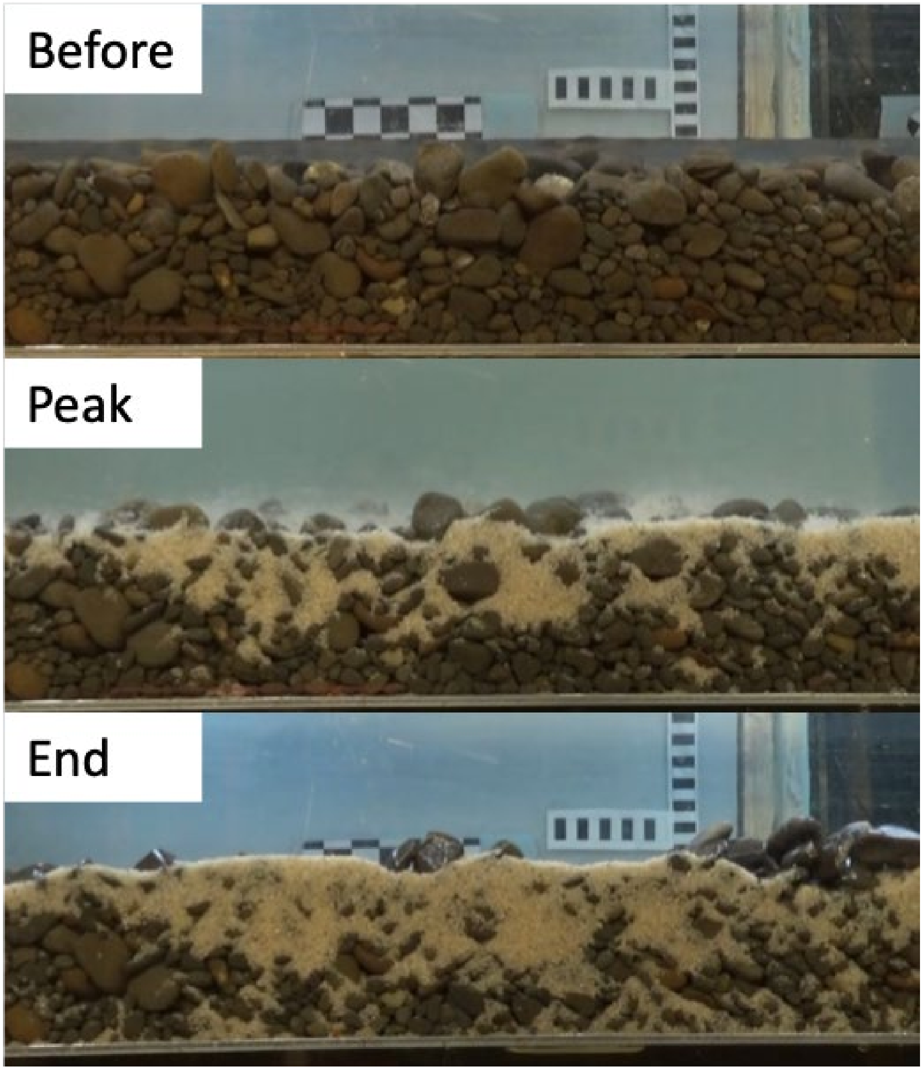


Figure 2. Example of sand Infiltration before, at the peak and at the end of the flood.

By Andy Feng (contact afen216@aucklanduni.ac.nz) and Jamie Culpan (contact jamieculpan.jc@gmail.com); supported by Diego Ravazzolo (contact diego.ravazzolo@auckland.ac.nz).

INTRODUCING A HYDROPOWER RESERVOIR OPERATION ROUTINE INTO A SPATIALLY DISTRIBUTED HYDROLOGICAL MODEL FOR THE MANAGEMENT OF MULTIPLE RESERVOIR SYSTEMS

Jayandra P. Shrestha, University of Canterbury

Hydropower is the dominant form of renewable energy in the world. According to the 2020 report of International Hydropower Association (IHA), the total installed hydropower capacity worldwide has reached 1308 GW (Gigawatt) in 2019, generating 4306 TWh (Terawatt-hour), which accounts for about 17% of the total electricity generated. Hydropower is generated by converting potential hydrostatic energy into electricity. The operation of a hydropower reservoir depends on the natural hydrologic system and energy generation target. However, climate change and land use change could alter hydrologic regimes, which could consequently affect hydropower generation. In addition, suspended sediment in the water flow enters into a reservoir and can deposit in the reservoir. The deposition of sediment in a reservoir reduces its storage capacity that threatens the sustainability of the reservoir. Furthermore, the trapping of sediment in a reservoir decreases the release of sediment from the dam which impacts the downstream sediment regime. Nevertheless, we can manage reservoir sedimentation by implementing one of these methods: reducing sediment inflow from upstream (catchment management, bypassing and check dams), minimizing sediment deposition (sluicing and routing), and removal of reservoir sediment (flushing, dredging and hydrosuction) after it has been deposited. Therefore, scientists and researchers have been using various modelling tools to simulate and analyse catchment hydrology, as well as reservoir operations and sedimentation, for the better management of the hydropower reservoir.

