

# Bridging



Peter Cullen  
Water & Environment Trust

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Newsletter of the Peter Cullen Water & Environment Trust

Spring Edition

## From the Chief Executive Officer



The COVID-19 lock-downs and border closures are playing havoc with the Trust's leadership programs and our face-to-face networking. It is a challenging time. I extend the best wishes of our team to all Fellows and Friends in taking care of your

well-being and that of your family and colleagues. The impact of COVID-19 on our programs is eloquently covered by Bek Christensen later in *Bridging*, along with new initiatives for social engagement and leadership journeys.

In this Spring Edition of *Bridging*, I write from Darwin, on Larrakia country, where it is Gururwla (or big wind time) - the sixth of seven main seasons on the Gulumoerrgin (Larrakia) calendar.

Thank you to the members of Gulumoerrgin language group and CSIRO researchers who have developed this resource as one of ten Indigenous season calendars under the [Tropic Rivers and Coastal Knowledge \(TRaCK\) program](#).

The calendar, and the hot humid weather, reminds me how different the Top End is to southern Australia in Spring. It also reminds me of the critical need for diversity in our leadership to provide different water policy settings and water security strategies, and engage with the diverse range of Aboriginal and Torres Strait custodians, communities and stakeholders across Australia.

In the resource of Peter's work, edited by Vicky, *This Land Our Water*, Andrew Campbell (currently a Director of the Trust) in talking about the establishment of the Trust, said "(Peter) leaves a huge gap in so many ways, and his shoes will be impossible for anyone individual to fill. But it is critical in honouring his legacy that we attempt to ensure that Peter's spirit imbues whatever we set up..."

Andrew was right 10 years ago. We now have an alumni of over 200 Fellows, with another 34 undertaking the 2021 Women in Water and the next the Science to Policy leadership programs. This cohort covers every corner of Australia with diverse backgrounds of research, academia, policy, regulatory, industry and consultant. Peter was a great mentor, and I believe he would be very proud of his legacy.

I have been rereading *This Land Our Water* as we consider supporting a reprint, and other options, to provide access to Peter's work. Although 10 years since publication, Peter's lessons remain as powerful and relevant as when he delivered them with influence and impact - a veritable goldmine. Seeking solutions through common threads. Giving voice to community. Our rivers will depend on politicians having the courage to follow scientific advice. Talking truth to power. And many more.

Peter was a champion of the Cooperative Research Centre program, and leader of the CRC for Freshwater Ecology. The Trust is delighted to be a partner in both the Water Security CRC bid and the One Basin CRC bids in round 23 stage 1. If the bids are successful, the Trust will deliver customised training and leadership programs. Leith Bouilly is the Chair and Stuart Bunn the interim CEO of the Water Security CRC bid. Wendy Craik is the chair and Mike Stewardson the interim CEO of the One Basin CRC bid. We wish both bids well. Australia desperately needs the investment in science, policy, industry transformation and leadership.

Please contact me if you see value in continuing publication of *This Land Our Water*, or alternatives to share Peter's story and wisdom.

**Darryl Day**  
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## Programs Update

The PCT team recently decided that 'pivot' didn't capture our feeling for the constant changes and adaptations we were making. Perhaps a more elegant *pirouette* was better, or even *grande jeté*? But with the increasing degree of difficulty posed to our work by lockdowns and travel restrictions across the country, I now wonder if we should say we're doing the triple-twisting double-tucked salto (aka [Biles II](#))? I'm sure many of you will know the feeling as your goals and plans are adjusted, upturned, adapted, re-made, postponed, re-booked, or shelved altogether. I hope that your continuing connection with the Trust is a source of ideas, solidarity, and support to continue the important work you do.

Read below to hear about our latest gymnastics manoeuvres to continue delivery of the Trust's Programs.

### Women in Water 2021

In our last edition of Bridging we reported on the postponement of Session 2 of the 2021 Women in Water Program to November. The Program participants, along with the Women in Water Program co-Directors Leith Bouilly and Kate MacMaster have taken this postponement in their stride. The group are using the extra time available to them as an opportunity to deepen their exploration of leadership by meeting (virtually) with senior leaders from across the sector. Thanks to PCT Friend Jane Doolan, PCT Board Chair Karlene Maywald, and Kathryn Fagg AO who have or will soon meet with the group.

At the time of writing, we are not sure where Session 2 for the Program will be hosted in November given the ongoing travel restrictions. However, we have a few contingency plans in play to ensure that the show can go on.

