



Australia's National  
Science Agency

# Drought Resilience Mission

Mission progress update

May 2021



# Australia needs an integrated national approach to drought resilience

Despite recent flooding rains in some parts of Australia, the next drought is coming. More frequent, severe, and prolonged droughts are predicted for many parts of Australia, and rainfall generally will be lower across Southern Australia.

This challenge requires novel responses from the agricultural sector, regional communities, and government to improve Australia's drought preparedness and resilience before the next drought.

Drought resilience comes from the actions taken before, during and whilst recovering from drought.

Now is the time to act.

A broad perspective of the effects of drought that considers the needs of different stakeholders is required to build both economic, environmental and social resilience against drought.

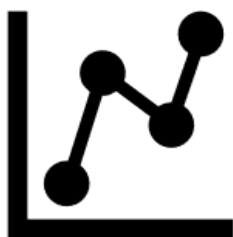
CSIRO is developing the Drought Resilience Mission with a growing number of government, industry, community, research and investment partners to address the pressing national challenge we face from more frequent and severe drought cycles in Australia.

## **The Drought Resilience Mission has a goal to reduce the impacts of Australia's droughts by 30 per cent this decade**

Three main work packages have been identified to achieve the goal of the Drought Resilience Mission:



**On-farm innovation**



**Regional resilience**




**Policy enablement**

The Drought Resilience Mission has recently seeded projects and has been working with partner investments to investigate ways to reduce the impacts of future droughts and build drought resilience.

In coming years we will work with aligned partners to develop and implement science-based solutions that create change on-farm, in regions, and provide the information to support policy that improves Australia's resilience and prosperity leading into, during and recovery from droughts.





## Drought Resilience Mission achievements to date

By engaging with partners and investors to co-design opportunities and projects we have:



- Developed a range of tools to:
  - Identify the risks of loss of soil by wind erosion.
  - Inform the development of risk sharing tools.



- Completed an assessment of the water banking opportunities in the Murray-Darling Basin.



- Developed a consortium of interested parties and planned for community engagements to increase regional resilience.
- Further developed the National Drought Map.
- Initiated the development of the Climate Services for Agriculture program, which will be available later in 2021.

Reducing the impacts of Australia's droughts by 30 per cent this decade will require quality science and quality engagements between industry, regional communities, government, researchers, and others from across society to build a broad innovation ecosystem focused on building drought resilience.

We are completing a review of the economic, social, environmental costs of drought to capture the types of costs, provide baselines where they exist and highlight where methodologies need to be developed to guide future research and policy development.

Examples of work to date in each of the three work package areas follows. We invite ideas and engagements from all interested partners and investors.



# Work package 1: On-farm innovation



The focus of the on-farm innovation work package is to develop partnerships across the agricultural innovation system and deploy technologies, tools, and practices at scale.

When implemented, these developments will improve agricultural productivity, profitability and sustainability going into, during and in recovery from drought.



# On-farm innovation

## Farming system interventions

Australia has a dry and very variable climate that leads to large annual differences in production, income and profitability. We seek to help primary producers reduce the effects of these swings that are predominantly driven by rainfall.

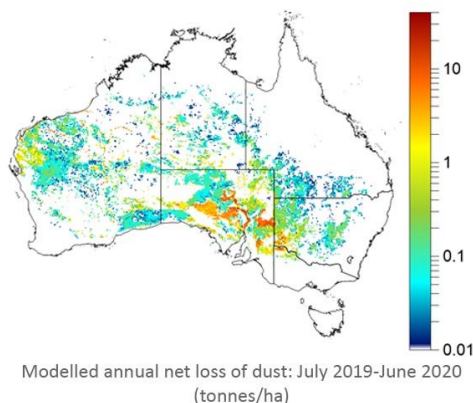
Dryland and irrigated cropping research teams have engaged producers, consultants and grower groups to explore new farming system innovations and strategies with potential to reduce the impact of unpredictable rainfall using experience from recent droughts. Growers and consultants nominated successful early crop establishment under variable seasonal conditions as critical to improving business resilience. We are investigating novel agronomic innovations to facilitate early sowing including the use of crop varieties with genetic traits allowing them to emerge from deeper in the soil (long coleoptiles) using rain that is stored at depth in the soil rather than waiting for the increasingly unreliable autumn rainfall for sowing.

