www.goyderinstitute.org

WELCOME

How often have you heard that South Australia is the driest State on the driest inhabited continent on earth? To the people of South Australia, this is not just another cliché, but is in fact a way of life. Since the earliest days of settlement when the namesake of our Institute, George Woodroofe Goyder, laid down some of the foundations for water reform in the State and across Australia, South Australia has been recognised as a place where the challenges of sustainable water management need to be addressed and overcome. The recent Millennium Drought clearly exposed the increased threat to the security of water supplies for communities, industry and the environment.

South Australia's future economic growth and resilience is dependent on the provision of sustainable water supplies under a variable and changing climate.

This vital importance of water to the quality of life and the economic interests of the people of South Australia was recognised by the South Australian Government in establishing the Goyder Institute for Water Research in July 2010 and the development of a $50 million, 5-year strategic research plan.

We are building a research institute of national and international standing through a partnership model that brings together the State's leading water research capabilities at the University of Adelaide, Flinders University and UniSA in collaboration with CSIRO, into a single, comprehensive research institute.

The Goyder Institute, through its partners, is delivering the science and knowledge that is needed to provide expert, independent scientific advice to inform policy and decision-making in the areas of water management critical for South Australia. As we move forward, this science base will position the South Australian Government to pro-actively respond to future threats to water security and manage the water resources of South Australia in an integrated way.

With a powerful knowledge base coming to fruition, a focus for the Institute is to ensure that the research outcomes are readily available for all. Availability of this expert science, in a format relevant for water policy decision makers and water managers, will help ensure that the expert science created by the Institute is embedded in its partner organisations and with other stakeholders.

I invite you to read more about the Institute in this document and keep up to date with our activities through our website at www.goyderinstitute.org

Michele Akeroyd
Director, Goyder Institute for Water Research
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STRATEGIC INTENT

The Goyder Institute will support world leading water resource management in South Australia through excellent science.

The Institute will provide knowledge to support:

- The delivery of reliable and resilient urban water supplies that meet future needs
- The ongoing viability of existing water dependent developments and the identification of future sustainable water resource development opportunities
- The provision of environmental water to achieve optimal outcomes
- Proactive responses to climate change in water resource management
- Effective water management policy and decision making with clear and transparent trade-offs

GOVERNANCE

The activities of the Goyder Institute are managed through an independent office that draws advice from a Research Advisory Committee reporting to a Management Board.

MANAGEMENT BOARD

The key role of the Management Board is to set the strategic vision and direction for the Goyder Institute and to monitor its implementation and outcomes. It also reviews and approves annual research programs and budgets, and oversees the effective delivery of the research programs.

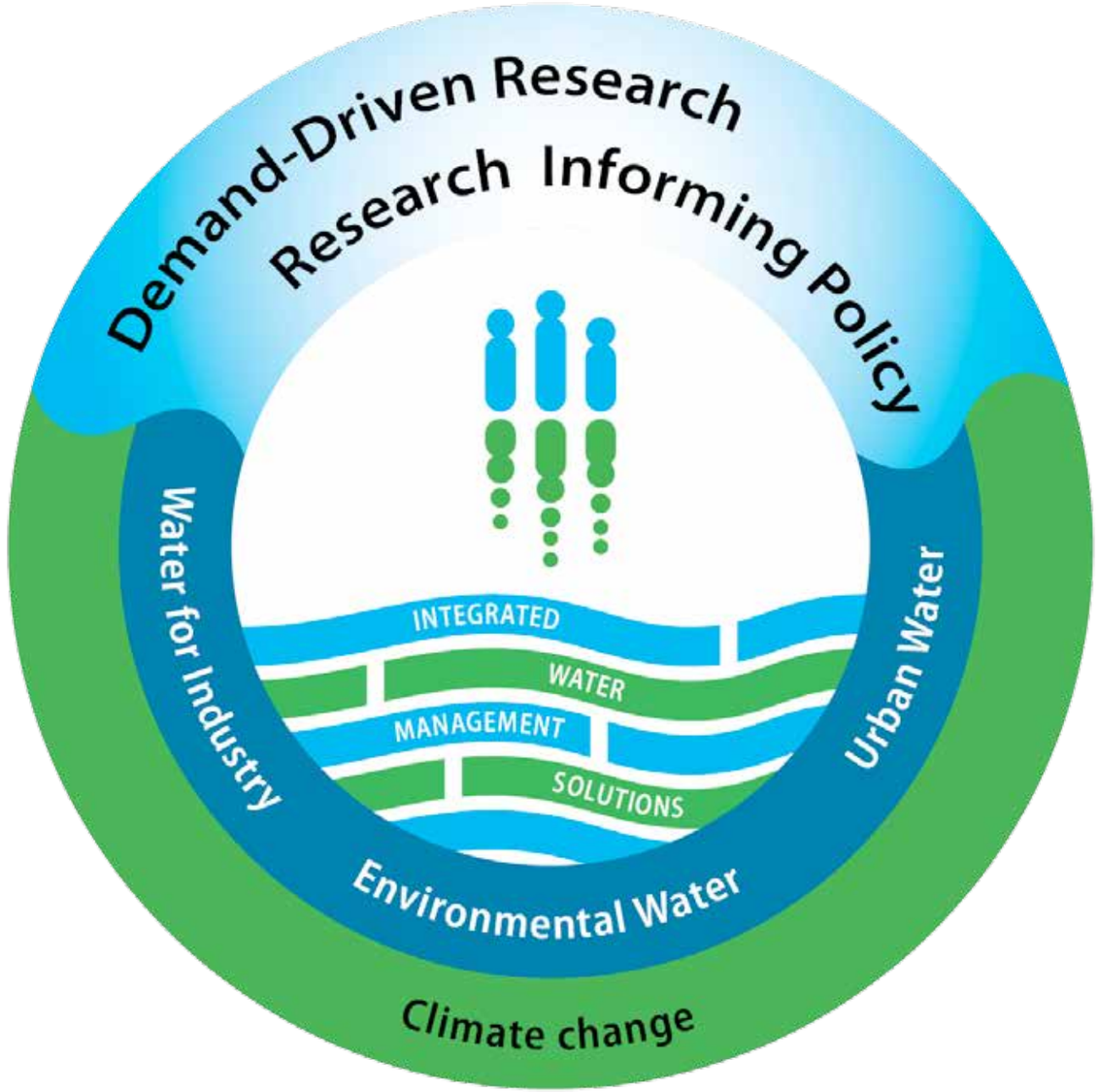
The Management Board comprises an Independent Chair, two representatives from CSIRO, two representatives from the State Government, and one representative each from Flinders University, the University of Adelaide and the University of South Australia.