### #wateREvolution

**FRIDAY 12 NOVEMBER 2021, 12-4:30PM AEDT**

After taking stock of the curveballs of 2021, we've decided that #wateREvolution will now be in-house (PCT Fellows and Friends only), and online only.

The overarching question for #wateREvolution is: How can the PCT Network drive a #wateREvolution from within?

Several PCT Fellows are working on short (<5 minute) digital stories that capture a water challenge, issue, or idea. We'll share these at #wateREvolution to provide and inspire conversation within the PCT community around how to respond to, engage with, and effectively promote the ideas presented.

There is still time for PCT Fellows to contribute a digital story, or help another Fellow with theirs: **Story topic submissions (akin to a story 'abstract') are due by Friday 1 October, with final presentations needed by 1 November.** You can join in with an existing group to work on a story or present an entirely new digital story of your own making.

If you've got a water story you want to share, or if you'd like to help another Fellow with theirs, please [email Bek](#).

### Science to Policy 2021

The 2021 Science to Policy Program has been postponed until the first half of 2022. Currently, we intend to hold Session 1 of Science to Policy and Session 1 of Women in Water 2022 sequentially in March 2022, and to hold Session 2 of each program in parallel in May 2022. Of course, we've learnt to hold our plans lightly so we will wait and see what 2022 brings.

### WSAA Young Utility Leaders Program 2021-22

The Trust has again partnered with the Water Services Association of Australia (WSAA) to deliver their Young Utility Leaders (YUL) Program across 2021-2022. I hosted the first workshop for this year's group online in August, and we will continue for the foreseeable future with online interaction. We are hopeful of meeting in-person at least once during this Program!

### Communicating with Impact and Influence – DELWP in-house program

With a strong preference for finishing this program in-person, we continue to wait for QLD-Victoria travel to resume so I can join our DELWP counterparts for our final workshop. In the meantime, we have met on Zoom to keep connection and momentum with the group, and to explore some tips, tricks, and tweaks for remote team communication.

**Dr Bek Christensen, Programs Director**



## Updates from the Fellows Network Committee

### Thanks Elissa

After a couple of years in the role, Elissa McNamara has stepped down as Chair of the Fellows Network Committee. On behalf of the Fellows Network, the Committee has expressed their thanks to Elissa for the hard work, energy, and good humour she has given to her role as Chair. We look forward to thanking Elissa in person when circumstances allow!

The Committee are now taking some time to review their Terms of Reference, and get feedback from the Fellows about what you want from the Network (see the link to the Fellows survey elsewhere). If you're interested in joining the Fellows Network Committee please [email Bek](#).

### Fellows PD Day resources available online

About 20 Fellows joined 'video ninja' Rebecca Saunders, and our #waterREvolution partner Will Tait from FutureCrunch, for the online digital storytelling PD Day on 22 July. Participants worked in small groups to explore and apply the topics including planning and storyboarding, and filming basics. Some of those small groups have continued to work together in developing their digital stories for the upcoming #waterREvolution event on 12 November.

[Four modules from PD Day are available online for PCT Fellows here.](#)

Each module is only 10 minutes long so it's easy to digest. The four modules are:

1. Digital Storytelling Fundamentals
2. Planning and Storyboarding
3. Filming Basics
4. Questions and Discussion

### 5. Networking Breakfasts

With the postponement of Women in Water Session 2, the traditional national Fellows networking breakfast couldn't take place. Instead, we tried to facilitate networking breakfasts in each of the capital cities. Most of these were foiled by COVID and scheduling challenges, but our Canberra- and Hobart-based Fellows were able to get together and connect with each other and our Adelaide Fellows have just met. To all of our other capital cities: there will be a breakfast coming to you - keep an eye on your inbox for an invitation in future.



South Australian PCT Fellows at the recent Networking Breakfast. Clockwise from left: Tanya Doody (2015), Declan Page (2014), Claire Sims (2019) and Nicole Hughes (2019)

### Fellows Survey - Tell us what you want

The Trust has now been delivering leadership programs for over ten years, and our Fellows community has grown to over 200 people. We'd like to know what you want from your Fellows Network, and how we can best use our resources to support the Fellows. **To help us understand your needs, please take a few minutes to [complete this survey](#) before 15 October.**



## FellowsConnect Sessions

Thanks to PCT Board Chair Karlene Maywald for joining many of our Fellows on Zoom for a PCT 'Fellows Connect' session on 31 August. The hour whizzed past, as we took the opportunity to check-in and connect with each other, and to share our challenges and insights about connection both personal and professional in the circumstances we currently find ourselves in. **One of the key messages from this session is that Fellows would like more opportunities to connect and network with each other. To that end, keep an eye on your inbox for an invitation to Fellows networking drinks (virtual) soon!**

**Due to the popularity of this session, we've also scheduled another 'Fellows Connect' session for 13 October, this time with PCT CEO Darryl Day as special guest.** This session is an opportunity for Fellows to connect with each other, to get to know Darryl better, and to hear some of his thoughts and plans for PCT. A calendar invitation has already gone to all Fellows – if you missed out on this invitation [please contact Bek](#).



