manatiaki kōawa

rivers GROUP

A joint technical interest group of IPENZ & Water NZ

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NEWSLETTER Issue 19 | September 2017

FROM THE CHAIR

Kyle Christensen

WELCOME to Issue 19 of the Rivers Groups Newsletter, "Flow", our third for 2017.

As we welcome the first days of Spring across the country the rest of the world is being hammered by massive floods. Since the 1st of September the following headlines provide a summary of what has happened around the world -

USA – Hurricane Harvey Leaves 7,000 Homes Destroyed, 35,000 in Shelters

Pakistan – Flash Floods and Heavy Rain Leave 20 Dead in Sindh and Punjab Provinces

UK – Emergency Rescues After Flash Floods in South West England

Nigeria – Thousands Displaced by Floods in Benue State

Italy – Deadly Floods in Livorno After 250mm of Rain in 2 Hours

USA – Hurricane Irma Causes Major Flooding in Northern Florida

Croatia – Floods in Zadar After 280mm of Rain in 24 Hours

Philippines – Floods in 3 Regions After Tropical Storm Dumps 500mm of Rain in 24 Hours

Vietnam – 100,000 Evacuated as Cyclone Doksuri Brings Flooding Rain

Along with the significant floods that we have experienced across NZ this year it is becoming more apparent that we need to be accelerating our efforts to better manage large flood events and that we should expect these large events to occur more frequently. Very careful consideration is needed on how to best manage larger flood events where part of the flood risk to a community is managed through stopbanks. Simply increasing the height of stopbanks, especially where they have been built many decades ago with limited control of the earthworks, should not be the default option.

The further confinement of flood waters can increase the risk due to the increased consequences of failure through deeper faster water from a breach combined with more intensive floodplain development due to the perception of higher levels of protection. The risk of piping and other geotechnical failure mechanisms also increases with increased depths of water between stopbanks. The issues with higher and higher stopbanks were clearly highlighted in Neil Ericksen's 1986 – Creating flood disasters?: New Zealand's need for a new approach to urban flood hazard management. Neil spoke at the Rivers Group symposium in 2013 and he concluded that we hadn't really heeded the advice from 1986. Elsewhere around the world, and especially in the Netherlands https://www.ruimtevoorderivier.nl/english/ the more modern approach has been to widen rivers and create offline spilling compartments to "make room for the river" rather than try and force it into narrower and higher floodways. To encourage more discussion around the use of this philosophy for managing larger floods in NZ rivers we have a special session at this years symposium http://isrs2017.com "Making Room for Rivers". This will be a great session along with the many other interesting papers from around NZ and the world that are going to be on offer at the symposium. I hope to see many of you at the symposium and if you can't make it for the full duration I would recommend Wednesday as the best day to attend. There are also a number of Regional Events in the coming months across the country http://www.ipenz.org.nz/riversgroup/Events.cfm for members and others to get together and discuss and share ideas.

Kyle Christensen
Chairman

TOWARDS UNIFORMITY IN FLOOD MAPPING

Mike Law, Senior Associate – Water Resources

Beca Ltd

ABSTRACT

For a country of New Zealand's relatively small size and population, the lack of uniformity in development and presentation of flood maps across the country is striking. In parallel to efforts to promote country-wide uniformity in rainfall-runoff modelling, and drawing on examples and experience from around New Zealand and overseas, a case is presented for greater uniformity in flood mapping and clarity in communicating flood risk.

Flood maps are developed for a range of uses, including high-level hazard identification, integrated catchment management planning and District Plan hazards management.

Terminology and the content of information presented on flood maps differ across the country.

Knowing that a map is showing the flood depth and extent does not in itself explain the level of modelling detail and reliability; was the model a simple 2D only rain-on-grid model, or a fully coupled model representing piped networks, open channels, structures and floodplains, and what were the underlying assumptions and constraints? Beyond the raw model output, different approaches are adopted for the inclusion of freeboard or identifying flood sensitive margins.

In addition to their use by stormwater practitioners and planners, the communities we serve are also interested, especially where they are at risk of flooding or it might affect property value and options. Flood maps are a key tool for communication, so communities need to understand the flood maps and have confidence in them.

For this they need to be accessible; an internet search for "flood maps" rarely delivers the desired result. Uniformity of flood mapping terminology and consistency of how councils make their flood maps available would assist, both for community understanding and to assist less well-resourced councils.

Moving towards a uniform approach would result in councils relinquishing local control of flood map specification, but should provide tangible benefits to the country as a whole.