RESEARCH ADVISORY COMMITTEE

The Research Advisory Committee assists the Director in the development of the Research and Development Plan of the Goyder Institute.

The RAC ensures that research is of international quality in areas that will ensure that South Australia's science is being most effectively deployed to manage the water issues facing the state.

The RAC is chaired by the Goyder Institute Director and comprises a research coordinator from each research partner, up to two representatives from government agencies including the Department of Environment, Water and Natural Resources (DEWNR) as determined by the State, a representative of the South Australia Research and Development Institute (SARDI) and a representative of SA Water.



BUILDING CAPABILITY

The Goyder Institute is enhancing the South Australian Government's existing capacity to develop and deliver science based policy solutions and in doing so, underpin the sustainable development of the State.

It is also strengthening the State's position as an international leader in water resource management and provides the South Australian community with confidence that the best scientific minds available are being targeted at resolving the State's key water resource management issues.

To achieve these outcomes, the Goyder Institute has initiated a number of activities including a PhD program, the ANZSOG-Goyder Institute Visiting Professor Program, embedding State Agency policy and science staff in the development and delivery of projects, and the creation of multi-organisational project teams working across the Goyder Institute Research Program.

These programs are developing enhanced science capability across academia, the South Australian government and industry and supporting the creation of future leaders in water management.

The Institute has also established a number of strategic partnerships nationally and internationally to ensure our capacity as leaders in water resource management for the benefit of South Australia.

SUPPORTING AGENCY STAFF TO ENHANCE SKILLS

Dr Sally Maxwell from the Science, Monitoring and Knowledge Branch of DEWNR has been involved with the Goyder Institute project on Water Allocation Planning in the Mt Lofty Ranges since 2013. In this project she has been involved in scientific studies to underpin the risk-based water planning with her research focussing primarily on ecological response modelling and the design and collection of field data to support this work.

Sally's involvement in this Goyder Institute project has allowed her to develop further her statistical modelling capabilities and further increase her presentation and professional writing skills. It has also afforded the opportunity for joint publication of results.

Furthermore, working as a visiting research scientist at CSIRO and being involved in a Goyder Institute multi-disciplinary project has enabled Sally to develop professional relationships with colleagues at numerous scientific agencies within South Australia, nationally and internationally. These skills and experience will prove highly valuable for her further science work to advise policy development within DEWNR and future research collaborations.

Photo: Church Hill Photography

RESEARCH PROGRAM

Historically, South Australia has relied on three rain-dependent sources of water – the River Murray, Mt Lofty Ranges and groundwater. However, like much of the southern regions of the continent, many areas of South Australia experienced a decline in surface water flows and groundwater over a decade from the early 2000's compared to long term averages.

