



Australian
National
University

Institute for
Water Futures

Institute for Water Futures:



ANNUAL REPORT

2022

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We acknowledge the traditional custodians of Country throughout Australia and pay our respects to Elders past and present.

We recognise the diversity of First Nations Peoples and celebrate their knowledge and ongoing connections to the land and waterways upon which we live and work.

Acknowledgements

We are grateful for financial support from the Australian National University (ANU). We are proud to contribute to the delivery of the ANU Societal Transformation Plan, a framework underpinning the University's Strategic Plan 2021–2025.

We would like to express our appreciation for our partners, collaborators and supporters who have backed our vision and helped us as we work towards our goals.

We would like to extend a special thanks to the ANU Fenner School of Environment & Society for providing us with ongoing support and a place to call home.



Message from the Director

Welcome to the second report of the ANU Institute for Water Futures (IWF).

2022 was a welcome year of consolidation and development for IWF, emerging from the pandemic and building stronger connections within and beyond the ANU.

What has become clear over the year was that IWF is crafting multiple pathways for engagement and influence in the complex water challenges that confront regions, the nation and the globe.

In this report, you will be able to see these diverse strategies. We engage in critical assessments on whether communities' water needs are being met and amplify the voices of marginalised and under-served groups to decision-makers in positions of power.

We work actively with water professionals in public and private sectors to identify the tools, practices and processes that help develop new understandings and create new options for better water management.

I am particularly proud of the evolving 'futures' work the Institute is leading, and we are seeing a growing interest in the water sector around how futures thinking, methods and tools can support a longer-term perspective.

At the same time, we have worked hard to grow our own understanding of the nuances and subtleties that underlie our efforts to achieve just and sustainable futures for all. Making decisions now that set us up for the water challenges of the future – which will no doubt become harder and more complex over time – is the central purpose of the IWF, and it is exciting to see our collective expertise consolidating around this broad goal. All of this and more is presented in the report that follows.

Thank you for your interest in our journey.

A handwritten signature in blue ink, appearing to read 'Lorrae Van Kerkhoff'. The signature is fluid and cursive, written over a light blue circular stamp or watermark.

Lorrae Van Kerkhoff
Director

2022: at a glance



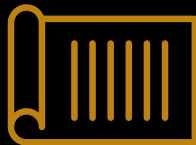
30+

Higher degree
research scholars



17

Researchers



13

Active projects



4

Professional staff

2022: at a glance

External partners and collaboration



11 Key partners



3 New research activities



5+ Partner engagement events and activities



Participation as a tier-one partner in a major consortium

Outreach

6

Public events

400+

Attendees at public webinars and lectures

600+

Engaged social media followers

450+

Newsletter subscribers

160+

Media items about IWF research

Education and capability building

13

13 courses taught by or with IWF researchers



Futures thinking pilot program completed

3

3 PhD theses submitted

Indigenous participation



Indigenous scholarship announced



2023 cultural resident appointed



Inaugural cultural residency program completed

About us

The future of water poses one of the most intricate challenges we face as a nation and a global community.

IWF is an interdisciplinary research institute created to respond to this challenge. Established in 2020, our Institute unites researchers and students from across the ANU to investigate strategies for how we can manage and plan for water to meet environmental, economic and cultural needs over the long term.

At IWF we adopt a futures-focused and collaborative approach. Our research encompasses advanced technologies, modelling, the social and natural sciences, governance, economics and policy.

By harnessing expertise from different fields, we strive to create innovative tools and foster novel perspectives to address the future of water. Our ultimate goal is to adapt to the challenges posed by climate change and other external influences, ensuring the sustainable management of this vital resource.

Through effective engagement, we work to ensure that our research influences practice, policy and attitudes and, in doing so, helps to shape a future of sustainable and equitable water stewardship.



IWF introductory video – [Watch here.](#)

Strategy



Our
vision

Understanding change | Enabling action

Sustainable and just water futures for all, empowered through collaboration, innovation, integrity and influence.