FULL PAPER

To view the full paper, Click Here

KEYWORDS

Flood mapping, national policy, community communication

PRESENTER PROFILE

Mike has 27 years' experience in flood risk management and modelling, hydrology, and water resources, both in the UK and New Zealand. He joined Beca's Christchurch office in 2009, and has undertaken a wide range of hydrological investigation and flood modelling projects throughout New Zealand, Australia, and the Pacific Region.

THREE AGENCIES WORK CLOSELY TOGETHER

Sue Faulkner, Project Coordinator, Flood Plain Protection
Greater Wellington Regional Council

The RiverLink project reflects intense co-operation between its partners Greater Wellington Regional Council, Hutt City Council and the NZ Transport Agency.

While each partner has a particular focus – flood protection for Greater Wellington; urban rejuvenation for Hutt City; and better regional transport links for the NZ Transport Agency, each agency relies on the other. As a result, we are increasingly coordinating our discussion and decision-making to ensure all parts work together to deliver the benefits recognised by RiverLink to the people of Lower Hutt.

Take for example, improving river flow through the tight narrows under Melling Bridge is vital for flood protection and effectively requires the bridge to be replaced. However, doing so will fundamentally affect transport links into Lower Hutt gateway, which raises questions for the NZ Transport Agency about how any future SH2 interchange could be integrated with a new bridge. The location for a new bridge and its potential effect on traffic flows within Lower Hutt's city centre is also of key interest to Hutt City Council's transport team who manage the local road network for cars, cycles, buses and pedestrians.

City rejuvenation is also touched by each partner. Greater Wellington's stopbank design needs to account for the aspirations of Hutt City Council's transformational Making Places strategy, as does the interface between local streets and the stopbanks, and improvements to the SH2 intersection at Melling, all of which will support Hutt City's future and growth.

They are just some of the examples of interdependency, there are many others, and as we move closer to final designs strong links between the partners will be vital.

"Ultimately, continued tight coordination between partners is beneficial to the delivery of RiverLink. The increasing progress we're making is a great reward for the additional complexity of working together. Our original promise to the fourth partner in the project, the community, was that the sum of our activities would be greater than its parts. I believe, as the project takes shape, that we are on course for honouring that promise "says Hutt Valley Flood Management Subcommittee Chair, Cllr. Prue Lamason.

CLIMATE CHANGE RISK ASSESSMENTS – WHAT CAN NZ LEARN!

Liam Foster, Opus International Consultants

Greater Wellington Regional Council

ABSTRACT

'Globalization is changing the nature of risk. Natural and social systems – from climate to energy, food, water and economies – are tightly coupled. Abrupt changes in one have a domino effect on others. Floods in Thailand in 2011, for example, led to a global shortage of computer hard disks as a result of factories closing, as well as more than US $330 million in damage and around 250 deaths'1.

This paper will seek to share the lessons so painfully learnt across the world over recent years and how unprepared communities, businesses and infrastructure actually is for extreme flood risks and rainfall that seem to be occurring with greater regularity. The author will seek to share that there is a common lack of readiness to effectively managing the evolving risks of today. For example, PwC research has identified that asset management decision making is largely driven by human judgement/decisions – which is looking to be a dangerous tactic in a time of unprecedented uncertainty.

With this in mind, it is obvious we need to take steps to change our approach and become more resilient to uncertainties, particularly against a growing backdrop of asset interconnectedness. The outcome of which is that the flooding impacts are exponentially growing, with the impacts cascading through other infrastructure, in other words, the domino effect.

The paper will showcase how investing in practical resilience measures through to a complete rethink of the approaches to risk, resilience and ongoing planned maintenance can help minimise impacts of these events and keep communities and businesses going.

It is clear that there is the need for a new and comprehensive, long-term strategy to address flood risk across New Zealand, which should seek to encourage everyone to own their risks as much as local and national government.

KEYWORDS

Resilience, Climate change, domino effect, preparedness, long term strategy, flood risk assessments

INTRODUCTION

Our economy and society depend on a secure supply of services such as electricity, telecommunications, water, healthcare and transport. Across many countries, many of these essential services are delivered by the private sector, within regulatory frameworks set out by Government. These frameworks specify the responsibilities of private sector operators to deliver a reliable and resilient services.

[1]Erisman et al (2015) 'Global change: Put people at the centre of global risk management', Nature, March 015

Recent events have exposed weaknesses in the resilience of national infrastructure to some natural hazards, such as flooding. Across the world, national governments are seeking to understand their current and potential exposure to the vagaries of the current and future climates.