Current assessment of hydropower reservoir management entails three key steps: flow and sediment estimation with a hydrological model (e.g. SWAT - Soil and Water Assessment Tool), reservoir operation modelling and sediment management modelling. This approach, however, is time-consuming to set up and leads to challenges regarding simulating the impacts of interrelated processes such as climatic conditions, land use changes and operational policies on the flows, sediment and hydropower production. Moreover, multiple reservoirs in a catchment and their dependencies add complexity to flow and sediment management. Therefore, a single model that can simulate hydrological processes, reservoir operations and sediment management at the river basin scale is warranted. Hence, the main objectives of this study are to develop a new hydropower reservoir operation routine for the spatially distributed SWAT hydrological model and apply it to the case study site to better understand the management of multiple reservoirs in the catchment.

A new modelling routine called Reservoir Operation and Sediment MANagement (ROSMan) was developed within the framework of the SWAT model. It calculates the water balance of a reservoir and energy generation of a hydropower plant using predefined operational policies such as rule curves. It has functions to estimate sediment accumulation in multi-reservoir systems, and its impacts on the storage capacity and hydropower production of the reservoir under user-specified operational policies. Furthermore, it allows to compute the restoration of storage volume due to the removal of sediment by flushing (removal of sediment from a reservoir by passing water and sediment through flush gates located at the low level of a dam) and sluicing (passing sediment before suspended sediment solids have settled down in reservoirs). Firstly, the developed routine was applied to assess the impacts of climate change and operational policies on hydropower production. Secondly, we applied it to quantify the change in the natural hydrologic regime due to reservoir operations. Thirdly, we assess reservoir sedimentation due to reservoir operations for 100 years and implemented sediment management techniques for effective release of sediment through multiple reservoirs to the downstream regime, as well as better management of hydropower production.

The developed routine was applied in the Sekong, Sesan and Srepok river basins, collectively known as 3S basin, of the lower Mekong. The Mekong basin is one of the biodiversity hotspots in the world, yet hydropower reservoirs are being planned and developed at a rapid pace. The 3S is the largest tributary system contributing about 20% of flow to the lower Mekong Basin. The transboundary 3S basin (Figure 1) is located in Southeast Asia with a catchment area of 78,650 km^2, of which 37% (28,950 km^2), 24% (18,800

