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Elements of a National Drought Policy: The Australian context

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Précis

Agriculture in Australia has had a long history with droughts. Globally, governments have developed comprehensive responses to the impacts of droughts and other extreme climate events, but have struggled to effectively address the risks. This paper describes the context and evolution of the Australian National Drought Policy (1992). The objectives outlined in the drought policy remain but have received different emphases by government over time. Because of the inherent variability in agricultural production systems and the unpredictability of when and where droughts occur, it appears that a flexible approach is required to determine when to intervene, when to retract, and which aspect to support. Likewise, the information required by producers and governments changes with changing circumstances.

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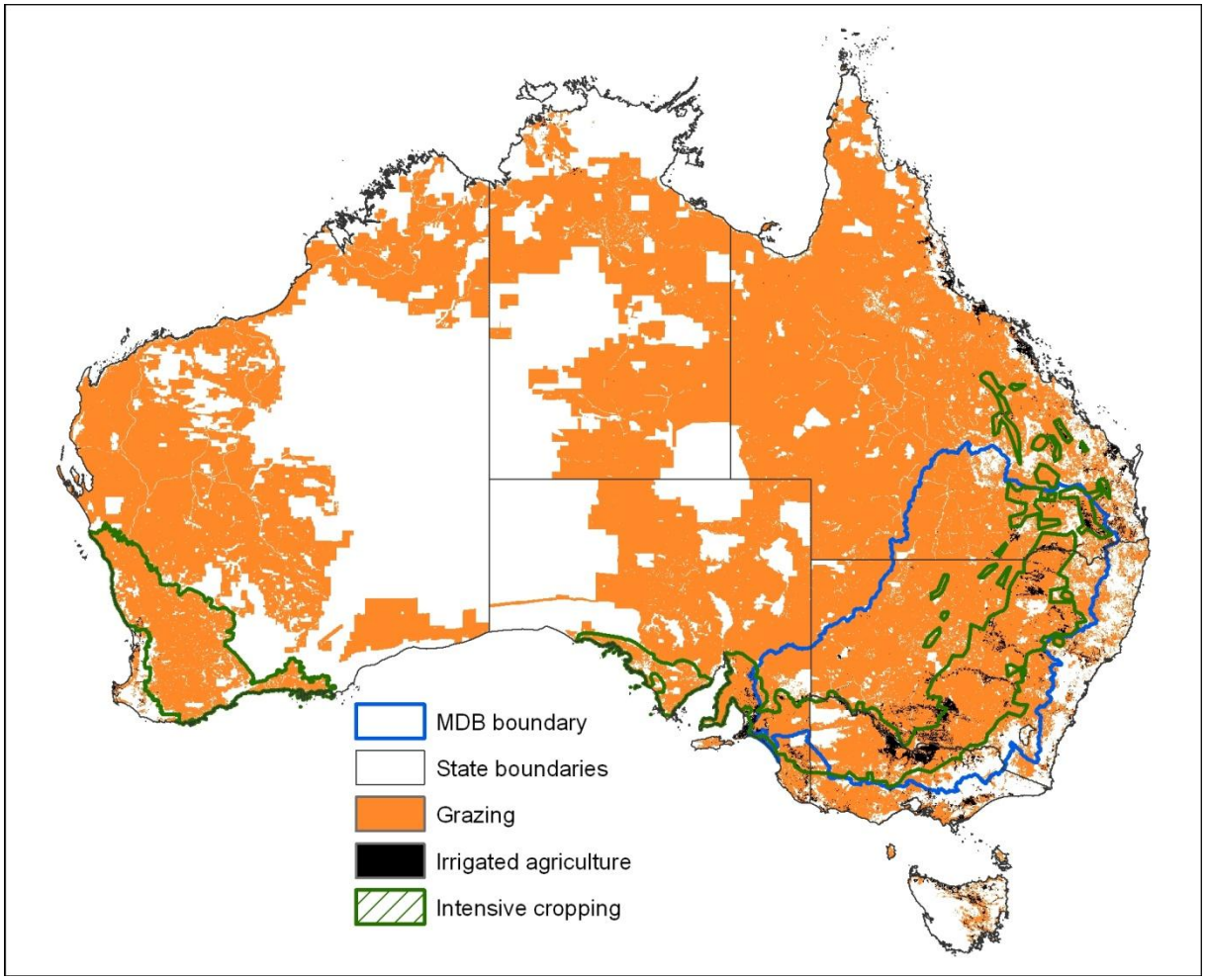
Agro-climatic context

Australian agricultural production systems are diverse and include cropping systems, pastoral systems and mixed farm enterprises. While the farming systems are diverse, a commonality between them is the need to manage financial, environmental and social risk. At the tactical level, the major management focus is typically on a short-term, production and profitability basis. However, management decisions are often made within the context of longer-term resource conservation, economic, political, and lifestyle influences (Blacket 1996; Hammer 2000). A major risk factor that affects the biophysical, socioeconomic and political systems is climate variability (Hammer 2000).