Our
values

- ▶ **Innovation**
- ▶ **Integrity**
- ▶ **Influence**



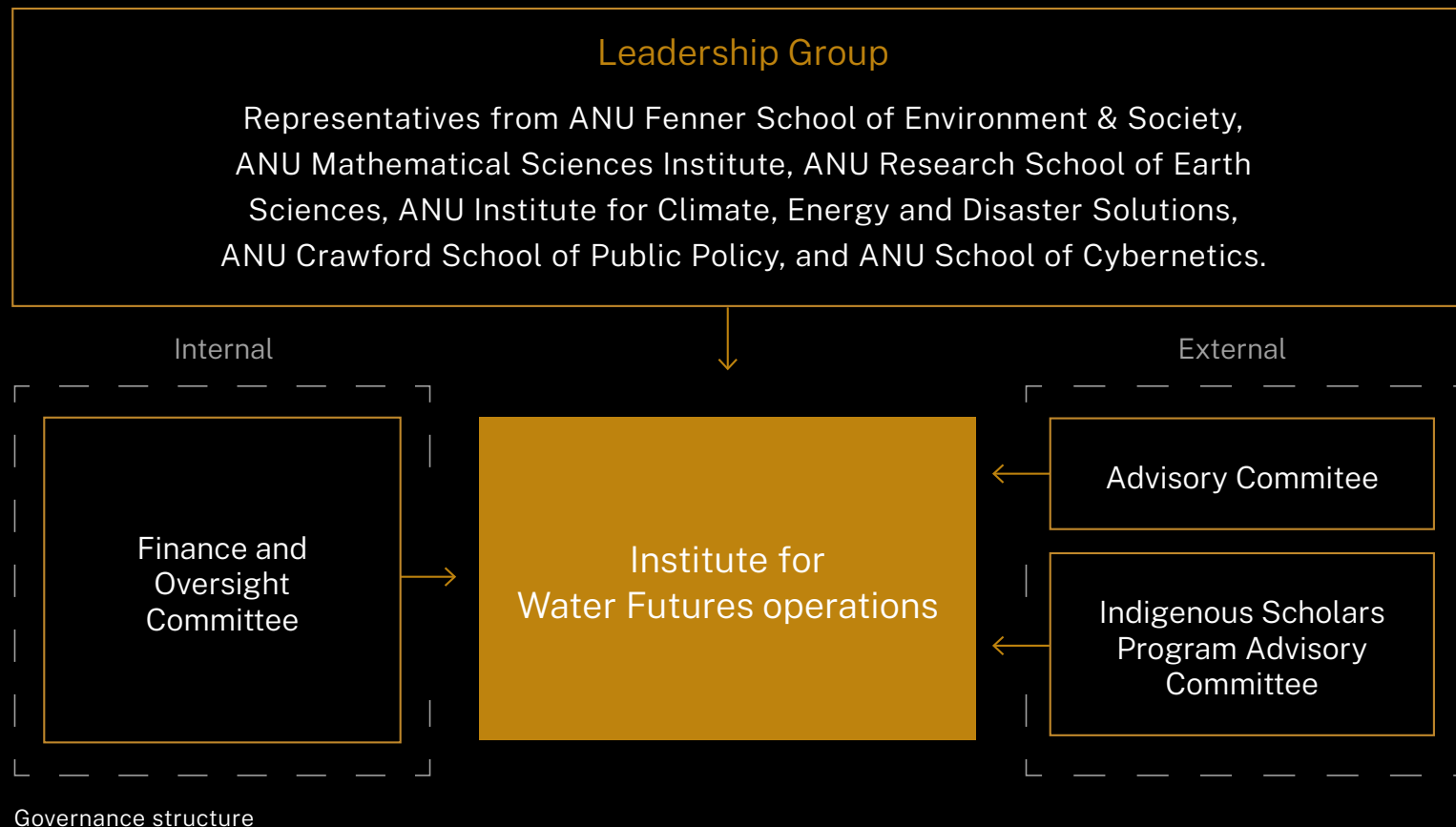
Focus
areas

Strategic intent

- Australia — National
- Murray-Darling Basin
- Great Barrier Reef catchments
- Indigenous-led initiatives
- Indo-Pacific region
- Global engagement

Governance

The strategic direction of our Institute is guided by a governance framework representing the groups that make up the IWF, as well as expert external stakeholder groups.