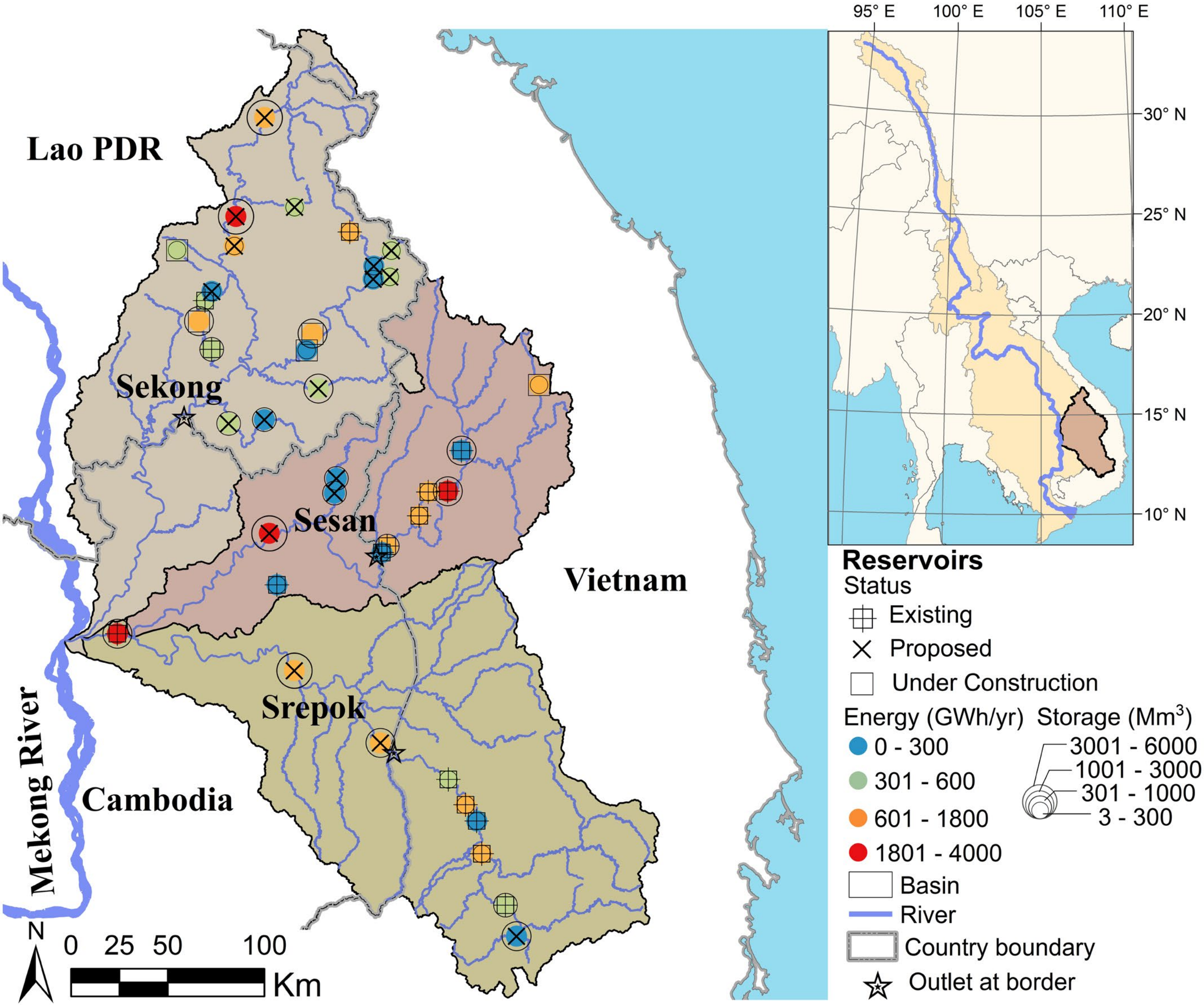


Figure 1. Location map showing the river network, energy production and storage capacity of each existing, proposed and under construction hydropower reservoir in the Sesan, Srepok, and Sekong (3S) river basins of the Mekong.

Our results showed that the impacts of climate change on hydropower production will be minimal with compared to changing operational policies in the 3S basin. Furthermore, the calculation of hydrological alteration indices revealed that the natural flow and sediment regime could be altered significantly by due to reservoir operations. These alterations can adversely affect ecological dynamics, in particular, habitat availability of fish and other aquatic lives.

Subsequently, we applied ROSMan to assess and manage reservoir sedimentation in the multi-reservoir system of the 3S basin. The results showed that operation of reservoirs will significantly trap sediment loads and the most affected reservoir due to sedimentation can lose up-to 39% of its original capacity. The implementation of individual sediment management in the multi-reservoir system demonstrated ineffective and inefficient when sediment management techniques, particularly flushing, are operated in an uncoordinated manner. Therefore, sediment management techniques should be operated in coordination in a multi-reservoir system i.e. managing the sequence, timing and frequency of operation. System-wide sediment management coordination simulations demonstrated that bi-annually and 5-yearly flushing of alternate reservoirs are effective options for efficiently releasing sediment from the reservoirs.

ROSMan expands the functionalities of the SWAT hydrological model to allow for comprehensive assessment of the operation of complex reservoir systems under land use and climate change.
The methodology and tools presented here may prove useful in applications in New Zealand since hydroelectric power is a key part of New Zealand's energy system.

Author bio: Jayandra P. Shrestha is a PhD candidate at the Department of Civil and Natural Resources Engineering, University of Canterbury and working on the modelling of hydropower operations in a complex hydropower setting of the Mekong basin. Prior to arriving in New Zealand in 2017, he worked on a wide variety of civil engineering projects in Nepal, including hydropower planning, design and construction, hydrological and hydraulic modelling. He completed his MSc at the Norwegian University of Science and Technology, Norway and gained a Bachelor's degree in Civil Engineering from the Tribhuvan University, Nepal. His main research interests are hydropower operations, reservoir sedimentation, and hydrological and hydraulic modeling.

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RIVERS GROUP EVENT CALENDAR

In February the rivers group committed to a busy 2021 events calendar. The events calendar kicks off with the co-hosting of a screening of "Picture a Scientist" in Tauranga, a feature-length documentary film chronicling the groundswell of researchers who are writing a new chapter for women scientists. For those interested in hosting similar events in their local town, get in touch. We are always keen to support local members to organise their own in person events, and we have lots of support from ENZ available.

A number of in-person events are also planned this year, including workshops on Te Mana o te Wai and fluvial geomorphology.

Webinars

This year, Rivers Group Webinars will be held the last Wednesday of every month (dates are listed below). The first webinar will be on 24 March and is presenting will be Kyle Christensen, formal chair and frequent contributor, details will be out on the website and social media soon (as well as the mailing list). We have a few open slots in the second half of the year, get in touch if you'd like to present!

- 24-Mar
- 28-Apr
- 26-May
- 30-Jun
- 28-Jul
- 25-Aug
- 29-Sep
- 27-Oct
- 24-Nov

Conferences

The rivers group conference will be held this year in Wellington in November or December with details to be released in the next conference organising committee in March.

Third Party Events

The rivers group will be publicising events from third parties that we believe our members will be interested in, from flood modelling to RMA reform on social media and our website. Keep a lookout for these. Also, please send links our way so we can share with our community.

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.

Issue	#	Deadline for contributions
June 2021 issue	#33	Monday, 17 May 2021
September 2021 issue	#34	Monday, 16 August 2021
December 2021 issue	#35	Monday, 15 November 2021

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.

Please email nzriversgroup@gmail.com to submit your FLOW contributions. 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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