



THE AUSTRALIAN WATER SCIENCE NETWORK



What is the Australian Energy and Water Exchange Research Initiative (OzEWEX)?

OzEWEX is the Australian water science network—a volunteer science community organization that connects researchers and research users in academia, government and industry. Our guiding purpose is to support transformative research via science advocacy, knowledge sharing and capacity building (Figure 1), with each priority area expanded upon in the body of this document.

OzEWEX is not a funding organization. Instead, we support Australian water science by providing mechanisms to share information and knowledge, welcome informed debate and champion collaborative scientific efforts. Collaborative research experiments, workshops and events for development and training of early career researchers and practitioners are among our activities. To date many of these activities have focused on efforts to promote and increase measurement, understanding and prediction of the water, energy and carbon cycles and related variables over the Australian continent.

Supporting transformative research

Building capacity & sharing knowledge

Growing trust in water science

Advocating for national water research infrastructure

Figure 1 - OzEWEX priority areas

Australian Water Science Stakeholders

Key sectors for water science and water science policy



Agriculture



Energy



Communities



Environment



Mining & Industry

BOX: A DECADE OF MOUNTING PRESSURES

The pressures on our water resources will accelerate over the coming decade, with ever-increasing competition for finite water resources. We can expect:

- *Increased demand for water across all major sectors*
- *Continued change and intensification of land use, including urban development and the expansion of irrigation agriculture*
- *Enhanced water stress levels projected under climate change*
- *Increased incidence of a range of water-related natural hazards*

There will also be new demands on our water resources. The energy-water nexus means that water systems are becoming an increasingly critical component of the transition to a renewable energy future. We will also need to continue to balance human and environmental water requirements, and recognise the critical need to preserve cultural water for First Nations communities.

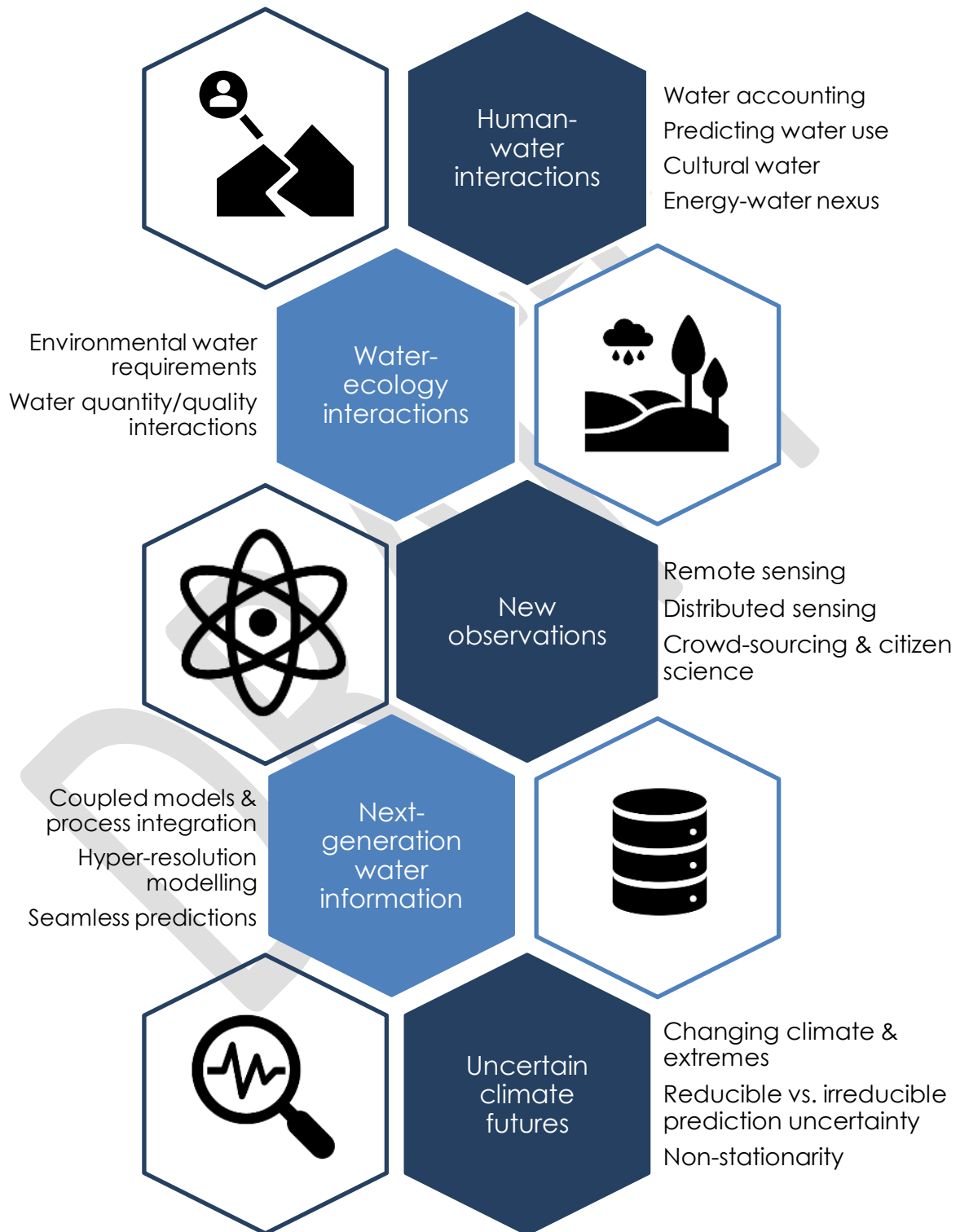
Yet there is hope that with adequate coordination and investment, Australia will be able to meet these challenges. We have a long history of innovation in water science backed by a strong scientific community that is well connected internationally. Australia has pioneered the application of new concepts in water science and policy, such as innovation in water markets and agricultural water use efficiency. With strategic focus and collaborative scientific efforts, Australia can leverage and build on its existing strengths and position itself to address these mounting challenges.