Leadership group

A group of global thought leaders from the ANU make up the IWF Leadership Group and meet monthly to oversee our operations and strategy.

Leadership Group members are senior representatives at our partner schools and institutes.

Director



Lorrae van Kerkhoff
Professor
ANU Fenner School of
Environment & Society



Paul Tregoning
Professor
ANU Research School
of Earth Sciences



Katherine Daniell
Professor
ANU School of
Cybernetics,
ANU Fenner School
of Environment
& Society



Mark Howden
Professor
ANU Institute for
Climate, Energy
& Disaster Solutions



Tony Jakeman
Emeritus Professor
ANU Fenner School
of Environment
& Society



Barry Croke
Associate Professor
ANU Mathematical
Sciences Institute,
ANU Fenner School
of Environment
& Society



Quentin Grafton
Professor
ANU Crawford
School of
Public Policy

Committee

The Committee comprises a diverse group of national and international experts external to ANU, who advise on the strategy and direction of our Institute.

Drawing on expertise from industry, research, advocacy and policy, the Committee meets virtually on a biannual basis to provide oversight to help position us as a leading authority in water research.

Chair



Members

Finance and Oversight Committee

The IWF Finance and Oversight Committee is made up of senior leadership from each of the ANU core member schools. The Committee provides guidance on the financial management and performance of the Institute.

Indigenous Scholars Program Advisory Committee

The IWF Indigenous Scholars Program Advisory Committee is focused on growing Indigenous scholarship and participation in the Institute.

Members



People

We are a diverse team comprised of fellows, research staff, graduate students, associates and professional staff, bringing together expertise from across ANU and beyond.

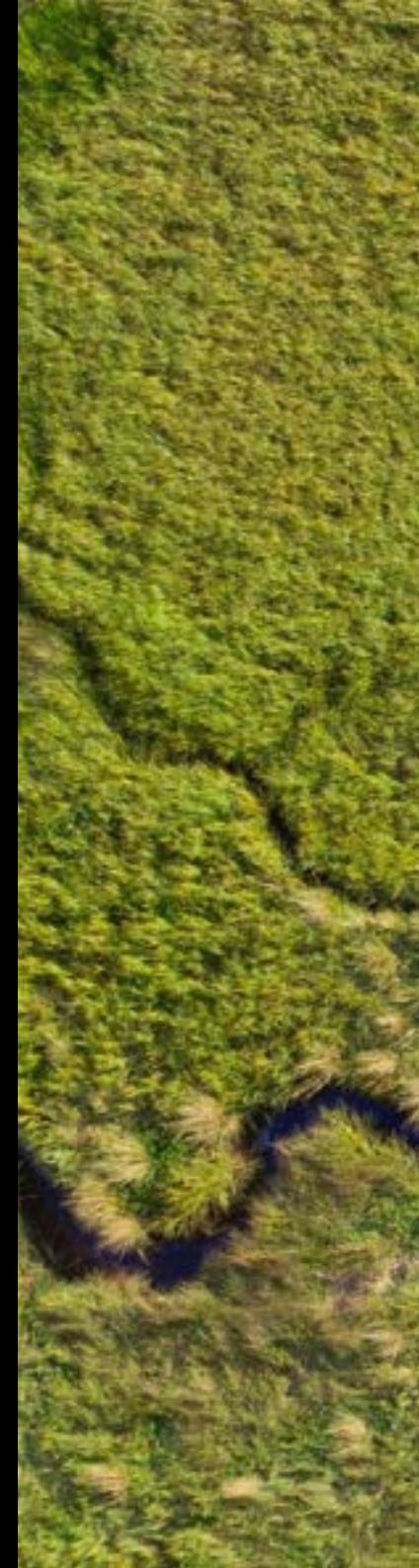
Our fellows are based in various host schools and institutes, a structure designed to promote cross-campus collaboration. In 2022 we welcomed two new fellows — Dr Saman Razavi, hosted by the School of Mathematical Sciences, and Dr Jason Alexandra, hosted at the Institute for Climate, Energy & Disaster Solutions.

