

SUBMISSION

Submission to the Department of Agriculture, Fisheries and Forestry

Submission to the Australian Government Drought Plan

11 September 2024

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

Droughts can have deep and long-lasting impacts on the environment, communities and agricultural industries. The Millennium Drought in the early 2000s affected the vast majority of Queensland, New South Wales and Victoria and cut farm incomes by 51%, cut employment in the grain, beef and cattle industries by a third, and devastated regional communities (Lu and Hedley 2004). Droughts are becoming longer, more severe, and more frequent as the climate changes, and their onset can be more unpredictable (Falster et al. 2024). Preparing for drought is therefore vital not only to our agricultural sector but also to the survival of regional communities.

The Academy recommends that the key focus of the proposed Australian Government Drought Plan be on prevention and preparation, with some planning for drought response also included. ATSE commends government support in response to droughts that focuses on supporting resilience and recovery for all members of affected communities (not just agricultural business). Enabling and supporting farmers to prepare for inevitable drought conditions can help mitigate the impact of droughts and reduce the need for crisis support when droughts inevitably hit. This would ideally be supported by centrally monitoring water networks using satellite technology to better understand and manage our water systems. Improved drought prediction reliability, and investment into data collection, monitoring and analysis – and effective, timely communication of findings - will provide communities with the information they need to prepare, survive and thrive through tough and variable conditions. Investing in a pipeline of research and development of new technologies to prepare for and mitigate drought impacts will also be essential to ensuring the long-term prosperity of Australia's regional communities and agricultural sector.

ATSE recommends the following actions to help manage droughts in Australia:

Recommendation 1: Support farmers to identify and adopt the most effective drought mitigation and preparation technologies and alternative revenue streams.

Recommendation 2: Develop a National Flood Plan, aligned with the Australia Government Drought Plan, to develop strategies to mitigate the impacts of flooding.

Recommendation 3: Implement the recommendations of the Independent Review of the Australian Climate Service by establishing a one-stop-shop for climate and water data to support effective decision making.

Recommendation 4: Invest in agricultural research and development, and incentivise greater research and development investment from businesses in agricultural technologies and innovations.

Building social licence for drought management

The development of the Australian Government Drought Plan is a critical opportunity for the Federal Government to engage with rural and farming communities - this engagement may be as impactful as the plan itself. ATSE commends the Department for the Draft Plan's commitment to engaging with Aboriginal and Torres Strait Islander peoples and communities, and to learning from their ancestral knowledge of Australia's landscape and weather systems. This engagement provides an opportunity to bring together science, Traditional Knowledge and expertise from farmers and landholders to help highlight best practice and build drought preparation and prevention into everyday practices.

This consultation will be most effective when done under a formal commitment to a consultation framework, for example the CSIROs [Our Knowledge Our Way framework](#). It should honestly assess previous drought management strategies and examine what has and has not worked in the past, accounts for the lived experience and documented impacts of both droughts and prior strategies on farmers and communities, and understands which previous objectives remain unfulfilled and why. Recent reviews of drought preparedness – such as the [Review of Australian Government Drought Response](#) and the [2019-20 Drought Response Resilience and Preparedness Plan Implementation Review](#) - will provide a strong starting point for these consultations. Engaging frankly and openly with these challenges and with local communities will help to ensure that the plan benefits from all knowledge systems and is grounded in a strong understanding of on-the-ground impacts, enabling the plan to provide drought support to communities in the most holistic and effective way possible.

Drought as a business risk

Droughts, while devastating, are a standard business risk for farmers. Since federation, Australia has been subjected to seven major drought periods lasting multiple years – roughly one every 18 years (Bureau of Meteorology 2020). Preparing for droughts is much cheaper and more effective than responding to them (UNCCD 2023). Drought preparation and mitigation should therefore be a part of every farm's risk management strategy rather than prioritising drought response and recovery. Information and support - to uplift understanding of drought preparation options, assess local drought risk and determine the most appropriate preparation for individual farms - will support farms to survive during typical droughts and enable government support during times of crisis to be directed towards the public benefit, rather than protecting private businesses.

Options for rainfed farms include setting aside fodder for future droughts, and on-farm long-term water storage. Irrigated farms can adopt water saving technologies, such as closed channels and dams and automated/scheduled drip irrigation to get the most out of the water that is available. More broadly, farmers can consider the water intensity of their crops and use water saving variants of crops where available. Alternative revenue sources, such as green energy infrastructure can also help farms to survive economically during periods of drought. Providing information and resources to farmers on managing drought risk should be a primary objective of the Drought Plan.