These represent both a risk and an opportunity moving forward and a Climate Change Risk Assessment undertaken at regular intervals enables the identification of the current status and where there are gaps in knowledge that are required to be better understood to help direct the scientific and business community to help achieve the overarching goals of any climate change legislation, namely to better understand the risks and enable the nation and its communities to face into and thrive into the future as opposed to be continuously exposed to negative impacts.

A key element of how countries, communities, individuals and corporate organisations can survive and thrive into the future is to understand the potential range of risks and opportunities that can present themselves and position themselves to adapt to these changes best. The climate change risk assessment is one such tool that can help this identification phase as well as point to simple 'no-regrets' investments that can help to safeguard future infrastructure service potential.

FULL PAPER

To view the full paper, Click Here

USING NEW LASER TECHNOLOGY TO MEASURE BANK EROSION

Jo Hoyle, Jo Bind
NIWA

Fine sediment is NZ's most widespread contaminant, degrading ecosystems and impairing recreational, cultural and aesthetic values in our rivers, estuaries, and coastal seas. NIWA's Managing Mud research programme is focused on this issue, exploring the sources, characteristics, dynamics, and fate of fine sediment in NZ's rivers and estuaries in order to provide knowledge, methods, and tools to assist managers and policymakers to implement government policies (i.e., NZ Coastal Policy Statement, National Policy Statement for Freshwater Management) that aim to maintain and improve environmental and cultural values in waterways impacted by sediment.

A key source of fine sediment in NZ's rivers and estuaries is river bank erosion. Traditional methods of measuring bank erosion have struggled to accurately capture volumes of erosion at a reach scale, making it difficult to quantify the relative contribution of bank sediment to the system. Traditionally, bank erosion has been monitored using cross section surveys or erosion pins. These approaches may adequately capture bank erosion at each cross section or pin location, but will miss bank changes between cross sections. The relatively recent development of Terrestrial Laser Scanners (TLS) has transformed our ability to capture high resolution and high precision measurements of bank erosion measurements. However, TLS operate from a fixed location and the length of bank that can be scanned from a single set up is limited. Also, this method uses a single laser, which provides a single view of the bank. This means that the bank can often be obscured by vegetation. Recent advances in mobile laser scanners show potential to transform our ability to measure bank erosion.

NIWA has recently purchased a LiDAR USA Scanlook 2.0 mobile mapping system (Snoopy), which is a miniaturised LiDAR scanner integrated with GPS and an inertial reference unit (Figure 1). This scanner can collect high precision, high resolution data on the move. The scanner's array of 32 lasers span a 40 degree field-of-view, which minimises shadowing effects caused by vegetation and other physical obstacles. It is ideally suited for rapidly surveying dry areas of river channels, and its small size and weight allow deployment on a range of platforms (e.g., 4WD vehicle, backpack, jet-boat, Unmanned Aerial Vehicle).

Figure 1: NIWA's LiDAR USA Scanlook 2.0 mobile mapping system (Snoopy)

NIWA is currently using Snoopy, deployed on a jet boat (Figure 2), to measure bank erosion in a 5.8 km study reach of the Oreti River in Southland. For each survey the reach is scanned twice, capturing very high resolution (300-3000 points per 1 m radius) and high precision data on the state of the banks (Figure 3), all in under 30 minutes. Making two passes of the study reach provides twice the data but, more importantly, also allows us to establish error models, enabling us to confidently assess what change is real during future repeat scans. Repeated surveys over time can be used to monitor bank retreat (e.g. Figure 4) and calculate volumes of erosion. The intention is to use measured volumes of bank erosion along with monitored suspended sediment data to develop a sediment budget for the reach, improving understanding of the dynamics and relative sources of fine sediment.

Figure 2: A zoomed in view of the point cloud data collected by Snoopy along the Oreti River.