Our dedicated researcher staff actively participate in IWF work while also engaging in separate ANU and external projects. Additionally, we have a number of IWF associates, including academics and practitioners from across campus and further afield, who maintain a continual interest and involvement in IWF activities.

Our professional staff - bringing a breadth of expertise to the Institute, oversee operations, support the research team and contribute to our strategic goals.

Throughout the year, we have fostered a supportive and collegial environment through regular networking opportunities, meetings and social activities. While we welcomed new team members, we also bid farewell to a couple of our researchers who have embarked on new career paths by joining our partner agencies in government and industry. Although we are sad to see them go, we are proud to have provided a nurturing space for their growth in the water sector and are committed to maintaining a close relationship with them.

We extend our heartfelt gratitude to each person who works with us and contributes to our projects. We consider it a privilege to have such dedicated and passionate people as part of our Institute.



People — Research fellows



People — Research staff



People — Professional staff



Susan Ward
Institute Manager



Scholars

Higher degree research (HDR) scholars are an integral part of the IWF community. Our HDR scholars work on water-related research under the supervision of IWF research staff and fellows.

We are committed to supporting their study journey while also valuing and incorporating their unique insights and experiences.

We aim to nurture an interdisciplinary research culture and promote an understanding of futures thinking among our cohort of scholars.



In the first quarter of the year, a group of PhD scholars participated in a 3-Minute-Thesis competition where their video pitches were evaluated by representatives from our external partners. You can watch the videos pitches [here](#).

During July, our IWF scholars and researchers ventured off campus to Murrumbateman for our annual researcher retreat. The retreat featured workshops on science communication, strengthening interdisciplinary teams and opportunities to scale up our existing work. It provided a fantastic opportunity to connect with one other and engage with researchers from different disciplines who are also focused on water-related research.

Throughout 2022, we welcomed several new scholars to our cohort, bringing the total number to over 30. We are pleased to announce that three scholars from the group have successfully submitted their theses, and we extend our heartfelt congratulations to them on this significant achievement.



Natasha Harvey

PhD scholar

IWF and Fenner School
of Environment & Society

PhD topic

“Reimagining the representation of snow hydrology in catchment models within an age of emerging technologies for sensing, data science and machine learning.”



Carla Alexandra

PhD scholar

IWF and Fenner School
of Environment & Society

PhD topic

"Foresight in water transitions —
local to regional approaches
in the Murray-Darling Basin."



Collaboration

Our Institute is committed to fostering inclusivity by bringing diverse voices and experiences into our work. By doing so, we can address the challenges of achieving the futures we desire. While we maintain focus on aspirations, we also recognise the importance of taking immediate action in the present to work towards those envisioned futures. We proudly join hands with those on the front lines of water planning and management.

This includes forging partnerships with community and industry groups, collaborating closely with First Nations partners and working alongside government agencies. In this way we aim to co-create innovative solutions and enhance our collective capacity for future-oriented decision making.

Through this collaborative approach we strive to foster sustainable water management practices and drive positive change.

Partners

We are grateful to our partners and their ongoing engagement and support.

- **Bureau of Meteorology (BoM)**
- **Commonwealth Scientific and Industrial Research Organisation (CSIRO)**
- **Atlas of Living Australia (ALA)**
- **Murray-Darling Basin Authority (MDBA)**
- **NSW Department of Planning and Environment**
- **Office of Water Science — Department of Agriculture, Water and the Environment (DAWE), now Department of Agriculture, Fisheries and Forestry (DAFF)**
- **QLD Department of Environment and Science (QLD DES)**
- **Australian Institute of Marine Science**
- **Icon Water**
- **Watertrust Australia**

Collaboration

In 2022 we focused on relationship building with our partner network.