There are some risks that follow droughts that cannot be fully mitigated. Drought conditions can increase the risk of other natural disasters – bushfires, dust storms, heatwaves and floods – by making them more likely or more severe (Xu et al. 2023; AdaptNSW n.d.). Floods, in particular, are devastating to the national economy and are exacerbated by droughts as overly dry surfaces fail to absorb water, leading to increased runoff during heavy rainfall. Modelling projects that between 2022 and 2050 floods will cost the Australian economy \$44 billion, while droughts will cost the economy \$28 billion (GHD 2022). The impact of floods can be in the tens of billions of dollars - the 2010-11 Brisbane floods were found to have cost the economy \$14.1 billion (Ulubasoglu and Beaini 2020). The Australian Government Drought Plan will need to consider these indirect and flow-on impacts of droughts on Australian agriculture and communities. A separate, but linked, National Flood Plan would help support the government's response to and preparation for interlinked natural disasters including in towns and cities.

Recommendation 1: Support farmers to identify and adopt the most effective drought mitigation and preparation technologies and alternative revenue streams.

Recommendation 2: Develop a National Flood Plan, aligned with the Australia Government Drought Plan, to develop strategies to mitigate the impacts of drought related flooding.

Using data and coordination to manage water systems

Centralised coordination of information on water resources is technologically achievable yet remains underutilised. Low-cost data collection is available through satellites that enable the assessment of a huge range of factors that help indicate the health of our water systems – flow rates, salinity, usage offtake rates, flood plain harvesting and more. Collecting and utilising this data both before and during drought conditions will enable improved water management and more effective responses to drought conditions. By developing modelling based on these data, adjustments to water management could be made in near real-time, allowing for assessment of how changes will impact both local areas and the broader water network.

This kind of monitoring will also help to support Australia's energy network, with water playing an increasingly important role in energy storage and generation through hydroelectricity and green hydrogen. During low rainfall conditions, the volume of water stored in dams reduces, limiting energy generation. Drought conditions have caused severe reductions in hydro generation across the world, in China, the United States, Canada and, most recently, Ecuador (Willige 2023; Buschschlüter 17 April 2024). Monitoring of reserves across water networks and managing these systems appropriately will therefore be vital to protecting both agricultural and energy production.

Management and use of climate data is the responsibility of the Australian Climate Service (ACS). However, a recent review of the ACS found that it "cannot meet the national needs for climate services and a different delivery model is required" (O'Kane et al. 2024). The review recommended the reorganisation of the ACS into a National Climate Service (NCS) within the Department of Climate Change, Energy, the Environment and Water, with the new NCS being the first port-of-call for climate data to enable effective coordination of

information to enable effective decision-making. Implementing the recommendations of the Independent Review of the Australian Climate Service would go a long way to ensuring better data collection and utilisation across the country.

Recommendation 3: Implement the recommendations of the Independent Review of the Australian Climate Service by establishing a one-stop-shop for climate and water data to support effective decision making.

Supporting drought resilience through research and development

Australian agricultural research and development (R&D) is world leading, but underfunded. While agricultural, veterinary and food sciences were the largest recipient of direct government R&D funding (15%), just 2% of business R&D expenditure in Australia was spent on the agricultural sector (Australian Bureau of Statistics 2024, 2023). Investment in R&D in Australia has fallen as a proportion of GDP since 2008 (World Bank 2024), with direct government funding dropping to just 0.56% of GDP, and total research funding at 1.68% of GDP (Australian Parliamentary Library 2022).

Investing in R&D could result in major improvements to farms' capacity to survive drought conditions. Research on climate models and weather impacts can help us better predict the likelihood and severity of droughts, reduce uncertainty, and help policy makers to respond more effectively to droughts. On-farm technologies can help develop new water supplies, through desalination of underground water reserves, and better manage water resources through better conservation and storage. Continued development of drought resistant crops and pasture can help ensure farms remain profitable during droughts. Research investment should go beyond just farm and water saving technologies. Social science research into rural communities' capacities, responses and social resilience to droughts would support appropriate programs and allocation of resources to support those communities. Direct government investment through research grants and the Rural Research and Development Corporations can help stimulate this research, but more work is needed to bring in business investment. Research hubs, tax incentives and co-investment are all possible mechanisms to incentivise business in agricultural technologies and innovations to invest more in R&D.