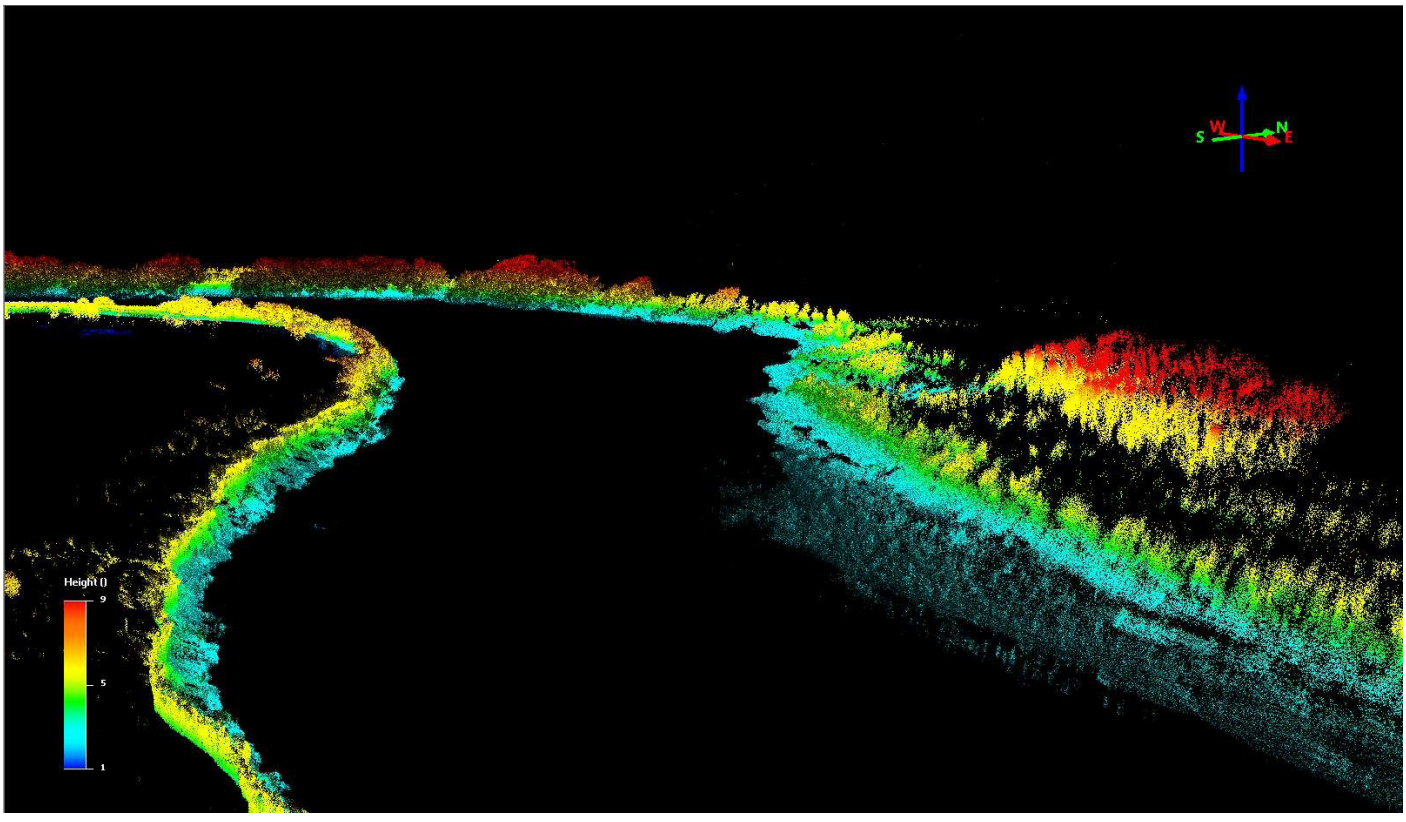


Figure 3: Snoopy mounted on a jet boat

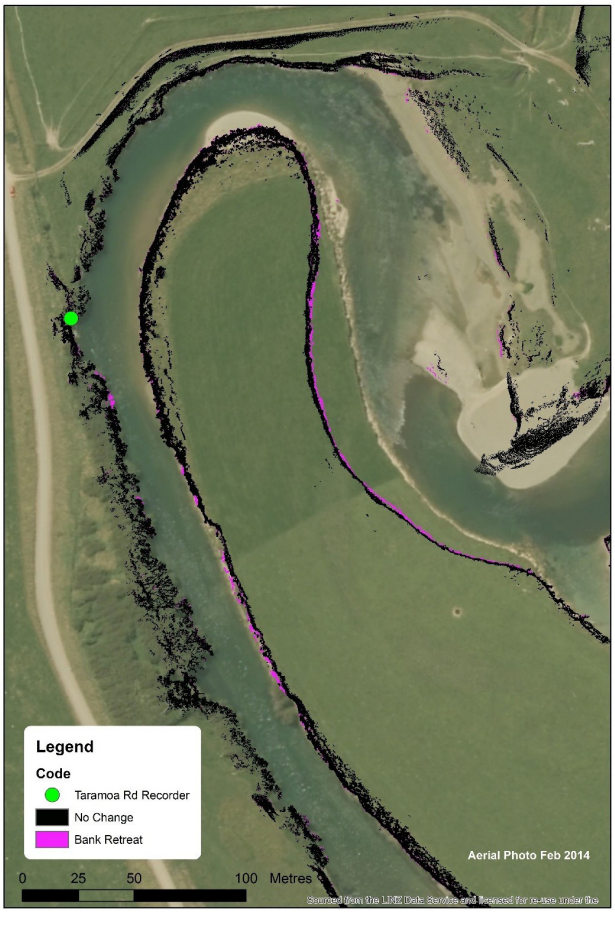


Figure 4: Example of bank retreat between June – August 2017 on the Oreti River, captured by repeat Snoopy scans. Longer term changes are clear from the 2014 aerial photograph.