PCT Fellows Connect with Karlene Maywald

## Mentoring

Don't forget that the PCT offers a mentoring program. If you are a PCT Friend who would like to mentor a Fellow, or if you are a Fellow who would like a mentor, please fill out the EOI downloadable from the PCT website <http://www.petercullentrust.org.au/mentoring/> and send to [bek@petercullentrust.com.au](mailto:bek@petercullentrust.com.au)



## Peter Cullen Trust 2022 Women in Water Leadership Program

### Applications are now invited for the Trust's 2022 Women in Water Leadership Program

This Program was developed in 2016 and enables the women at the forefront of Australia's water and environment sector to develop their leadership capabilities, communication skills and ability to drive change.

The Program is limited to 16 participants drawn from across Australia. Applicants must be available to attend both residential sessions and take part in the intervening project work. People who complete the whole program successfully join the community of Fellows of the Peter Cullen Trust.

Sessions dates for 2022 are:

**Session 1: 21-25 March 2022**

**Session 2: 16-20 May 2022**

Information for applicants and sponsoring organisations, together with the application form, are available for download from the [Trust's website](#). The cost of the Program includes all course fees, flights, accommodation, and a Graduation Cocktail Event where Graduates will be welcomed as Fellows and have an opportunity to connect with other alumni, Friends and Trust Board Directors.

*Please encourage all the outstanding water and environment leaders in your network to apply. For further information or to submit your application please email Executive Officer Linda Cumming at [office@petercullentrust.com.au](mailto:office@petercullentrust.com.au)*

**Applications close on 24 October 2021.**

## Ripple Award 2021

### Nominations are now invited

The Peter Cullen Trust is now seeking nominations for this year's Ripple Award - recognising a Fellow for their outstanding contribution to the objectives of the Peter Cullen Trust and the Fellows Network through their work and engagement within the water and environment sector and the Peter Cullen Trust. The Award acknowledges Fellows who have made a notable 'ripple' and signifies the capacity of one person to influence the whole pool. Candidates are Fellows nominated by Fellows.

The last recipient of Ripple Award was 2010 Fellow Chris Arnott for his outstanding contribution to the Trust and our programs over many years, and in particular his development and coordination of the highly successful Leader Lunch Series.

Other recipients of the Ripple Award have been Kaye Cavanagh (2015), Susie Williams (2016), Sarina Loo (2017) and Kirsten Shelley (2018).

Please send your nomination (it could be a self-nomination) to Linda at [office@petercullentrust.com.au](mailto:office@petercullentrust.com.au) by **Thursday the 28th of October** with a brief rationale about why your nominee is deserving of recognition.



Kirsten Shelley and Chris Arnott in Canberra following the presentation of the 2019 Ripple Award.



## Peter Cullen Trust Lunch with a Leader Series

### Professor Karen Hussey; Deputy Director General Queensland Department of the Environment and Science



Professor Karen Hussey

A small group of Queensland fellows were thrilled to be able to have an intimate in-person Lunch with a Leader with Prof Karen Hussey in mid-August. As always, the conversation was lively and wide-ranging inspired by Karen's professional journey through academia and into the senior levels of the Queensland government.

We tackled some really

interesting and challenging issues, as well as having some big belly laughs, along with a tasty two-course lunch at the heritage-listed Customs House.

Some of the topics of conversation included:

- Use and generation of science in 'the real world' including how science is developed and communicated both inside and outside of academic institutions; how the source of information/research is very important and can cloud both the content and perceived value of the work; when is science important and when do other things matter in forming a balanced view
- Value and power of having a personal 'brains trust' – people that you trust and can rely on to provide you with both technical information, but also crucial reality checks; the value of mentors
- Fascinating discussion about institutional cultures – how they get built, sustained and when/where change is possible; when is it useful to operate inside the tent and when is it better to walk away Karen's achievements and challenges in entering the most senior levels of the public services as 'an outsider' rather than someone who came up through the ranks and how she has effected change that others at her level may tend to reject as being too hard

- The unexpected challenges of senior leadership roles – how to balance competing needs and agendas; when and how to care about small issues without them consuming all your time; pushing back on unacceptable behaviours in creative but meaningful ways
- Professional identity – how people define what they do and who they are as professionals; how this in turn how this influences their behaviours, including as individuals and within their professions; and where these identities can create barriers or reluctance to collaborate or conversely be really useful
- Reflections on making big, often career-changing decisions.