This resulted in an increased threat to the security of water supplies for regional communities, industry and the environment. With projected impacts of climate change indicating a generally drier outlook, the State is facing a future of increased water scarcity and adjustment to those conditions.

Water is one of South Australia's highest priorities. South Australia's future economic growth and resilience is dependent on the provision of sustainable water supplies.

This has led to the State becoming a national leader when it comes to water innovation, including stormwater and rainwater recycling and urban water reuse.

The establishment of the Goyder Institute for Water Research is enabling critical further investment in water research and the next generation of knowledge to guide smart water use.

A copy of our Strategic Research Plan can be downloaded from our website at ***www.goyderinstitute.org***

The research effort funded by the Goyder Institute is focussed across four enduring Research Themes:

- Urban Water
- Water for Industry
- Environmental Water
- Climate Change

The Goyder Institute Strategic Research Plan 2011-2015 details the long-term strategic outcomes for a research program that will help ensure the water resources of the State are sustainably managed for economic, social and environmental benefits.

The role of the Goyder Institute is to develop and execute a research program that provides the science and research for specific water management outcomes and/or policy directions that have been identified by the South Australian Government in its strategic policy plans, Government Agencies and other stakeholders.

The ongoing development of our research program and associated strategic roadmaps takes place in consultation with research partners, stakeholders and the water industry to identify existing expertise, ongoing strategic developments, and any gaps-in-knowledge that need to be addressed in order to achieve specified outcomes.

URBAN WATER

In the Urban Water theme there are several projects aimed at supporting the development of an Integrated Water Plan for Greater Adelaide and to ensure that Water Sensitive Design forms an integral part of any current and future urban design.

The Goyder Institute is examining the use of alternative water sources for fit-for-purpose water supplies including options for harvesting, storage and recycling of stormwater, and has made several contributions to-date to the development of the South Australian Stormwater Strategy and to the preparation of the Urban Water Blueprint.

Allied projects under the Water for Industry Theme are researching the storage capacity, sustainable yield and salinity constraints of the Adelaide Plains groundwater resources, Mount Lofty Ranges water resource modelling of surface water quantity and quality across the catchments, and the hydro-ecological response of catchment environmental assets to water availability. These complement and contribute to the Urban Water program.

MANAGED AQUIFER RECHARGE AND STORMWATER USE OPTIONS (MARSUO)

To support management of stormwater reuse, The MARSUO project was designed to assess risks associated with different stormwater use options and determine how they can be managed to inform assessment of the net public benefits of potable and non-potable options, and to determine the level of community support for these options.

Studies of satellite sites in Australia and overseas were undertaken to compare stormwater quality and treatment requirements for reuse. The Parafield stormwater harvesting scheme at Salisbury in South Australia was a key case study in this project.

It is intended that the project will inform stormwater policy in Australia and will allow the best uses of stormwater to be identified for projects of different types and scales. The methods and results will provide tools, guidelines and examples to simplify the safe and efficient uptake of this resource.

Further information and technical reports can be found on the Goyder Institute website **www.goyderinstitute.org**

WATER FOR INDUSTRY

In the Water for Industry theme, techniques are being developed to promote equitable water sharing in multi-use catchments and in remote regions of the state. The objective is to develop sustainable water management practices for communities and industries (e.g. food, wine, forestry and mining) that are heavily reliant on safe and secure water supplies.

Initial project work has concentrated on the characterisation of regional water resources, the use of recycled water for irrigated agriculture, the identification of potential water sources for mining and outback community water needs, environmental water needs and cultural values associated with water.

OUTBACK WATER SOLUTIONS

Planned and potential mining and energy development in South Australia's far north is set to have significant consequences for the water resources of the region. The scale of planned developments and the potential from current exploration programs, facilitated by the South Australian Government through the Plan for Accelerated Exploration (PACE) Program, will result in a substantial increase in infrastructure requirements, including access to water resources and Aboriginal lands for exploration and potential mine developments.

The G-FLOWS research project, funded by the Goyder Institute, was undertaken to supplement information and knowledge developed by DEWNR under the Finding Long-term Outback Water Solutions (FLOWS) Initiative.

Research under G-FLOWS has provided key techniques to inform the accessibility and viability of the state's groundwater resources, the sustainability of those resources and the relationship to environmental and cultural assets.

The outcomes of this project will enable prudent decision making and policies regarding water allocation, accounting, licensing and sustainable yields whilst ensuring the protection of dependant ecosystems and environmental assets.

The G-FLOWS stage 1 project, led by CSIRO, has developed new analysis techniques to reinterpret historical minerals exploration Airborne Electro-Magnetic (AEM) datasets. A six-step method was developed that brings together many different datasets and combines them in a structured way to build a hydrogeological framework for the detection of potential regional groundwater resources.

