

Understanding the impact of climate on water availability in the Murray-Darling Basin

Water for a Healthy Country Flagship

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National Research
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Dealing with a variable climate is an important aspect of Australian water resource management.

CSIRO's climate and water scientists are involved in a range of research partnerships investigating the impact of a changing climate on water availability in the Murray-Darling Basin.

Research is underway to improve the characterisation and attribution of climate in south-eastern Australia, downscaling global climate model projections to provide catchment-scale climate and hydrological modelling to predict climate change impact on future water availability.

This will provide more accurate predictions of future water availability to guide water planning and management.

South Eastern Australian Climate Initiative

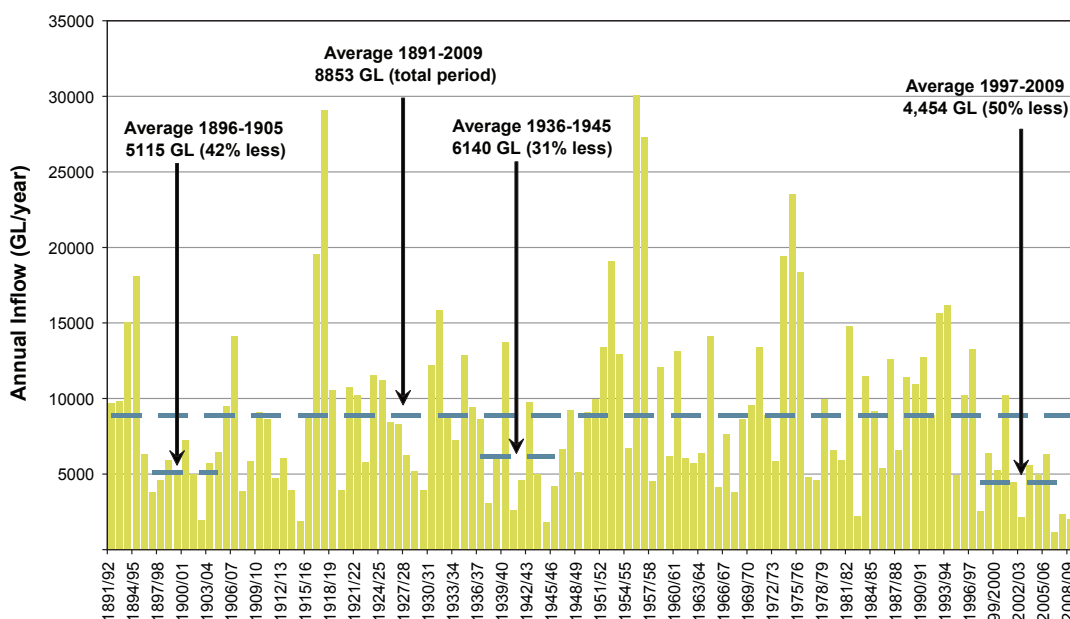
CSIRO research is primarily occurring through the South Eastern Australian Climate Initiative (SEACI), a partnership between research and policy agencies of the Australian and Victorian governments.

Research from SEACI and related studies have confirmed that:

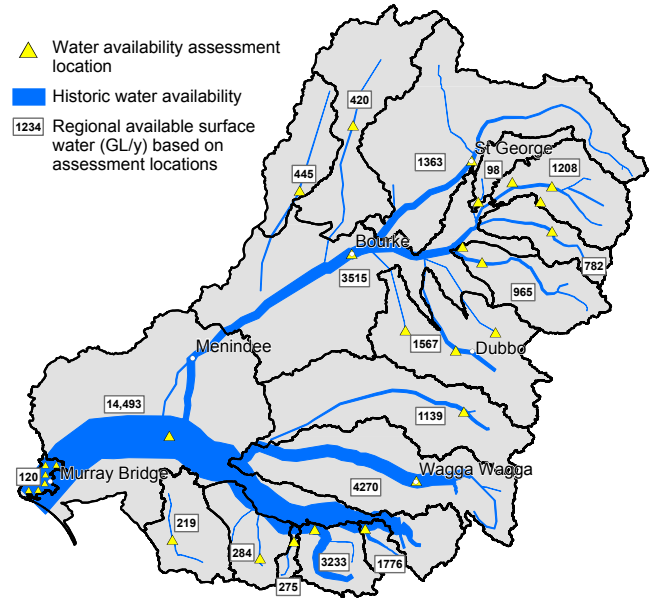
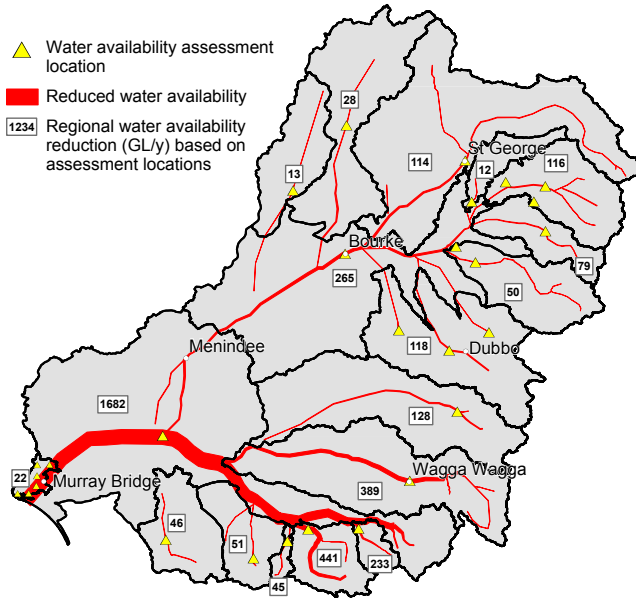
- The southern Murray-Darling Basin, where most of the runoff is generated, was in a prolonged drought.
- Factors that have contributed to streamflow decline include the: reduction in mean annual rainfall; disproportionate rainfall decline in autumn resulting in dry soil conditions at the start of the runoff season; rainfall decline in winter and spring when most of the runoff occurs; lack of high rainfall years in the past decade; and higher temperatures.

- The prolonged drought has placed immense pressure on the limited water resources and has led to the perception that this may be the start of a step change from historical conditions.
- The current rainfall decline is at least in part attributed to climate change, but it is difficult to separate the climate change signal from the high natural variability.
- Climate and water modelling indicates that under a medium global warming scenario there would be around 11 per cent less water on average in the rivers of the Murray-Darling Basin, compared to the long-term historical average.

Despite the best science, there is a wide range of future water predictions. Water managers and policy makers need to build these possible futures into their plans.



> Inflows to the Murray River showing the current drought in the context of longer term water and climate variability. Source: Murray-Darling Basin Authority.



> Decline in average annual water availability in the Murray-Darling Basin under a median future climate in 2030 (left) compared with the 20th century average (right), modelled by the CSIRO's Murray-Darling Basin Sustainable Yields project.

Supporting the Basin Plan

Based on these findings, a review of the latest science and an expert workshop, CSIRO's Water for a Healthy Country Flagship has provided the Murray-Darling Basin Authority with advice on defining climate scenarios for use in its modelling to guide the development of the first Basin Plan.

Advice was provided on three aspects:

- Climate baseline, based on the long 100+ years of observed historical data to describe the size, extent, connectivity and condition of the Basin's water resources.
- Future climate series to drive hydrological models using a method similar to that used in the CSIRO Murray-Darling Basin Sustainable Yields project. The method scales the historical climate series to reflect a future climate, informed by projections from global climate models used by the Intergovernmental Panel on Climate Change, to model runoff and inflows across the entire Basin. The modelling allows the determination of long-term sustainable diversion limits to consider the risks to the availability of water due to climate change.
- Climate sequences over the period of implementation of the first Basin Plan to assess the water resource, environmental and socio-economic implications of proposed diversion limits over the period of implementation of the Plan. A range of possible scenarios were proposed to assess system robustness and resilience to historical droughts as well as future climate projections.

Investigating the climate of south-eastern Australia

The South Eastern Australian Climate Initiative (SEACI) is investigating the causes and impacts of climate change and climate variability across south-eastern Australia.

SEACI aims to improve our understanding of the climate of the area so we can better manage the impacts of climate change and variability on water resources.

This research aims to provide improved projections of climate and water availability to help future water planning and policy.

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Want to know more?

South Eastern Australian Climate Initiative (SEACI): <http://www.seaci.org>

CSIRO Murray-Darling Basin Sustainable Yields project: <http://www.csiro.au/partnerships/MDBSY.html>

CSIRO advice to the Murray-Darling Basin Authority on defining climate scenarios: <http://www.mdba.gov.au/files/publications/Defining-climate-scenarios-report-from-CSIRO.pdf>

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CSIRO and the Flagships program

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