And a critically important piece of wisdom that information communicated in 14 pt Helvetica font will cut through any barriers. It was an absolute pleasure to have enjoyed Karen's and my fellow Fellows' company for 2-hours and I cannot wait to for the next Lunch with a Leader.

**Ailsa Kerswell (2016 Fellow)**



## Peter Cullen Trust Lunch with a Leader Series

### Anthony Slatyer



On 8 August PCT Fellows and Friends from around the country joined Tony Slatyer as part of the Lunch with a Leader series.

I had the pleasure of working for Tony in my first foray into the Commonwealth Government. Tony was heading up the Water Division at the Department of Agriculture and Water Resources, which amongst other things included overseeing the implementation of the Murray Darlin Basin Plan.

Born in Ngunnawal country in Canberra, Tony spoke of his long and distinguished career as a Commonwealth Public Servant working in a diverse range of sectors both in Australia and abroad. Tony talked about the opportunities that you have as a public servant; being an agent of change and the reward of seeing the outcomes of your efforts. Some of his early career achievements included playing a pivotal role in saving the SBS and negotiating international fishery agreements in the Pacific – these agreements are still in place today and are the economic backbone of some Pacific countries.

Tony spoke of his ‘accidental’ career in water, which has seen him play a key role in Australia’s most significant and complex water policy initiatives. While heading up the Bureau of Transport and Regional Economics their work on the role of water resource allocations in influencing development along the River Murray culminated in the formulation of the National Water Initiative and the transformation of water policy in Australia. Tony also played a pivotal role supporting Malcom Turnbull (then Parliamentary Secretary to the Prime Minister on Water) in navigating the millennium drought, which ultimately led to the National Plan for Water Security and the Murray Darlin Basin Plan.

While now retired, Tony continues to be actively involved in the water sector, both nationally and internationally. He worked as a Special Advisor to then Prime Minister Malcolm Turnbull on the United Nation’s High-Level Panel on Water and has recently established the Water Policy Group. Tony is particularly excited about the opportunities that lie ahead in terms of the group’s ability to assist leaders to tackle the many complex water policy challenges faced in the future, not the least to mention climate change.

Tony also provided some invaluable reflections on leadership, politics and public policy.

Tony talked about water being a political problem, and considers the assertion that we should take the politics out of water illogical. The reason we have politics is to address issues that deal with conflicting social and community values. Many of the issues with the Basin Plan are not technical, but rather problems of a social nature that required political solutions. Tony highlighted that it wasn’t until a former politician was appointed to the Chair of the MDBA that the Basin Plan was saved from failure.

In an issue dear to our PCT hearts, Tony discussed the importance of science and evidence in policy making. While evidence needs to be factual, rational, robust and defensible it also needs to be timely and relevant. There is often a window of opportunity for policy initiatives, and the information needs to be explained to policy makers in a way they understand – Tony highlighted that Peter Cullen was a master of this craft.

I particularly liked Tony’s parting words to the audience - ***“If you have a clear vision of what is good for society then persuade others of your vision and get on with it. Don’t let a moment go by without doing the best you can with that moment and be a positive influence wherever you can.”***




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## Upcoming Lunches



### **Dr Jonathan Spear** **Tuesday 5 October,** **12:20-1:45pm AEST via ZOOM**

Dr. Jonathan Spear is Infrastructure Victoria's Deputy Chief Executive, Chief Operating Officer and General Counsel. He leads Infrastructure Victoria's work on the 30-year infrastructure strategy, research program and providing independent advice to the Victorian Government.

Before Infrastructure Victoria's inception, Jonathan held senior leadership roles including Executive Director of the Policy & Cabinet Group at the Department of Premier & Cabinet, General Counsel of the Department of Premier & Cabinet, Director of Innovation & Strategy at the Department of Justice, Executive Adviser to the Chief Commissioner of Victoria Police, and Practice Group Leader at Slater & Gordon Lawyers.

Jonathan holds a Bachelor of Arts (Hons.), Bachelor of Laws (Hons.), Master of Laws, Executive Master of Public Administration and Doctor of Philosophy (History). He is also a graduate of the Williamson Community Leadership Program and the Australian Institute of Company Directors. Jonathan is a Director of the Melbourne Forum and a member of university research and industry advisory boards.