WELLINGTON REGIONAL EVENT AND MASSEY STUDENT EVENT
August 2017

Wellington Regional Event

Opus kindly hosted 50 of us for an evening event in Wellington in August. Following pizza and drinks ("networking"), we heard from two presenters. First up was Rebecca Polvere from Greater Wellington Regional Council. Rebecca presented on the Riverlink Project, which is a joint effort between GWRC, Hutt City Council and NZTA to deliver better flood protection, transport links and urban form in Lower Hutt. Paula Warren from DOC then took us through the legalities of river ownership and restoration – which had some surprises including how often the ownership of river beds is unknown or assumed. The presentations were well received and we were hungry for more information in the many questions that followed!

If you missed it the presentations can be found here:

Presentation to Rivers Group:
https://ipenzproduction.blob.core.windows.net/cms-library/docs/default-source/temporary-file-storage/presentation-to-rivers-group.ppt?sfvrsn=2

RiverLink Aug:
https://ipenzproduction.blob.core.windows.net/cms-library/docs/default-source/temporary-file-storage/river-link-aug-2017.pdf?sfvrsn=2

Massey Student Event

The Rivers Group have again supported the rivers related programmes campus run by Ian Fuller and Russell Death at Massey University Palmerston North.

The Rivers Group hosted a BBQ at Massey for the students and staff following presentations of certificates to the top students in their respective courses and an address by Amanda Death on her career path into river Management. A great turnout of about 40 students and staff enjoyed the event.

A big thank you to Amanda who gave a very interesting and challenging address to the students on her career path so far in the fields of river management. Amanda is currently and Environmental Planner with the Greater Wellington Flood Protection Group

The top students' awards this year went to:
- Hannah Walters – River Management
- Ella Whale – River Processes
- Anna O'Hara – Top 200 level student

WHAT'S ON

2017 EVENT CALENDAR

An exciting range of events are being planned by the Rivers Group committee for this year, these include:

Location	Event	Type	Timing	Further Information
Wellington	The Rivers Group invites you to join us for a social get-together and some presentations on exciting river-related projects and ideas. Our speakers will cover an interesting range of river-related topics and challenges: The Riverlink Project - Rebecca Polvere, Greater Wellington Regional Council & Taking Ownership: The legalities of River Ownership and Restoration - Paula Warren, DOC	Public Event	Tuesday 29th August 2017, 5.00pm - 7.00pm	mark.hooker@gw.govt.nz
Christchurch	Waterways Centre Postgraduate Student Conference that showcases student's freshwater related research. Student prizes will be presented from the Rivers Group.	Student Event	14th November	http://waterways.ac.nz/conferences_workshops/pgstudentconf.shtml or suellen.knopick@canterbury.ac.nz
Christchurch	New Zealand's rivers: Can we learn from history? Presenter: Dr Catherine Knight	Public Lecture	Wednesday, 20 September 2017, 7.00pm - 8.00pm	http://www.canterbury.ac.nz/ucconnect/
Wellington	Talk Environment Bringing together Engineers, Architects, Planners, Urban Designers, Landscape Architects, Scientists, Contractors, Surveyors and more. Meet professionals from across the region and celebrate the environment we have all helped to create.	Public Event	Friday, 29 September 2017 5.30pm - late	http://www.talkenvironment.co.nz/
Auckland	Two day short course on Geomorphic Principles and Applied Techniques in River Management at Auckland University	Course	16-17 November	j.tunnicliffe@auckland.ac.nz
Auckland	Auckland University Symposium where the Stephen Coleman Prize will be presented	Student Event	November	j.tunnicliffe@auckland.ac.nz
Hamilton	ISRS/NZFSS/NZRG 2017 Conference - Integrating Multiple Aquatic Values. 5th Biennial Symposium of the International Society for River Science.	Technical Conference	19-24 November	http://isrs2017.com/

WHAT'S ON

LUNCHTIME SOCIAL AND PRESENTATION
Wellington Regional Event
4 October 2017

The Rivers Group invites you to join us for a lunchtime presentation on New Zealand's Rivers: can we learn from history?