Members of the IWF team networking with partners at a cocktail event in March.

We sought feedback and input on our strategy and continued the process of co-creating a roadmap for future collaboration.

In March, we presented our finalised **Strategic Plan** to a group of partners. Through a workshop, partners also gave feedback on how they would like to be involved with the IWF beyond individual projects and activities.

Later in the year, we began to roll out operational planning meetings with individual partners, providing a platform to discuss future directions and opportunities for collaboration. We will continue to have these discussions towards the ongoing strategic development of the IWF.

In September, we hosted a policy roundtable with renowned water policy and law expert Professor Robert Glennon. During his visit and discussions with IWF researchers, Professor Glennon presented to a group of partners and stakeholders around water crisis issues in the United States and invited attendees to reflect on the Australian situation, sharing insights and lessons learned.



Secondments and internships are another way in which we strengthen our partnerships.

Throughout 2022 IWF fellow Dr Luigi Renzullo undertook a one-year secondment at the Bureau of Meteorology. During his secondment, Luigi applied his expertise in satellite earth observations to assist the Bureau in upgrading models that help to deliver water budget information for Australia.

We also ran a futures thinking pilot program for partners. The workshops were designed to introduce the basic concepts of futures thinking and explore how these approaches can be used to support strategic decision making in the water governance sector.

Based on the feedback from this pilot, we hope to develop new professional development offerings that will support our partners to approach a changing and complex future with greater confidence and new ideas.



Lorrae van Kerkhoff discussing IWF strategy with partners.



Photo by Zac Edmonds.

Major partnership for the future of the Murray-Darling

One Basin Cooperative Research Centre

Read more



Photo by Binyamin Mellish.

Building drought resilience

Southern NSW Drought Resilience Adoption and Innovation Hub

Read more



Knowledge broker report

Dr Anita Peerson

[Read Policy Submissions](#)

Read more



Indigenous initiatives

At IWF, we celebrate the ancient and contemporary knowledge and expertise of First Nations People in managing Australia's waterways. We work to grow our understanding of the complexities of the issues confronted by Indigenous peoples in relation to water. During 2022, we launched and advanced several initiatives that help to nurture Indigenous careers in the water sector and promote Indigenous voices on water.

Launch of Honours scholarship

In supporting First Nations students, we were pleased to launch the inaugural IWF Indigenous Honours Scholarship in October 2022. The award offers Indigenous students the opportunity to undertake a funded Honours year in water-related research.





Cultural residency 2022

Throughout 2022 we ran the inaugural IWF cultural residency program, a first of its kind at ANU. Based loosely on the concept of an artist-in-residence, the cultural residency is a one-year program that draws on the process of creating art to foster cross-cultural understanding of Indigenous peoples and cultures.

The inaugural cultural resident was **Rev Glenn Loughrey** — a Wiradjuri man, Anglican Priest, speaker, writer, and celebrated artist.



Glenn Loughrey explaining one of his paintings to a group of IWF scholars. Photo credit — Samantha Vilkins.



Rev Glenn and some of the IWF team after a cultural awareness workshop.

Through several workshops throughout the year, Glenn worked with our researchers and partners to unpack decoloniality. This learning is a first step to understanding how Indigenous and non-Indigenous communities can move forward together and how we can bring this awareness to our research.

As part of his residency, Rev Glenn created the artwork — *Water is Life, Not Property*. The painting depicts the Baaka River around Wilcannia and reflects the conflicting views that water is property to be controlled through agricultural, irrigation and property rights versus the idea that water is a life force that is shared and plentiful for all.

Indigenous initiatives

Announcement of 2023 Resident

The year came to a close with the appointment of the 2023 IWF cultural resident. **Hozaus Claire** is Bunuba/Gooniyandi man, young community leader and artist living in Broome. He uses art to tell the story of the Martuwarra Fitzroy River and why it is deserving of love, protection and promotion. Hozaus also works closely with young people in his community, helping to empower children and teenagers with the support to live happy and vibrant lives, contribute positively to the community and pass on their culture to future generations.