**A free event for PCT Fellows only. [Register here.](#)**

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## Appointments

### **Dr Diana Day is now a Doctoral Mentor for the Australian Academy of Technology and Engineering STEM Industry Mentoring Network, a flagship industry engagement initiative.**

Diana is a Friend of the trust and Chair of committees & boards across Australia. The Industry Mentoring Network in STEM (IMNIS) is an award-winning industry-led initiative of the Australian Academy of Technology and Engineering (ATSE). IMNIS connects motivated PhD students and postdoctoral fellows in science, technology, engineering and mathematics (STEM) with outstanding high-level industry leaders in a one-year mentoring and professional development program.

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## Awards

### **Congratulations to Associate Professor Bradley Moggridge and Professor Ross Thompson on being awarded the Engineers Australia GN Alexander Award by the National Committee on Water Engineering at the closing session of the online Hydrology and Water Resources Symposium 2021.**

The Medal is awarded for the paper:

Bradley J. Moggridge & Ross M. Thompson (2021) Cultural value of water and western water management: an Australian Indigenous perspective, Australasian Journal of Water Resources, 25:1, 4-14, DOI: 10.1080/13241583.2021.1897926



## New Friends

### Jane Coram – Director of the Land and Water Business Unit at CSIRO



Jane Coram has long supported the work of the Trust, and the Board is honoured that Jane has accepted the Board's invitation to be a Friend. Jane, an inspirational leader in water and mentor to many, joined CSIRO in June 2018 and reflected that

the CSIRO leaders who have come through the Trust's leadership program are her superstars.

Jane's career in natural resources science delivery spans 30 years and has been focused on developing and applying scientific solutions to natural resources management challenges. Her experience and technical knowledge spans a range of issues including coal seam gas, coal and unconventional energy resources, uranium mining and radioactive waste disposal, groundwater sustainability, dryland salinity, groundwater-surface water dynamics; forest ecology and management; reserve design and biodiversity management.

With formal qualifications in hydrogeology and earth sciences, Jane has a broad multidisciplinary understanding of land and water sciences. She is Director of CSIRO's Land and Water Business Unit and has also held senior leadership positions including as Chief Executive of the National Measurement Institute, and Acting Chief Scientist and leader of the groundwater capability at Geosciences Australia. Jane's multidisciplinary perspective has also seen her provide scientific advice across a number of committees and boards.

Jane's interests include science communication, mentoring emerging science leaders, and working to provide inspired, innovative and impactful science solutions to national problems.

### Joanne Townsend – Chief Executive Officer of the Department of Environment, Parks and Water Security NT



We are delighted that Joanne Townsend has accepted an invitation from the Board to join the Peter Cullen Trust as a Friend. Jo has been a sponsor for the S2P Leadership Program and is a mentor to many in the environment and water community. A little about Jo:

Jo is the Chief Executive Officer of the Department of Environment, Parks and Water Security in the Northern Territory. Prior to establishing the larger agency in September 2020, Jo was the Chief Executive Officer of the Department of Environment and Natural Resources where she led the agency through an extensive legislative reform program and positioned the organisation to deliver new accountabilities for the regulation for water resources, onshore gas and environmental impact assessment, as well as new approaches to bushfire management, established the Office of Climate Change and supported an expanded assessment of water, land and biodiversity resources across the Territory.

Jo also holds the statutory appointment of the Controller of Water Resources under the Water Act 1992 where she is responsible for management, allocation and enforcement responsibilities under the Act.

Jo has an extensive and diverse career in the Northern Territory public sector spanning more than 25 years and has held executive leadership roles in social policy, public health, child protection, water resources. Jo has a Bachelor of Arts degree and a Graduate Diploma in Applied Psychology



## Upcoming Events and Conferences

### 24th International River Symposium - The First Ever Hybrid International River Symposium 27-30 September 2021 | Brisbane, Australia & Online

#### RECOVERY TO RESILIENCE: LEVERAGING PARTNERSHIPS

We invite you to join us on the journey to celebrate and transform our rivers towards resilience and ensure our rivers are there for our future generations. Global changes, such as the COVID-19 pandemic, have given us more impetus for a paradigm shift and/or movement: from achieving healthy rivers to achieving resilient rivers. The road to resilience can be a complex journey with the interdependence of environmental, social and economic outcomes. Only through unlocking the transformative power of partnerships can we, together, achieve resilient rivers, resilient communities and resilient economies.