When: 12:30-1:30 pm, Wednesday 4 October (talks start at 12.45pm)
The Rivers Group will put on some coffee and cakes to accompany your lunch.

Where: Beca, Level 7, 85 Molesworth St, Thorndon, Wellington
Who: Rivers Group members and other professionals with an interest in rivers
Cost: Free for Rivers Group members, others please drop a koha in the jar

Please bring along your lunch and enjoy an interesting talk over your lunchtime! The Rivers Group will provide cakes, fruit and coffee to accompany your lunch.

Catherine Knight - New Zealand's Rivers: can we learn from history?
In February this year, the government announced a proposal to make more of our rivers 'swimmable' by 2040 – it attracted significant controversy, reflecting the sense of urgency that many New Zealanders feel about the perilous state of many of our waterways. In this talk, Dr Catherine Knight, author of New Zealand's Rivers: An environmental history, will provide important context to this debate by exploring some of our complex – and often conflicted – history with rivers since humans first settled in Aotearoa New Zealand. She will argue that knowing our history is an important foundation to forging a better future, both in terms of our environment and our socioeconomic wellbeing.

Catherine Knight is an environmental historian. New Zealand's Rivers: An environmental history (Canterbury University Press, 2016) was longlisted for the Ockham New Zealand Book Awards 2017 and was selected as one of the Listener's Best Books for 2016. Her previous book, Ravaged Beauty: An environmental history of the Manawatu (Dunmore Press, 2014), won the J.M. Sherrard major award for excellence in regional and local history, and Palmerston North Heritage Trust's inaugural award for the best work of history relating to the Manawatu. Catherine is a policy and communications consultant and lives with her family on a small farmlet in the Manawatu, where they are restoring the totara forest.

We hope to see you there!

Please RSVP by Thursday 28th September for catering purposes to Simon Newton Simon.newton@beca.com

AUCKLAND MODELLING SEMINAR

HEC-HMS and HEC-RAS in Auckland Final 2017 Course Offerings!

Register at
www.surfacewater.biz/auckland/

Crowne Plaza Hotel Auckland **6-9 November 2017**

About HEC-HMS and HEC-RAS

With extensive basin characterisation and calibration features, HEC-HMS is freely downloadable rainfall-runoff software that is widely used across New Zealand.

Download HEC-HMS

Ideal for modelling floodplain inundation, dam break, development impacts, hydraulic structures, coastal and marine environments, water quality, sedimentation, and numerous other applications, HEC-RAS is a hydraulic modelling program that allows users to exchange 1D and 2D input and results without licensing costs or constraints.

Download HEC-RAS

We are excited to announce that Surface Water Solutions have teamed up with New Zealand's own Golovin to offer a comprehensive course covering rainfall-runoff and hydraulic modelling using the freely downloadable HEC-HMS and HEC-RAS programs.

We invite you to advance your career and further your hydrologic and hydraulic modelling capabilities by joining us for these engaging, interactive training workshops.

Click here for additional registration details; if you are interested in other course topics, locations, or dates, please fill out the expression of interest form and we'll keep you informed of other upcoming training opportunities in NZ.

We've had a great response to our previous courses and have used the feedback to continually improve our program. Who attends? What are they saying?

2018 Open Courses

We will be holding additional hydrologic and hydraulic modelling courses throughout 2018. Please pass along the registration of interest form to colleagues or professional contacts. Referral discounts are available.

Customised In-house Courses

In-house courses can be customised to suit your organisation's needs and can provide better value by focussing your time on topics most relevant to you. Tutorial exercises can be created from your own projects.

In addition to HEC-RAS, we also offer specialised training in dam break, sediment transport, HEC-HMS, GIS interfacing, hydraulic structure design, and other topics.

Consulting Services

If you have any needs related to review or QA/QC of deliverables, setting up new models, troubleshooting models, or other items, please contact us.

Presenters

Lectures and workshops will be presented by our highly experienced trainers with extensive code writing, model development, and lecturing backgrounds.

For previous course attendees or experienced HEC software users, please see our latest articles with modelling tips and tricks, glitches and fixes.

Pricing and Enrolment

We keep our prices to the absolute minimum to encourage attendance across a wide range of organisations. Flexible attendance options are available to suit all backgrounds. Attend any or all days.