The project's activity in this area is an international first and is attracting interest from other national agencies where exploration datasets may be a significant but undervalued resource for groundwater assessment purposes. These techniques are currently being adopted by the State Government's Plan for Accelerating Exploration, PACE 2020 for its AEM programs.

A stage 2 project is expanding the research work into northern Eyre Peninsula. This is an area of active exploration and mining with considerable water availability issues. This project will apply the stage 1 method and techniques to an area where there is a greater amount of airborne geophysical and well data to further develop the techniques.

Further information and technical reports can be found on the Goyder Institute website **www.goyderinstitute.org**

ENVIRONMENTAL WATER

In the Environmental Water theme, the focus is on developing a detailed understanding of the ecosystems of our major water resources like the River Murray and the groundwater fed system of wetlands in the South East of South Australia. These systems contain several RAMSAR wetlands of international importance that require a robust integrated management approach to maintain the environmental values of these regions, while also achieving social and economic outcomes.

The Goyder Institute has made significant contributions to public debate and government policy development through its robust reviews of the science underpinning the proposed Murray Darling Basin Plan and investigations of the River Murray ecosystem response to flooding after an extended drought period.

The water resources of the South East are managed as a holistic system recognising the interconnection between surface water and groundwater and the region's wetland systems.

A series of Goyder Institute projects has been established to provide surface water models and a better understanding the environmental water requirements of wetlands, including the influence of water quality to manage the delivery of water to wetland systems in the Upper South East through the South East drainage system, and develop a regional groundwater computer model for the lower South East for water allocation planning and management.

MURRAY FLOOD ECOLOGY

During the height of the Millenium Drought the health of the River Murray was critical. The decade long drought combined with overallocation of water from the river system, resulted in a huge loss of abundance of species across the whole Murray Darling Basin and severe degradation of the environmental assets of the River Murray were evident. The 2010 floods provided a unique opportunity for a cross-disciplinary team to investigate if the ecosystem was able to recover in the South Australian section of the River Murray.

The Murray Flood Ecology (MFE) project was a collaborative research project that investigated the ecological responses to flooding in the South Australian section of the River Murray. The research undertaken aimed to develop critical knowledge to inform the management of environmental watering required under the new Murray Darling Basin Plan. Data collected will aid in the development of models for assessing ecosystem response to various flow events, helping to create a framework of future management tools for the SA River Murray.

Flooding facilitated important ecological processes, such as fish movement, recruitment and increased food resources across the river system, leading to improved condition and recovery of key communities after drought. The research outcomes highlight that flooding, as an integral part of the natural flow regime, is important in maintaining the ecological integrity and connectivity of floodplain rivers.

CLIMATE CHANGE

The Climate Change theme is aimed at developing an agreed set of downscaled climate projections for South Australia to support pro-active responses to climate change and variability and to ensure a consistent cross-government approach for climate adaption planning and water resource planning.

This has led to an increased understanding of the primary climate drivers that are driving the observed climate change and variability over South Australia.

Climate projections have been developed for each of the eight natural resource management regions based on this improved understanding of local climate drivers.

USABILITY OF CLIMATE PREDICTIONS IN WATER MANAGEMENT

Professor Steve Rayner was the first ANZSOG-Goyder Institute Visiting Professor. The Visiting Professor Program brings to South Australia a range of skills and expertise to contribute critical review and interrogation of water policy issues facing water managers.

Professor Rayner is the James Martin Professor of Science and Civilization and Director of the Institute for Science, Innovation and Society at Oxford University. He is also Honorary Professor of Climate Change and Society at the University of Copenhagen and Senior Fellow at the Breakthrough Institute, a non-partisan environmental NGO based in California's Bay Area.

Through the Visiting Professor Program, Professor Rayner collected data for a South Australia case study to contribute to a larger project of the Oxford Martin School of Oxford University on the use, and usability of, weather and climate information in resource management. The aim of this interdisciplinary project is to address how and why scientific information is (or is not) used in decision making for the management of natural hazards and resources. In particular, it focuses on understanding the role of weather and climate information in the current practices of water-resource management.

It seeks to identify factors that promote, enable or constrain the successful use of data and forecasts, and the extent to which forecast information quality and/or institutional practices of decision makers contribute to these forecasts being used or not used. In addition to South Australia, case studies are being conducted or are planned in the Columbia River Basin of the US Pacific Northwest, the UK's Thames Valley, Belize, Kenya, and India's Ganges Basin.

Learn more in an interview with Prof. Rayner
http://mtu.flinders.edu.au/events/weather_rayner.cfm

GOYDER INSTITUTE FOR WATER RESEARCH

Partners of the Goyder Institute for Water Research

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The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department of Environment, Water and Natural Resources, CSIRO, Flinders University, University of Adelaide and the University of South Australia.

Photos: Claire Punter