For more information please go to  
<https://riversymposium.com>

### National Water Week 18-24 October 2021 Caring for water and Country” National Water Week ([awa.asn.au](http://awa.asn.au))

The #NWW2021 theme for 2021 is Caring for Water and Country and celebrates the vital and cultural role that water plays in our lives. Recognising the importance our waterways play in our lives, Caring for Water and Country aims to deepen our understanding of Australian First Nations people’s knowledge of protecting and sustaining our water and lands for over 65,000 years.

[https://www.awa.asn.au/AWA\\_MBRR/About\\_AWA/National\\_Water\\_Week.aspx](https://www.awa.asn.au/AWA_MBRR/About_AWA/National_Water_Week.aspx)

### OZWATER’22 10-12 May 2022 Brisbane

Ozwater is Australia’s largest international water conference and exhibition, run annually by the [Australian Water Association](http://Australian Water Association). Over the years, Ozwater has evolved to include a comprehensive and inspiring three-day conference program and is now the largest water exhibition in the Southern Hemisphere.

This year’s theme is Our Water Journey, which celebrates the evolution of the water sector from its rich history, where we are now and what possibilities lie in our future.

<https://www.ozwater.org/>





## Publications of Interest

**Bradley J. Moggridge & Ross M. Thompson**  
**(2021) Cultural value of water and western water**  
**management: an Australian Indigenous perspective,**  
**Australasian Journal of Water Resources, 25:1, 4-14,**  
**DOI: 10.1080/13241583.2021.1897926**

### ABSTRACT

Water is a critical issue for governments and community in an Australian context, and internationally. First Peoples of Australia, its Indigenous peoples, have over 65,000 years of connection and understanding of water, held by more than 250 distinct Indigenous Nations that occur from the wet tropics, through desert country and south to the temperate zone, river lands and alpine regions. The value of water is central to Indigenous peoples' being and culture, but since European colonisation in 1788, water has been subject to pumping, storage, diversion, extraction and pollution and without Indigenous people's council. Most recently, water has been attributed a market value to sell and trade on a market that moves up and down with availability (drought, flood or in-between). Indigenous peoples have very small water entitlements despite the high value they place on water and the strong connection water has to their sense of identity, spirituality and culture. There is both a need and a great opportunity for Indigenous people to uphold and protect their water values through Indigenous-grounded methodologies or Indigenous-led water research, and so as to integrate Indigenous water knowledge into science and policy.

### Leading from the North

#### RETHINKING NORTHERN AUSTRALIA DEVELOPMENT

<https://press.anu.edu.au/publications/leading-north>

**Edited by: Ruth Wallace, Sharon Harwood, Rolf Gerritsen, Bruce Prideaux, Tom Brewer, Linda Rosenman, Allan Dale**

Leading from the North aims to improve public dialogue around the future of Northern Australia to underpin robust and flexible planning and policy frameworks. A number of areas are addressed including social infrastructure, governance systems, economic, business and regional development, climate and its implications, the roles and trends in demography and migration in the region.

This book not only speaks to the issues of development in Northern Australia but also other regional areas, and examines opportunities for growth with changing economies and technologies.

The authors of this book consist of leading researchers, academics and experts from Charles Darwin University, The Australian National University, James Cook University, the Australian Institute of Marine Science and many other collaborative partners.

Many of the authors have first-hand experience of living and working in Northern Australia. They understand the real issues and challenges faced by people living in Northern Australia and other similar regional areas. Backed by their expertise and experience, the authors present their discussions and findings from a local perspective.

**Behroozi A, Arora M, Fletcher T, Westerrn A and Costelloe J. Understanding the impact of soil clay mineralogy on the adsorption behaviour of Zinc, International Journal of Environmental Research, 2021, 15,3,559-569.**

### ABSTRACT

Infiltration systems are increasingly used to reduce peak flows and mitigate the impacts of stormwater runoff. Despite the benefits of infiltration systems, there is a risk for associated pollutants, including heavy metals to be introduced to the underlying soil and groundwater. The subsequent movement of metals in the subsurface and their potential to contaminate water resources is uncertain and profoundly depends on the adsorptive behaviour of the surrounding soil. We used two soil types, one natural (quartz-kaolinite-muscovite) and one synthetic (quartz and kaolinite only) with different clay mineralogy to test their potential adsorptive capacities through batch systems, with Zn(II) as a representative tracer. Nonlinear isotherms, Freundlich and Langmuir, provided good fits with the experimental sorption data. Kinetic data were well fitted by a pseudo-second-order model, indicating that cation exchange exists between the clay surfaces and Zn(II) in the liquid phase. We found that the natural soil adsorbed far more Zn(II) when compared to the synthetic soil which was attributed to the presence of the muscovite in the natural soil.