As part of his residency, Hozaus is working on an art piece exploring his cultural and personal relationship to the Martuwarra River and will share his insights with the IWF team along the way.



The IWF cultural resident for 2023, Hozaus Claire.

Our work

IWF teams lead a range of futures-focused research projects to improve knowledge, capability and governance in the water sector.



Research highlights

Dr Paul Wyrwoll led a **study** evaluating the gaps in Australia's drinking water quality and monitoring. Paul presented the work to federal government agencies and was featured in major media outlets.

Dr **Saman Razavi** developed a software program that can explain relationships across a range of natural or human-driven variables directly from any "given-data". His method is based on a fresh look at variography and can work even with small and patchy datasets. Through these insights, this research can contribute to more informed decision-making and policy development.

Building on longer term collaborations and research programs, **Dr Joseph Guillaume** and colleagues organised a workshop and **podcast** on Social Responsibility of Algorithms with a focus on digital agriculture, as well as international workshops on water policy innovation and modelling in a regulatory context.

In collaboration with Griffith University, the MDBA commissioned **Associate Professor Carina Wyborn** to undertake a literature review of socio-cultural values in the Murray Darling Basin. The team used the 'relational values' framework from the Intergovernmental Panel on Biodiversity and Ecosystem Services', and this report will serve as one of many inputs into the review of the Basin Plan.

Research highlights

Dr Hannah Feldman, Associate Professor Carina Wyborn and Dr Paul Wyrwoll, were awarded a grant to undertake exploratory field work in the northern Murray Darling Basin. This project has continued to grow into a full program of work exploring how decision makers and community members see the changing nature of their communities in the face of a water-stressed future. The project will continue as a core part of the IWF's cross-campus collaborative work in 2023.

Dr Jason Alexandra undertook research evaluating climate change risk assessments for Australia's Murray Darling Basin. He also reviewed legal and governance risks and developed options for more climate adaptive water policies, including options for more flexible allocation policy frameworks. The climate risk assessment research was published in several peer reviewed journals.

Dr Mahdiyeh Razeghi continued her **ground-breaking work** combining geodetic satellite data sets with in-situ observation to study groundwater evolution over Australia's basins.

Dr Barry Croke led ANU in the successful **One Basin CRC bid**, a collaboration of six universities and over 70 industry, community and government partners, focused on how the water available for the irrigation industry can be maximised while maintaining suitable water resources for communities and the environment. He was also part of a multi-disciplinary team lead by **ICEDS** that received funding to explore the potential for nature-based solutions to improve community resilience to flooding.

Research highlights

Dr Wendy Merritt and **Dr Serena Hamilton** contributed to an ACIAR-funded project examining inclusive agricultural value chains in the Philippines. Working with vegetable, coffee and coconut smallholder farming systems, their research explores the complexity of inclusion, including the conditions and drivers that enable the poor to benefit from well-functioning production systems and markets.

A team led by **Dr Baihua Fu** and **Dr Wendy Merritt** completed the **Queensland Foresight Project** — facilitating conversations on how government, industry and communities could embrace a culture of collaborative and future-oriented water planning and management.

Dr Steven Lade was awarded a Discovery Project from the Australian Research Council. The project will develop science-based environmental impact metrics incorporating water, land and climate for businesses and investors.

Dr Takuya Iwanaga was elected co-Chair of the Early Career Scholars Working Group with the Open Modeling Foundation, working with an international group to expand awareness and consideration of best practices and workflows to mitigate reproducibility issues.

Our work

Reviewing Australia's drinking water quality

A team led by Dr Paul Wyrwoll reviewed reports by 177 utilities servicing regional and remote Australia to identify locations exposed to poor drinking water quality. We assessed publicly reported data against the health-based and aesthetic criteria of the Australian Drinking Water Guidelines (ADWG).