Australia has the lowest (that is, the driest) and one of the most variable rainfall patterns of all inhabited continents (Gray et al 2011). Climatic variability is one of the greatest sources of risk for Australian agriculture (Kimura and Anton 2011). Climate variability exposes decision-makers to considerable risk, because outcomes of decisions—such as crop rotation decisions, marketing strategies, infrastructure investment, and policy decisions that affect ecosystem management—cannot be confidently predicted. In addition, current production systems are unlikely to adapt to the changes in climatic extremes that are expected to result from climate change and that have already been observed in some regions of Australia. Despite the challenges of farming in Australia, agricultural activities cover about 60 per cent, or 4.5 million km^2, of the continent, much of it in the dry, semi-arid rangeland regions (map 1). Only around 0.4 per cent of agricultural land in Australia is irrigated.

Map 1. Agriculture in Australia



History of drought

Australian agriculture operates in a highly unreliable climate (Laughlin and Clark 2000; Stone and de Hoedt 2000), which is characterised by frequent floods and intense, widespread droughts. These climatic extremes affect all types of agricultural production and present a challenge that farmers must manage to remain viable. There is a well-established relationship between El Niño events and drought in Australia, although not all drought events are El Niño related. El Niño events generally occur every two to seven years (Cane 2000; Meinke and Stone 2005). El Niño events typically result in severely reduced rainfall in winter and spring, particularly across eastern Australia where the majority of high-value cropping and livestock husbandry is practiced. Conversely, La Niña events can result in above average rainfall over much of Australia, although variability can occur between regions.

A drought can be defined as a prolonged, abnormally dry period with insufficient water for users' normal needs (BoM 2011). Meteorologists monitor the extent and severity of drought in terms of rainfall deficiencies, while agriculturalists rate the impact on primary industries. Drought disrupts

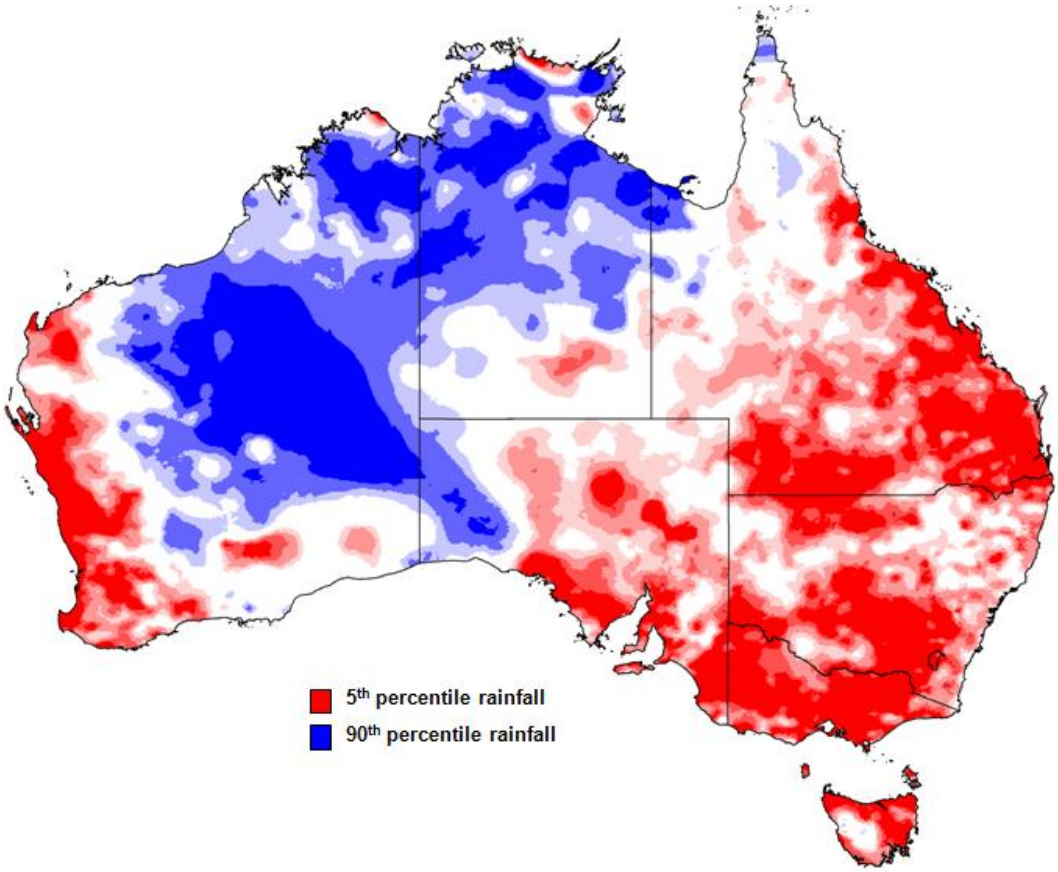
cropping programs, reduces breeding stock and threatens permanent erosion of the capital and resource base of farming enterprises.