Meeting Australia's Water Science Needs

As the pressure on Australia's water resources continues to increase (see Box), the country will depend on a vibrant and active research community that contributes positively to the national debate. OzEWEX's vision is that our science will be most effective when we work as a community, taking coordinated efforts to accelerate progress in areas of societal need.

This document focuses on areas where transformative research efforts are required to deliver a step-change in our understanding and predictive capacity. We set out the key actions and activities required by this community organization to affect change in Australian water science. We propose building capacity and sharing knowledge, growing trust in water science nationally and advocating for a national water research infrastructure. The following sections outline five scientific 'Grand Challenges' that require focused attention over the coming decade, followed by the description of OzEWEX's role in addressing these challenges across the priority areas outlined in Figure 1.

Grand Challenges for Australian Water Science



1

Drive impact focused science by developing a science agenda and capacity building program that directly supports policies and decisions.

2

Stimulate thinking and informed debate by disseminating new ideas and providing means for scientific debate.

3

Champion collaborative, multidisciplinary science focused on big challenges in complex water systems like the Murray-Darling Basin.

4

Advocate for sustainable water research funding models both nationally and internationally, to create the capacity and resources for a coordinated, world-best water science community.

5

Advocate for scientific evidence and integrity to strengthen trust in water science and improve decision making and public debate.

Supporting transformative research

Through five enabling activities, OzEWEX encourages transformative research into Australia's water resources, focused on a set of community-identified Grand Challenges*

Advocating for national water research infrastructure

A sustainable research infrastructure of experimental water resource systems, a national water observing system and a collaborative water modelling platform.

Infrastructure components to support transformational water science



Experimental water resource systems

A set of intensively measured representative experimental water resources systems (e.g. critical hydrologic observatories), to answer water science grand challenges.



National observing system

A national observing system providing interoperable observation streams on the water cycle and managed water systems, including essential satellite data products and distributed continental station and sensor networks.



Collaborative modeling platform

Community-maintained, cutting-edge water system models for use by researchers and practitioners, to integrate diverse observation streams, trace water resources, understand the interaction between surface water, groundwater, people and ecosystems, and predict future conditions.

What is OzEWEX's role?

1. **Advocate** for the importance of national infrastructure.
2. **Advocate and coordinate efforts** to ensure infrastructure is designed with the science in mind.
3. **Stimulate discussion** around fit-for-purpose infrastructure and **increase visibility** of existing systems.

Building capacity & sharing knowledge

Fostering engagement with research, sharing knowledge within the community, and supporting of emerging practitioners.



Knowledge sharing and transfer

Domestic and international coordination with aligned organisations (e.g. GEWEX, HEPEX, Future Earth, TERN) to increase knowledge sharing and the development of research priorities.



Network & engagement

A strong water science community covering all relevant scientific disciplines, professions, organisations and sectors, fostering communication between research producers and research users.



Supporting emerging researchers and practitioners

Providing training and development opportunities for early-career researchers and practitioners through events and forums.

What is OzEWEX's role?

1. **Facilitate networking and engagement discussions** on a regular basis
2. **Host development programs** for early career researchers and practitioners, such as the OzEWEX summer institute.
3. **Support domestic and international connections** for the purpose of knowledge sharing.

Growing trust in water science

Growing trust in water science knowledge and research capabilities nationally through transparency and open systems.



Transparency & integrity in water science

Fostering inspired, informed and empowered general population with an understanding of Australian water science and water science issues.



Open systems

An open data and open source philosophy to support community driven response to science questions alongside improved access to science for decision-making.

What is OzEWEX's role?

1. **Advocate for transparency and openness** around water science and policy.
2. **Host and facilitate workshops** to foster open engagement.
3. **Foster a culture of contribution** where researchers and practitioners share and give back to the community.



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* Grand Challenges echo a range of recent papers that review and propose contemporary water science challenges (i.e. Wilby, 2019. A global hydrology research agenda fit for the 2030s. *Hydrol. Res; Wagener et al*, 2010. The future of hydrology: An evolving science for a changing world. *Water Resour. Res.*, 46(5); Sivakumar and Singh, 2014. Special Issue on Grand Challenges in Hydrology. *J. Hydrol. Eng.*; Blöschl et al, 2019. Twenty-three Unsolved Problems in Hydrology (UPH)—a community perspective. *Hydrolog. Sci. J.*; Elsayah et al, 2020. Eight grand challenges in socio-environmental systems modeling. *Socio-Environmental Systems Modelling*.)