The results (**published in the Nature Partner Journal, Clean Water in July 2022**) found that at least 627,000 people in 408 locations lacked access to the ADWG definition of 'good water quality', and 40% of the locations with health-based non-compliance were remote Indigenous communities.

We also found that about 8% of Australians are excluded from national reporting. For example, in regional New South Wales, local water utilities are not required to publicly report their drinking water quality performance. This means that around 1.2 million people in that jurisdiction do not know what is in their drinking water. The project shows that a national drinking water quality database could help to guide government investments in water services.



Our work

Monsoon Mission blended rainfall analysis for India

The multi-source blended rainfall analysis ensemble for India project, better known as the Monsoon Mission, wrapped up in early 2022. The project was funded by the Indian Institute for Tropical Meteorology and involved collaboration between the National Centre for Medium Range Weather Forecasting (NCMRWF), the Indian Meteorological Department, Bureau of Meteorology, and the IWF, headed by Dr Luigi Renzullo.

Through the project, we aimed to use multiple sources of rainfall, including satellites data and rain gauge measurements, to get an accurate and spatially comprehensive estimate of rain rate across the whole Indian subcontinent for the real-time evaluation of the NCMRWF's rainfall forecasts.

The rainfall blending method was developed and tested and in addition to generating the best real-time gridded rainfall for India, the method generates an ensemble of grids that represents the uncertainty in the rainfall estimates, and which can also be used to calculate the probability of exceeding certain rain rate thresholds. The work culminated in the transfer of software to collaborators at the NCMRWF where they are currently implementing the code into their operation systems as part of their real-time forecast quality checking procedures.



Our work

Outreach

As the year began, we launched straight into a busy program of public events.



Future of Flooding panellists (left to right) Stephanie Rosestone, Joseph Guillaume, Katherine Daniell, Steven Lade and Lorrae van Kerkhoff

We hosted several public webinars that attracted large and engaged audiences from around the country. Featuring expert guest speakers as well as IWF researchers, we covered topics including **First Nations perspectives on COP26**, the biggest issues facing groundwater, and what the **May 2022 Federal election results could mean for water policy**.

In September, visiting water law expert Professor Glennon gave a public lecture on the future in a warming, water-stressed world.

He reflected on what must happen to solve the global water crisis and secure food supply for the globe, with a focus on water challenges facing the USA.

We also hosted a panel discussion exploring the speculative future of flooding. In this futures-thinking event, four expert IWF panellists each presented a version of the future where flooding is no longer a disaster, but instead a welcome and even celebrated event. Drawing from their expertise in engineering, technology, policy, uncertainty modelling, and history, the panellists pondered what such a future would look like and how we might get there, starting now.

Our work

Policy engagement

During National Water Week, IWF joined with the Department of Climate Change, Energy, Environment and Water (DCCEEW) for the panel discussion, Imagining the Science-Policy Interface in 2050, a special event for IWF and DCCEEW staff.

Our expert panellists comprised IWF research fellows and the DCCEEW Head of Water Division. They shared their creative thinking on how connections between science and policy might evolve in the coming decades, and what must happen so science and policy can work together to tackle the complex challenges of water and the environment. The networking lunch that followed enabled a number of positive conversations about how IWF and DCCEEW can engage further, and discussions are underway for collaboration opportunities ahead of the 2024 review of the Water Act.



The IWF and DCCEEW panellists (left to right) Matthew Dadswell, Jason Alexandra, Hannah Feldman, Joseph Guillaume, Paul Wyrwoll and Carina Wyborn.

Our work

Media spotlight

The ground-breaking work of our researchers caught the eyes of the media. IWF fellow Dr Paul Wyrwoll attracted significant media attention including [this interview](#) after the publication of [his research](#) finding that Australians in more than 400 remote or regional communities lack access to good-quality drinking water.

Fellow Dr Hannah Feldman wrote [an article in The Conversation](#) on where the major parties stood on youth and climate change ahead of the May election. Hannah also spoke on [an episode](#) of the ABC podcast Science Friction about her work on youth, technology and the environment.





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