Click here for pricing and enrolment details. Please enquire to receive coupon codes for professional organisation membership, group rates, or academic discounts of up to $300 per day. Partner organisations qualifying for membership discounts include IPENZ, NZSOLD, the Coastal Society, and the Sustainability Society.

Professional development certification is available to all participants. Attendees may bring their own laptop computer or hire a computer for the course. Click here to reserve a computer.

Updated Course Contents for NZ

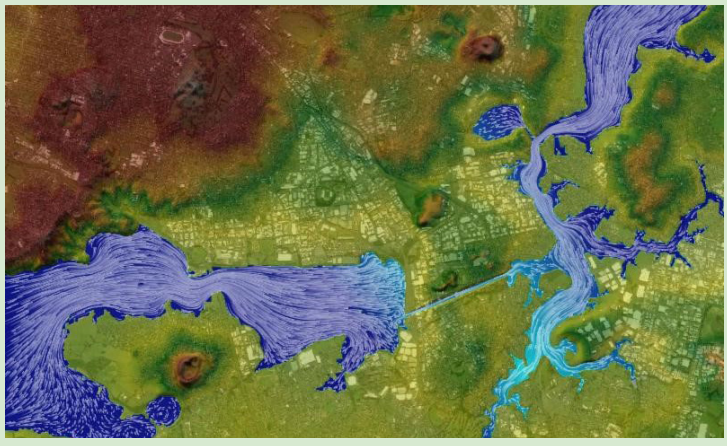
We have added all-new case studies, tutorial models, and workshops specific to NZ, including coastal interaction, earthquake-induced landslide dams, urban drainage, and rain-on-grid/direct rainfall examples.

For those who wish to bring along your own terrain files, we can customise the workshops to use your own projects.

Our intensive course will prepare attendees to estimate rainfall-runoff in HEC-HMS and build, run, view, animate, and interpret flood models from scratch using HEC-RAS.

Making Middle Zealand

Get a head start on the course by trying this workshop exercise that slices New Zealand's North Island in two and leaves Northland hanging!



Quick Links

Customised in-house courses

Future course dates and locations

Auckland course details

Subscribe

E-mail

Please note: I will limit e-mails to this group to less than one per month and only if there is relevant information to distribute, such as software updates, modelling tips, or the publication of benchmarking results. Feel free to unsubscribe if you do not wish to receive future communication from us.

Join our mailing list!

Contact
hec-ras@surfacewater.biz
0400-367-542

www.surfacewater.biz

Webinar available for download

Click on the image below to download the video recording of our free HEC-RAS webinar that was held earlier this year:

Hope to see you in Auckland in November!

GEOMORPHIC PRINCIPALS AND APPLIED TECHNIQUES IN RIVER MANAGEMENT

An IPENZ Rivers Group Workshop Nov 16 and 17, University of Auckland

THE UNIVERSITY OF AUCKLAND NEW ZEALAND	MACQUARIE University SYDNEY-AUSTRALIA	MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA UNIVERSITY OF NEW ZEALAND
Gary Brierley Jon Tunnicliffe	Kirstie Fryirs	Ian Fuller

We are please to offer a 2-day workshop to introduce essential concepts in fluvial geomorphology to tackle river management, as well as some practical perspective on usage and application of emerging technologies. The first day will provide an essential background in geomorphic principles, as well as new frontiers in river research and the implications for river management. A discussion session will serve to exchange ideas and issues in the context of New Zealand rivers.

Day Two will provide an overview of state-of-the-art techniques in river surveying, for the purposes of assessing inundation extents, and monitoring river change. A series of talks will review the capabilities and limitations of LiDAR, Structure-from-Motion and other point-cloud survey data, and the workflow from field to desktop. A hands-on demonstration will provide participants with an appreciation of new software tools and the potential for moving toward exploratory modelling flows and sediment transport using digital elevation data.

Day 1: Introduction to Fluvial Geomorphology

1. Catchment perspectives in fluvial geomorphology
2. The diversity of rivers in NZ and overseas
3. Channel geometry and instream geomorphic units.
4. Floodplain forms and processes
   Practical exercise: The character and behaviour of different river types
5. River evolution (change): patterns, connectivity and geomorphic responses to human disturbance
6. River management and prioritisation: River Futures – managing rivers with a history on a trajectory

Discussion Session

Dinner

Day 2: The New Geomorphology Toolbox

1. An overview of survey techniques for river studies
2. Processing workflow, from field to desktop

a. Instrumentation
b. Quality control, best practices
c. Specifying error, managing uncertainty
d. Cleaning and visualising survey results

