



Understanding climate change impacts on water resource management in Western Australia



Climate change poses a range of challenges for water resource management in Western Australia, including rising temperatures and changing weather and rainfall trends.

During 2018, the ESCC Hub undertook a small case study with the Department of Water and Environmental Regulation (DWER) which, building on previous engagement activities, identified research to inform their water resource management and planning activities.

This work also led to the co-design of a research plan to ensure current and future research by the Hub is tailored to the needs of DWER, and that the resulting knowledge and information is easily incorporated into their water management tools and frameworks.

Knowledge exchange to understand information needs

The climate in south-west Western Australia (SWWA) has been drying since the 1960s, and this drying trend is expected to continue into the future. Long-term planning of water supplies for all water users and for the environment is therefore required to ensure the sustainability of water resources for SWWA under a changing climate.

The ESCC Hub has engaged with various stakeholders in SWWA, including DWER, since 2016 to exchange knowledge and identify the information needs for managing SWWA's water resources. A workshop held in 2017 by the Hub and SWWA stakeholders identified and discussed these information needs.

More than 15 gaps and needs were identified, including the need for more information on the impact of climate change on water demand in Western Australia, the impact of climate change on extreme weather, and more detailed climate change risk and vulnerability assessments. Some of these gaps and needs may be met with existing ESCC Hub resources, while others will require additional resources and research. The workshop report is available on the ESCC Hub website at www.nespcclimate.com.au.

During 2018 the Hub worked with DWER water resource management stakeholders on a small case study to better understand their climate information needs and determine the best way to provide the required climate data so it can be used and incorporated into existing DWER water resource tools and frameworks.

Understanding how climate change information is used

There is a wealth of climate change information and data available that has been developed in Australia to assist management, planning and policy activities. Currently, DWER uses climate change scenarios that are constructed in-house and are based on climate projections methodology available in the literature and the global climate models used in the Intergovernmental Panel on Climate Change's Fourth Assessment Report (2007) for their water modelling. They recognise the need to update the climate change projections.

The engagement activities under this case study updated DWER with the latest climate projection information, and provided the Hub with a valuable opportunity to better understand the approaches and tools used by DWER in their water resource planning activities. This has allowed Hub researchers to consider the type and format of hydroclimate data most appropriate for incorporation into these tools. This knowledge will be used to inform future Hub research plans, and will result in an increase in the accessibility and usability of the resulting knowledge and information.

Stakeholder driven research through the co-design of research plans

Armed with a better understanding of the climate change information needs of DWER and how best to prepare the data for ease of use in water resource management tools, Hub researchers and DWER stakeholders co-designed a tailored and stakeholder-driven research plan. Under this preliminary project plan, researchers will investigate the reliability of water supply to SWWA farm dams and environmental flow under climate change in the Wilyabrup Brook catchment. This will be conducted through modelling design and the provision and incorporation of climate change scenarios into DWER water management tools and frameworks.

Specifically, the co-designed research aims to:

- identify the critical rainfall metrics that drive the reliability of supply to farm dams and resulting environmental flow in Wilyabrup Brook
- assess how these critical rainfall metrics are represented in the latest future climate change information
- assess how future climate, including both changes in rainfall and temperature, could impact the reliability of water supply to farm dams and environmental flows
- develop an approach that can be applied to other and more complex applications.

While the Hub may not currently be able to conduct all of the above aims, these should be viewed as a research roadmap for a future stage-based research process depending on available resources.

Benefits of stakeholder engagement and knowledge exchange

The engagement and collaboration processes conducted under this case study result in multiple benefits for both parties. DWER gains a better understanding of the utility of climate change information and data in informing management and planning activities, and Hub researchers gain insights into stakeholder

information needs and tools used to assess and manage water resources in SWWA. These activities also serve to further enhance and strengthen relationships between researchers (the Hub) and policymakers/managers (DWER stakeholders) to encourage collaborative problem solving on environmental and climate change issues, which is a key objective of the National Environmental Science Program and the ESCC Hub.

The long-term benefit of these knowledge exchange activities and the co-design of tailored and stakeholder driven research will be that DWER has the information and science-based evidence required to inform their management and planning for the current and future impacts of climate change on the water resources of Western Australia.

Next steps

The ESCC Hub will continue to work with DWER on the co-designed research developed under this case study. The research will be undertaken throughout 2019 and 2020 within Hub projects that focus on water resources and climate change.

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