Comparison of the observed adsorption capacity of the two soils with their predicted adsorption capacities showed that while the adsorption capacities of the single-sized clay minerals are widely reported, these values cannot be linearly extrapolated to estimate the adsorption capacity of a soil that might contain varied fractions of clay. The results suggest that the designers of infiltration systems should first undertake an analysis of clay mineralogy of the subsurface soil to better predict the fate of heavy metals within the surrounding soils.

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**Mondal A, Arora M, Mumford K and Dubey B.**  
**Porous media transport of iron nanoparticles for site remediation application: A review of lab scale column study, transport modelling and field-scale application, *Journal of Hazardous Materials*, 2021, 403, 123443.**

#### ABSTRACT

Injection of surface modified zero valent iron nanoparticles for in situ remediation of soil, contaminated with an array of pollutants has attracted great attention due to the high reactivity of zero valent iron towards a broad range of contaminants, its cost effectiveness, minimal physical disruption and low toxicity. The effectiveness of this technology relies on the stability and mobility of injected iron nanoparticles. Hence the development of a modelling tool capable of predicting nZVI transport is indispensable. This review provides state of the art knowledge on the mobility of iron nanoparticles in porous media, mechanisms involved in subsurface retention of nZVI based on continuum models and field scale application. Special attention is given to the identification of the influential parameters controlling the transport potential of iron nanoparticles and the available numerical models for the simulation of laboratory scale transport data.

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**Shrivastava S, Michael Stewardson M and Arora M.**  
**Influence of Bioturbation on Hyporheic Exchange in Streams: Conceptual Model and Insights From Laboratory Experiments, *Water Resources Research*, 2021, 57, 2.**

#### ABSTRACT

Bioturbation occurs in streambeds by the action of a range of faunal species, but little is known about how it could modify the hyporheic exchange in streams.

Previous experimental work investigating the effects of sediment-biota interaction on exchange across the sediment-water interface has been largely conducted in small mesocosms or infiltration columns that do not represent the lotic environment adequately. Therefore, the experimental findings from these studies may not be transferable to flowing water environments (e.g., streams). In this work, we first present a conceptual model demonstrating the causal pathways through which the sediment reworking and burrow ventilation processes (together referred to as bioturbation) could potentially modify the hyporheic flow regime. Next, to study the role of activities of faunal organisms in lotic environments and test some of the arguments presented in the model, laboratory experiments are conducted in re-circulating flumes. The experiments involved investigating the modification of dune-induced hyporheic flow due to the activities of a model bioturbating organism, *Lumbriculus variegatus*, following a control (without organisms) and treatment (with organisms) based experimental design. The sediment reworking activities such as surficial deposition of fecal pellets and burrowing by *L. variegatus* caused significantly higher hyporheic flux, longer mean residence times, and deeper solute penetration in the treatment flumes relative to the control flumes. We advocate that more intensive laboratory experiments and field investigations must be conducted to test the propositions put forward in the conceptual model and advance our understanding of the role of bioturbation process in fluvial ecosystems.

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**Ray L. Ison, Kevin B. Collins, Ben L. Iaquinto,**  
**Designing an inquiry-based learning system: Innovating in research praxis to transform science-policy-practice relations for sustainable development. *Systems Research and Behavioural Science*, 2021**

<https://onlinelibrary.wiley.com/doi/10.1002/sres.2811>

#### ABSTRACT

When designers of activities concerned with the dissemination of research findings pursue their practice all too often, the linear model is implicitly or explicitly the default position. This paper uses the lens of praxis (theory-informed practical action) to offer a shift in possibility away from reliance on the linear model of innovation to a second-order modality of research practice more suited to sustainable development goal (SDG) implementation.



Whilst second-order modalities of knowledge production, necessary to enact sustainability transitions and transformative praxis, are emerging many lack purposefully designed modes of praxis and are limited in their considerations regarding enactment and performativity. We report on the testing and evaluation of a purpose-driven design of a 'learning system' within the Australian urban-water sector to enact a 'systemic inquiry' capable of generating social learning. Changes in understanding and/or practices by those who participated were achieved, thus satisfying key criteria for initiating but not necessarily sustaining social learning. The praxis innovation described is suited to situations best framed as uncertain, complex and contested. The positive outcomes of the enacted 'learning system' support the case for more investment in action-oriented research to support innovation in the field of second-order systems praxis.

**Ray Ison has also launched a new book in a video launch here: [book launch of Ison & Straw \(2020\)](#).**

**ISON, RAYMOND AND STRAW, ED (2020).  
THE HIDDEN POWER OF SYSTEMS THINKING:  
GOVERNANCE IN A CLIMATE EMERGENCY.**

*The Hidden Power of Systems Thinking* is a persuasive, lively book that shows how systems thinking can be harnessed to effect profound, complex change.