In livestock production systems stocking rate is a key decision as drought develops. A recent activity with Meat & Livestock Australia re-enforced the reasons many graziers find the decision difficult. A new approach is being explored to address the reluctance to sell animals with genetics that have taken many years to develop on-farm. Would de-stocking based on genotype be a better strategy than based on age alone? Genotyping is being adopted for many reasons, including choosing animals with increased immune response. Adding another use case could encourage greater technology uptake, providing benefit of early de-stocking whilst maintaining genetic performance of the herd.

## Dust forecasting and hindcasting

Dust in the atmosphere and soil loss are a consequence of the loss of groundcover, which is exacerbated by drought. Airborne dust can be transported hundreds of kilometres, causing dust storms, low visibility, poor health outcomes for animals and humans, and deposition of dust onto surfaces. Hindcasting using the model is showing us where hot spots of loss are likely, allowing us to engage with industry to develop strategies to reduce soil loss.

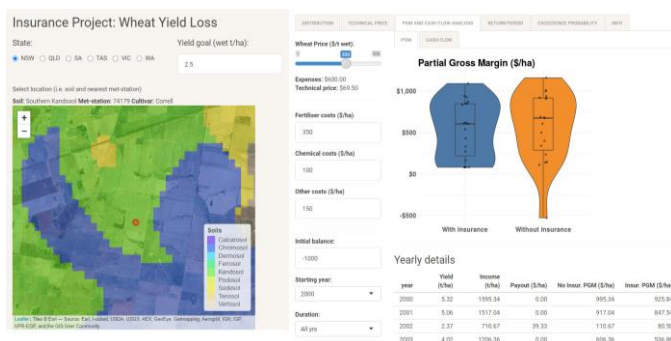
Knowledge of when and where dust storms are likely to cause problems (forecasting) – even at short lead times – is of benefit. Our new dust model estimates the current geographical extent and flux of soil lost, where it travels to and is deposited, and the total number of days per year that population centres experience air quality issues due to dust. Using decadal weather predictions, we aim to develop the capability to continue forecasting potential dust loss for the years ahead.



## Information to aid risk sharing

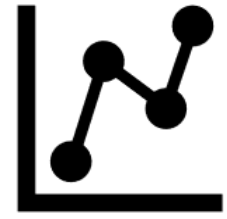
Adapting new farming systems alone will not mute financial losses in the worst of years, so we are using our modelling tools and analytics to underpin the development and adoption of market-based risk sharing strategies.

By engaging with industry, we are exploring how yield variation in one location can be presented so that growers and insurers understand the risks. This is relevant to other risk sharing instruments such as external investment, marketing, and new options and hedging approaches. We are working with the Bureau of Meteorology to evaluate the use of private weather stations to allow weather monitoring at resolutions that matter to individual farmers. New risk instruments can utilise this capability and provide the agricultural sector with tools and capability to manage climate variability.





# Work Package 2: Regional resilience



The focus of the regional resilience work package is to develop partnerships with regional communities to co-design and implement technologies, tools and policies at scale that improve regional resilience going into, during and in recovery from drought.

Potential benefits include improved community resilience, increased regional water security, and a reduced need for government and charitable assistance through the drought cycle.



