

Australian Rivers Institute

*Our mission is to provide
the knowledge to support
the sustainable use and
conservation of the world's
aquatic ecosystems.*

griffith.edu.au/ari





The Australian Rivers Institute at Griffith University is a world leader in research and education on rivers, coasts and catchments. We take a source-to-sea philosophy to provide knowledge to support the rehabilitation, sustainable use and conservation of aquatic ecosystems.

We are dedicated to training our staff and students to become leaders in the water industry, government and the scientific community. We seek to combine outstanding scholarship with service to society through provision of expertise, training, and advice in relation to the management of aquatic systems.

Through our partnerships with government and industry, we ensure our research is relevant, innovative and targeted to meet the challenges to water security and the sustainability of aquatic systems in the face of global change.

ARI researchers

The Australian Rivers Institute has a core group of 62 research staff with expertise spanning the environmental and social sciences, resource economics and law. ARI researchers have an active network of international collaborators and our science is having a significant impact around the world.

ARI students

The Australian Rivers Institute offers Honours, Masters and PhD programs aligned with our core areas of expertise. In addition to an excellent learning environment at Griffith University, our students receive unparalleled experience working alongside our eminent researchers, in world-class laboratories and diverse field locations.

Grand challenges

There are myriad threats to aquatic ecosystems, which must be approached from a perspective that balances environmental, social and economic concerns. Our research aims to address four grand challenges for society:

- Balancing water needs for humans and nature.
- Arresting aquatic biodiversity decline.
- Tackling land-based waterways pollution.
- Making catchments more resilient to climate change.

To address these challenges, our research is organised around nine core thematic areas.

Biodiversity and conservation management

We integrate across a breadth of research in theoretical and applied science, and laboratory and field-based studies, and use contemporary modelling and decision analysis tools to support aquatic biodiversity conservation and management. The significance of this work relates to the 2016 World Wildlife Fund Living Planet Report, which identified that aquatic biodiversity is declining three times faster than terrestrial and marine biodiversity. We provide:

- efforts to arrest the decline of aquatic biodiversity
- underpinning research for balancing the water needs of people and nature
- and a multi-objective, multi-action framework necessary to support biodiversity.

Using technical and analytical approaches for diversity conservation planning.

Reducing risks to water security

We develop methods for protecting water quality for human health in urban environments. The challenges and uncertainties of changing climate and growing urban populations make our research vital to underpin future water management. We focus on four of the 17 United Nations Sustainable Development Goals (SDG): clean water and sanitation (6), sustainable cities and communities (11), responsible consumption and production (12) and life below water (14). We assess:

- the need for resilience of water supply
- the chemical impact of wastewater and stormwater discharges on aquatic systems
- and specialise in integrating wetlands into urban water cycles.

Developing methods to protect water quality for human health.

Sustainable fisheries and coastal ecosystems

We provide practical, evidence-based solutions for tackling the increasing challenges to coastal ecosystem health, biodiversity and fisheries from excessive nutrients and toxicants, fishing pressure and climate change. Marine ecosystems are under increasing threat from these stressors but they also support activities highly valued by humans, including tourism, fisheries, aquaculture, and recreation. In an era of rapid global change we seek to enhance the values derived from coastal ecosystems, including tourism, fisheries, aquaculture, and recreation. We support:

- efforts to make fisheries and aquaculture sustainable
- biodiversity and conservation planning
- methods and approaches to monitor and reduce land based pollution and its impact
- and seek ways to deal with climate change impacts and develop
- mitigation strategies.



Repairing land and water systems

We address the need to improve the success and sustainability of restoration and rehabilitation efforts for land and water systems. Many of our catchments and aquatic ecosystems—and the services they provide to people—are degraded. Millions of dollars are spent on their repair, often with limited success. We focus on understanding the impacts of stressors on all aspects of catchments and associated aquatic ecosystems, and developing tools to optimise investment in on-ground actions. We aim to:

- identify environmental balancing water needs
- protect aquatic biodiversity and restore ecosystem service
- reduce land-based pollution of waterways
- and make catchments, estuaries and coasts more resilient to climate change.

Improving success of rehabilitation of land and water systems.

Connecting soil and water

We provide a framework for protecting and sustaining water quality and quality at the catchment scale. Our research explores how improved land management, including agricultural and mining practices, can reduce pollution and improve river health. Our research:

- provides solutions for land managers to reduce carbon and nutrient footprints
- enhances monitoring capability
- contributes plans for managing wastewater in mining rehabilitation sites
- and help protect coastal ecosystems.

Tackling land-based pollution of waterways.

Innovative approaches for monitoring and reporting

We aim to produce cost-effective, sensitive and robust monitoring tools that support assessment and monitoring of aquatic ecosystems leading to informed decision making. Our research seeks to more accurately detect and model trends in ecological condition, identify emerging threats, test hypotheses, and evaluate the efficacy of management interventions. We aim to:

- detect and diagnose the source of threatening processes
- use monitoring and assessment techniques to evaluate the condition of species, populations and ecological processes
- and provide quantitative predictions of responses to natural and anthropogenic disturbances and rehabilitation actions.

Producing monitoring tools to support the management of aquatic ecosystems.



Aquatic ecosystems in a changing climate

Our research aims to understand the impacts of climate change and to support the urgent need to adapt to its effects in already-stressed aquatic ecosystems. Climate change will fundamentally alter the water cycle through direct changes to the timing, duration and magnitude of rainfall events, increasing temperatures and sea level rise. We seek to understand how these changes will differ across aquatic ecosystems, with scale and how it will impact the species present. We examine the multiple dimensions of climate change impacts on aquatic ecosystems and provide:

- mitigation strategies to counter climate change impacts
- and information on climate change adaptation strategies.

Tackling impacts of climate change on aquatic ecosystems.

Water and society

We synthesise natural and social science research to better inform decision making and implementation of effective management practices in complex socio-ecological systems. We work alongside scientists to help frame the benefits of scientific innovation in economic and societal terms, within the relevant legal and governance contexts. We:

- adopt a 'socio-ecological' perspective and provide effective practical outcomes from scientific solutions
- provide a business case for repairing ecosystems
- and provide policy options to achieve integrated aquatic ecosystem management.

Bringing together natural and social science for waterway management.

Predicting water futures

We specialise in describing and predicting the response of aquatic ecosystems to environmental change using ecosystem models. We draw on ARI's expertise across natural and social sciences, and apply models to bring an interdisciplinary perspective. We provide:

- quantitative advice to inform decisions on the management of aquatic ecosystems
- ecological and jurisdictional boundaries to predict effects of regional and global disturbances
- tools to balance human needs for water and ecological resources with the needs of ecosystems
- and training for the next generation of quantitative scientists.





If you would like to study with us or collaborate on research, visit our website to find out more information about our research, facilities, latest news, events or joining our team.

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Contact

E ari@griffith.edu.au

T +61 (0)7 3735 7153

 GriffithARI

catchmenttocoast.wordpress.com

griffith.edu.au/ari