

Online submission

20 September 2024



**Australian Academy of Science submission on the
*A new Australian Government drought plan***

The Australian Academy of Science welcomes the opportunity to comment on the *A new Australian Government drought plan*.

Drought is a national challenge that impacts Australians and requires a coordinated effort across different sectors and organisations.

Australia's science system is part of this effort. Scientific research helps us understand the mechanisms that influence the timing, duration and severity of drought, in turn supporting efforts to better predict drought and develop new approaches for adapting our agricultural systems to drought conditions. It is crucial to maintain and regularly upgrade essential research infrastructure (e.g., weather stations, streamflow monitoring and satellite monitoring platforms) to better understand and predict drought across the country. Australia has existing strengths in agricultural and drought resilience research that requires a coordinated strategic approach to be maintained and expanded in the future.

The Academy:

- Emphasises that science is a critical input to drought preparedness, response and recovery, and ongoing fundamental scientific research is required to better understand the complexity of drought processes.
- Recommends the inclusion of additional content that explicitly addresses policy to coordinate, maintain and grow Australia's drought science capability. Additions could include:
 - further detail under 'Promoting innovation and adoption' (p. 12) regarding how the fundamental science underpinning innovation is being supported and coordinated.
 - articulating an approach to strategic coordination between organisations in the science system on science relevant to drought.
 - a sub-section on science, research and innovation in the 'Links to other government policy'.

The recommendations of *the Review of the Australian Government Drought Response, Resilience and Preparedness Plan* emphasise that a new drought plan should explain and clearly state the government's drought policy and the government's role in drought preparedness. These objectives are incomplete without explicitly addressing Australia's drought science capability.

Science enables drought preparedness

The Academy recognises that the focus of this plan is farming businesses and communities, who draw on tools and data enabled by science. A better understanding of the science of drought events and agricultural resilience can be translated into insights to assist with business and community planning.

Science has a critical role in drought preparedness and a recognition of this should be included in the plan. The global science network is continually developing new tools and knowledge that offer important opportunities for us to build drought and climate resilience into our production systems, including:

- climate and weather science underpinning weather forecasting, climate models and potential future scenarios
- genetics and genomics of climate resilience traits in crops and animals to support breeding programs
- disease, pest and weed epidemiology, and resistance mechanisms to help manage changes in incidence of outbreaks with shifts in climate

- soil chemistry, structure and biology changes resulting from drought and future rainfall patterns and baseline temperature shifts to support land management plans
- data processing and image (including spatial) analysis tools that lead to improved land management strategies under drought.

Scientific research is required to understand the mechanisms behind drought occurrence so that we can better predict droughts and develop new ways of adapting agricultural and other systems to drought. Currently, the ongoing requirement for basic science to better understand the complexity of drought processes is not recognised. Recent discoveries that highlight how an extended drought, lasting three years, required very different explanations in each year, demonstrate the challenges associated with any simple explanation of drought.¹

Our understanding of the fundamental science of drought processes has implications for preparedness and climate adaptation, however, gaps in our understanding of drought mechanisms remain. For example:

- we do not have a good understanding of what causes the lack of rainfall that results in droughts.
- while the causes of heavy rain are well understood, why these events are lacking, and what brings them back to break a drought are deeply uncertain.
- we know there are droughts in the longer record that dwarf anything seen in the historical record in terms of duration, but we do not know why. For example, analysis of ice cores identified a 39-year drought around 800 years ago.²

Recognising the full pipeline of drought science, research and innovation

While the plan references programs aimed at promoting innovation and adoption, these programs do not address the science and scientific capability that underpins our fundamental understanding of drought processes and drought resilience.

Australia has internationally recognised expertise in drought tolerance and agriculture. The plan assumes current capabilities will exist indefinitely. However, science is not static and our strengths in drought science cannot be taken for granted.

The Academy recommends **additional clarity be provided under the heading ‘Promoting innovation and adoption’ (p. 12) regarding how the fundamental science underpinning innovation is being supported and coordinated.**

The plan would also be enhanced by the inclusion of **a sub-section on science, research and innovation in the ‘Links to other government policy’ section.** This new sub-section should clearly state the government’s policy response to build, maintain and grow the full pipeline of science and research capabilities required to enable drought preparedness.

Coordinating and maintaining Australia’s drought science capability

Australia has existing strengths in drought science and innovation dispersed amongst a range of government departments, science agencies and programs. Further, coordination and considered efforts are required to maintain this expertise and grow it if required.

A new drought plan provides an opportunity to improve coordination between the wide variety of mechanisms in Australia for supporting research related to drought.

The Drought Resilience, Adoption and Innovation Hubs do not address this issue nor do the other organisations, such as the research and development corporations.

¹ Devanand, A., et al., 2024, Australia’s Tinderbox Drought: an extreme natural event likely worsened by human-caused climate change, *Science Advances*, 10, eadj3460, doi:[10.1126/sciadv.adj3460](https://doi.org/10.1126/sciadv.adj3460).

² Vance, T. R., et al. (2015), Interdecadal Pacific variability and eastern Australian mega-droughts over the last millennium, *Geophys. Res. Lett.*, 42, 129–137, doi:[10.1002/2014GL062447](https://doi.org/10.1002/2014GL062447).

The plan could be enhanced by **articulating an approach to strategic coordination between organisations in the science system on science relevant to drought.**

To discuss or clarify any aspect of this submission, please contact Mr Chris Anderson, Director Science Policy at Chris.Anderson@science.org.au.