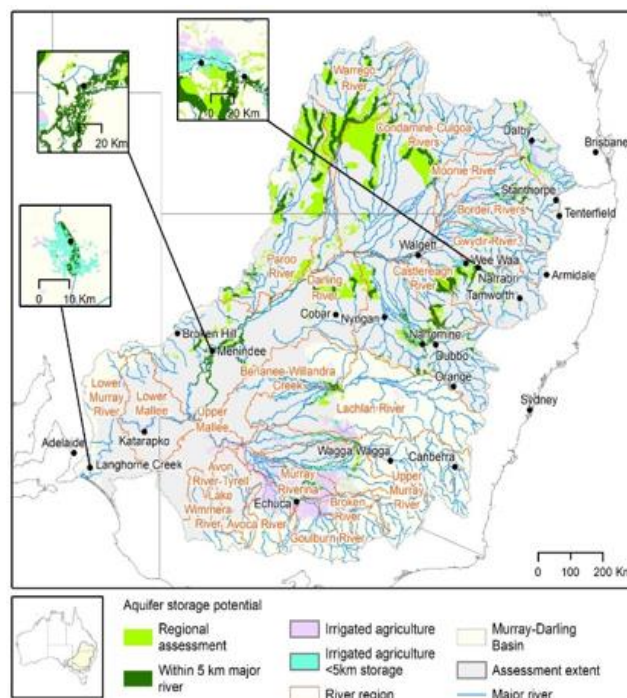
## Regional resilience

### Increased regional water security

Regional communities are affected economically, socially, and directly by the threat of running out of water as seen in the last drought where many towns approached day zero – the day they would run out of water. Some towns did, impacting their ability to operate due to expensive water cartage. We are working with local communities to address the problems of water security and regional resilience more broadly.

The Mission is pursuing water banking to store water in underground aquifers when there is water available, to be withdrawn later in times of drought. We recently assessed the opportunity for 4 km<sup>2</sup> of usable water storage in aquifers within the Murray Darling Basin, located within five kilometres of a major water course.

Together with the New South Wales Special Activation Precincts we are exploring a demonstration water banking site in the Moree region. Collaborations with the Australian National University to develop further assessment methods and a regulatory framework for NSW have recently commenced. Successful implementation would allow us to scale the solution to increase the water productivity of many regional towns. We are also investigating how water-banking and portable de-salination could also help agricultural industries.



Aquifer storage potential in the Murray Darling Basin

### Increasing community resilience

We are building an alliance of grower groups, local councils and others in drought affected regions to develop science-based transition planning for drought resilient communities. This involves collaborative research to identify the current state and trajectory of community wellbeing and resilience, identify future scenarios and economic transition pathways, and create business cases for implementation.

We currently have an alliance with FarmLink, Temora Council, Charles Sturt University, the Western Australian Growers Group Alliance, and the Birchip Cropping Group in Victoria.



We are working to secure funding to run three to four transition planning pilots, and then to build capacity to scale-up planning for resilience in other regions. This will help these regions effectively prepare and reduce the financial stress, and the social, psychological and environment impact of drought and associated stresses and shocks.



# Work Package 3: Policy enablement



The focus of the policy enablement work package is to partner with governments to provide analysis and insights, as well as useful platforms, technologies, and tools that inform policy development.

Through the National Drought Agreement and establishment of the Future Drought Fund, the Australian Federal Government has re-enforced its aim to move from responding to drought as a crisis to encourage preparedness.

These developments will help deliver enhanced economic, environmental, and social resilience throughout drought cycles.





## Policy enablement

### National Drought Map

Working with National Drought and North Queensland Flood Response and Recovery Agency, the [National Drought Map](#) was established in 2019 and some of the recently added data layers include soil characteristics, bush fire boundaries and pastoral lease boundaries. Data layers are now curated for target user groups.

We have also been working with the agency to:

- Characterise the availability of pasture and fodder during times of drought
- Assist the development of indicators that link meteorological drought (extended periods of very rainfall compared to the average) to socio-economic drought (when individuals are severely impacted)

These outputs will help policy makers better target drought assistance to those who need it most in the timeliest way possible.



National Drought Map

### Climate Services for Agriculture program

Working with the Department of Agriculture, Water and Environment and the Bureau of Meteorology we are building the initial stages of the Climate Services for Agriculture program as part of the Federal Government's Future Drought Fund.

Guided by end users input and feedback, the first prototype will be delivered in mid-2021. The program will supply current and future climate information for regions about future drought and climate risks.

The program will support users to make decisions based on the risks and opportunities of future climate. Additional information for four pilot regions will be added over the next year.





# More information and get involved

The Drought Resilience Mission welcomes ideas and engagements from all interested partners and investors.

For more information on the Mission and how to become involved, please contact us.

We look forward to meeting partners and investors at AgCatalyst 2021. Discover what CSIRO's working on nationally and regionally to prepare our agriculture and food sectors for a challenging future.

22-23 November at Luna Park, Milsons Point Sydney

[AgCatalyst 2021 - CSIRO](#)

**As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.**

CSIRO. Unlocking a better future for everyone.

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