In the age of the Anthropocene the need for new ways of thinking and acting have become urgent. But patterns of obstacles are apparent in any action, be they corporate interests, lobbyists, or outdated political and government systems. Ison and Straw show how and why failure in governance is at the heart of the collective incapacity to tackle the climate and biodiversity emergencies. They go beyond analysis of the problem and demonstrate how incorporating systems thinking into governance at every level would enable us to break free of historical shackles. They propose 21 principles for systemic governance.

This book will be inspiring reading for students of systems thinking that want to understand the application of their methods, specialists in change management or public administration, activists for 'whole system change' as well as decision makers wanting to effect challenging transformations. It is for anyone with the ambition to create a sustainable and fair world.

## Reassessing flood hydrology for Burdekin Falls Dam

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### ABSTRACT

Burdekin Falls Dam (BFD) is the largest water supply dam in Queensland, storing 1,860 GL at the designed Full Supply Level. SunWater are in the process of assessing the dam safety risk status of BFD and are considering upgrades to BFD to improve dam safety.

BFD has a catchment area of 113,500 km<sup>2</sup>, which makes analysis of design floods from such a large catchment particularly challenging. This study provided a comprehensive revision to the flood hydrology for BFD, incorporating current industry best practice for design flood hydrology and the following revised approaches:

- Revision of design rainfall frequency curves
- Monte-Carlo simulation of design floods in RORB, incorporating sampling of design rainfall depths, pre-burst rainfall, space-time rainfall patterns and losses
- Derivation of design flood estimates from explicit consideration of space-time patterns for storms that could occur across the whole BFD catchment, or storms that were focussed on Northern or Southern BFD subcatchments
- Verification to a composite series of flood estimates for inflows to BFD, derived from a combination of gauged flows, reverse routed inflows to BFD, flood peaks transposed from gauge sites well downstream of BFD and paleoflood estimates. This allowed the flood frequency curve at Burdekin Falls to be assessed with considerable confidence, from flow data and paleofloods at the site, out to an AEP of 1 in 1,000

The impacts of each of these significant changes to hydrological practice on the design flood estimates for BFD and other large catchments in Australia are discussed.



**Special Issue of Hydrological Processes**  
**“Women advancing research in Hydrological Processes”, by Tanya Doody et al.**

**NEW RESEARCH TO AID UNDERSTANDING OF WATER REQUIREMENTS OF FLOODPLAIN TREE *EUCALYPTUS LARGIFLORENS*.**

Tanya Doody in conjunction with 4 co-authors, have recently published a journal paper to help water managers to understand how different volumes of environmental water might benefit *Eucalyptus largiflorens* or Black Box trees in disconnected floodplain regions. Black Box trees are of high ecological and conservation value and are typically located at higher elevations on floodplains across the Murray-Darling Basin, in areas that are difficult to provide environmental flow too. This study used drip irrigation and water donated by the vineyard adjacent to the floodplain, to test the response of the trees to different water regimes. The study has provided some important new knowledge around the water volumes that can promote a positive change in tree condition which was determined using sap flow sensors and plant water status measurements. Given the disconnected nature of these tree stands in past, such information has been difficult to measure due to lack of water. A key outcome presented included two similar volumes of water delivered in different ways. It was found that 100 mm of water a month delivered in weekly intervals (25 mm per week), substantially improved tree condition compared to 100 mm of water delivered once every 4 weeks. While this is only one example of the study outcomes, such information is valuable to water and floodplain managers to assist with planning environmental flow volumes and instigates consideration of innovative ways to delivery water to such disconnected floodplain areas.

The journal paper has been published in a Special Issue of Hydrological Processes - “Women advancing research in Hydrological Processes”, where all first authors are female and celebrates women working in the field of hydrology (<https://onlinelibrary.wiley.com/doi/full/10.1002/hyp.14267>). Tanya has also been invited to present in August at an international seminar series “Women Advancing River Research Seminar Series” in August (<https://www.cce.psu.edu/events/women-advancing-river-research.aspx>).

**JOURNAL PAPER DETAILS**

Doody TM, Gehrig S, Colloff MD, Vervoort RW, Doble R. 2021. Determining water requirements for Black Box (*Eucalyptus largiflorens*) floodplain woodlands of high conservation value using drip-irrigation. Hydrological Processes <https://onlinelibrary.wiley.com/doi/full/10.1002/hyp.14291>





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