Recommendation 4: Invest in agricultural research and development, and incentivise greater research and development investment from businesses in agricultural technologies and innovations.

ATSE thanks the Department of Agriculture, Fisheries and Forestry for the opportunity to respond to the Australian Government Drought Plan. For further information, please contact academypolicyteam@atse.org.au.

References

- AdaptNSW (n.d.) *Climate change impacts on drought*, <https://www.climatechange.environment.nsw.gov.au/impacts-climate-change/weather-and-oceans/drought>, accessed 21 August 2024.
- Australian Bureau of Statistics (2023) *Research and Experimental Development, Businesses, Australia*, <https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/2021-22>, accessed 30 August 2023.
- Australian Bureau of Statistics (2024) *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia*, <https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-government-and-private-non-profit-organisations-australia/latest-release>.
- Australian Parliamentary Library (2022) *Budget Review April 2022-23*, https://www.aph.gov.au/About_Parliament/Parliamentary_departments/Parliamentary_Library/pubs/rp/BudgetReview202223, accessed 5 January 2023.
- Bureau of Meteorology (2020) *Previous droughts*, <http://www.bom.gov.au/climate/drought/knowledge-centre/previous-droughts.shtml>, accessed 20 August 2024.
- Buschschlüter V (17 April 2024) 'Drought causes power cuts in Ecuador', BBC News, Accessed 21 August 2024, <https://www.bbc.com/news/world-latin-america-68835127>, accessed 21 August 2024.
- Falster GM, Wright NM, Abram NJ, Ukkola AM and Henley BJ (2024) 'Potential for historically unprecedented Australian droughts from natural variability and climate change', *Hydrology and Earth System Sciences*, 28(6):1383–1401, doi:10.5194/hess-28-1383-2024.
- GHD (2022) *Aquanomics: The economics of water risk and future resilience*, <https://aquanomics.ghd.com/en/index.html>.
- Lu L and Hedley D (2004) *The impact of the 2002 drought on the economy and agricultural employment, Economic Roundup Autumn 2004*, <https://treasury.gov.au/publication/economic-roundup-autumn-2004/the-impact-of-the-2002-drought-on-the-economy-and-agricultural-employment>, accessed 21 August 2024.
- O'Kane M, Quinlivan D and Reichelt R (2024) *Final report Independent Review of the Australian Climate Service*, <https://www.dcceew.gov.au/climate-change/policy/tools-and-services/australian-climate-service-review>.
- Ulubasoglu M and Beaini F (2020) 'The Effects of the 2010-11 Queensland Floods on Individual Income: A Case Study on the Brisbane River Catchment Area', *PreventionWeb*, <https://www.preventionweb.net/publication/effects-2010-11-queensland-floods-individual-income-case-study-brisbane-river-catchment>, accessed 18 June 2024.
- UNCCD (2023) *Investing in resilience: Innovative finance for drought preparedness*, <https://www.unccd.int/resources/brief/investing-resilience-innovative-finance-drought-preparedness>, accessed 30 August 2024.
- Willige A (2023) *Hydropower: How droughts are affecting the world's biggest renewable energy source, World Economic Forum*, <https://www.weforum.org/agenda/2023/11/hydroelectricity-generation-falls-droughts-climate-change/>, accessed 21 August 2024.

World Bank (2024) *Research and development expenditure (% of GDP) - OECD members*, https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?locations=OE&most_recent_year_desc=false, accessed 21 August 2024.

Xu R, Yu P, Liu Y, Chen G, Yang Z, Zhang Yiwen, Wu Y, Beggs PJ, Zhang Ying, Boocock J, Ji F, Hanigan I, Jay O, Bi P, Vargas N, Leder K, Green D, Quail K, Huxley R, Jalaludin B, Hu W, Dennekamp M, Vardoulakis S, Bone A, Abrahams J, Johnston FH, Broome R, Capon T, Li S and Guo Y (2023) 'Climate change, environmental extremes, and human health in Australia: challenges, adaptation strategies, and policy gaps', *The Lancet Regional Health - Western Pacific*, doi:10.1016/j.lanwpc.2023.100936.