3. Leveraging new software tools for assessing and visualising channel change
   Practical Exercise: Merging river bathymetry and floodplain topography
4. Applications in modelling I: Flooding extents
5. Applications in modelling II: Morphodynamics
6. Implications for river management

Discussion Session

Closing thoughts: Putting it all together

For further information, please get in touch with Jon Tunnicliffe: j.tunnicliffe@auckland.ac.nz

NZ FRESHWATER SCIENCES SOCIETY ANNUAL CONFERENCE

19-24 November 2017 | Hamilton, New Zealand

In association with the 5th Biennial Symposium of the International Society for River Science (ISRS) and IPENZ/Water NZ Rivers Group Annual Meeting.
In partnership with the Waikato River Authority (WRA)

WELCOME

We are pleased to invite you to the 2017 New Zealand Freshwater Sciences Society (NZFSS) Annual Conference, in association with the 5th Biennial Symposium of the International Society for River Science (ISRS) and the annual meeting of IPENZ/Water NZ Rivers Group. These Conferences are being held at Claudelands Events Centre in Hamilton from 19-24 November 2017, in partnership with the Waikato River Authority (WRA).

SOCIAL FUNCTIONS

We have lined up some fantastic social functions to allow you to get to know the other delegates, and to have some fun!

- Sunday Powhiri at Tūrangawaewae Marae
- Sunday Pre-Conference Mixer
- Monday Mixer
- Tuesday Student Function
- Wednesday Optional Social Function
- Thursday Conference Dinner at Hamilton Gardens
- 8 Field Trips

CONFERENCE THEME

"Integrating multiple values"

Working rivers provide a range of goods and services that are important for biodiversity, ecological functions and human use. Balancing these multiple needs is a key challenge for water resource managers, and achieving outcomes that satisfy growing human demands while protecting environmental values is extremely difficult. This conference will provide a forum for sharing scientific and environmental knowledge underpinning management of rivers for multiple goals.

WHO SHOULD ATTEND?

The conference is targeted for a multidisciplinary audience of 300-500 delegates from the physical, natural and socio-economic sciences, as well as those who manage, create policy for and use riverine resources and their associated aquatic environments.

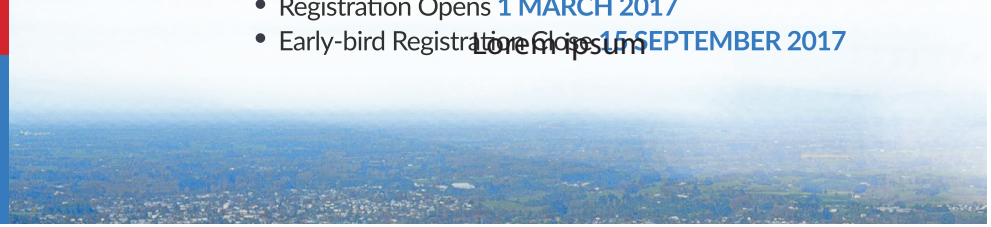
CONFERENCE FORMAT

The conference will include plenary speaker presentations as well as special and general contributed sessions, poster displays, a diverse array of exhibits, networking functions, and field trips that showcase New Zealand's unique river environments and attractions.

KEY DATES

- Special Session Nominations Close 30 NOV 2016
- Abstracts Open 1 DEC 2016, Abstracts Close 30 APRIL 2017
- Registration Opens 1 MARCH 2017
- Early-bird Registration Closes 15 SEPTEMBER 2017

Lorem Ipsum



FOR FURTHER INFORMATION
www.imav2017.com
Or Contact On-Cue Conferences
Phone: +64 3546 6330 // lea@on-cue.co.nz

PhD Scholarship
Nutrient Limits to Manage Freshwater Plants




Tēnā koutou freshwater colleagues,

We are currently advertising a fully funded PhD scholarship to study "Nutrient limits to manage freshwater plants" at the University of Waikato and NIWA.

The link to the advertisement is:
http://www.waikato.ac.nz/__data/assets/pdf_file/0008/355256/PhD-Scholarship-Nutrients-Limits-to-Manage-Freshwater-Plants.pdf

or go to: http://www.waikato.ac.nz/scholarships/other-funding
and click "External funding".

We would really appreciate it if you could share this message with your research network.

Kia ora rawa atu,
Dr Fleur Matheson (NIWA) & Prof. Ian Hawes (UoW)

Job Vacancies - Marlborough District Council

Marlborough District Council

River Engineering vacancies link

https://www.marlborough.govt.nz/your-council/careers/current-vacancies