Research by the Bureau of Meteorology (BoM 2011) indicates that severe drought affects some part of Australia on average once every 18 years. Some droughts are long-lived, while others are short and intense, causing significant damage (table 1). Some droughts are localised, with other parts of the country enjoying plentiful rain. Some regional droughts are not related to El Niño events, and are therefore harder to forecast (map 2).

Table 1. Historic droughts in Australia (BoM 2011)

1864–66	All states affected except Tasmania.
1880–86	Southern and eastern states affected.
1895–1903	The Federation Drought. Several years of generally below average rainfall followed immediately by one or two years of exceptionally low rainfall. Sheep numbers halved and more than 40 per cent of cattle were lost. This was Australia's most devastating drought in terms of stock losses.
1911–16	Loss of 19 million sheep and 2 million cattle.
1918–20	Most parts of Australia in drought.
1939–45	The Forties Drought. Loss of nearly 30 million sheep between 1942 and 1945. 1940 was one of the driest years on record across southern Australia.
1963–68	Widespread drought, the last two years of which saw a 40 per cent drop in wheat harvest, a loss of 20 million sheep and a decrease in farm income of $300–600 million.
1972–73	Mainly in eastern Australia.
1982–83	One of the most intense and widespread droughts on record. Total loss was estimated to have been in excess of $3 billion.
1991–95	Particularly dry in parts of Queensland, northern New South Wales and parts of central Australia. Average production by rural industries fell by about 10 per cent, resulting in a possible $5 billion cost to the Australian economy, The Commonwealth Government provided $590 million of drought relief between September 1992 and December 1995.
2002–07	Winter crop production declined sharply in 2002–03 and, after recovering, declined again in 2006–07. The Murray–Darling Basin inflows were the lowest on record, severely affecting irrigated agriculture.

Map 2. The 2002–2007 drought



Managing the risk of drought

Before 1992, the Australian Government did not have an explicit drought policy and assistance to affected producers was provided through a natural disaster relief program. In 1992, a National Drought Policy was established, with the objectives to:

- encourage primary producers and other sections of rural Australia to adopt self-reliant approaches to managing for climatic variability
- maintain and protect Australia's agricultural and environmental resource base during periods of extreme climate stress
- ensure early recovery of agricultural and rural industries, consistent with long-term sustainable levels.

The 1992 policy shifted the emphasis away from drought being classified as a natural disaster and towards that of a normal component of the operating environment. Drought and, more broadly, climate variability were seen as an inherent business risk that producers needed to manage, as they would any other potential risk. This shift in thinking was intended to create a setting in which drought

was considered a normal part of the Australian farming environment, with the core principle being to encourage producers to adopt self-reliant approaches for managing climatic variability and to prepare for drought.

The second objective is consistent with sustainable farming practice and is often addressed by government through natural resource management programs, such as providing conservation tillage, native vegetation management and soil retention.

While acknowledging the principles of self-reliance, the 1992 drought policy also recognised that there would be circumstances that were beyond the ability of farmers to manage alone (White and Walcott 2009). In these 'exceptional circumstances', governments could provide assistance to support otherwise viable farm enterprises through periods of 'severe downturns' in income, in effect underwriting the risks from droughts. This drought and exceptional circumstance policy was enacted through legislation, including the *Rural Adjustment Act 1992* and the *Farm Household Support Act 1992*.

Drought assistance

Since the 1992 drought policy was enacted, it has been reviewed and its principles reinforced several times (see articles in Botterill and Wilhite 2005). The current criteria for exceptional circumstance (EC) events are:

- the event must be rare and severe and of a scale to affect a significant proportion of farm businesses in a region
- the event must result in a severe impact on farm production and income, and that the downturn in income is not a result of other issues, such as market prices
- the event must not be predictable or part of a process of structural adjustment.

The original framework for assessment of EC as defined in 1995 was based on six core criteria (White et al. 1998):

- meteorological conditions
- agronomic and stock conditions
- water supplies
- environmental impacts
- farm income levels
- scale of the event.

EC would be declared when the combined impact on farmers was a rare and severe occurrence, and meteorological conditions would be the threshold condition. The threshold condition is assessed in terms of 'effective rainfall' and involves a 'rare and severe event'; rare being a 1 in 20 to 25 year event and severe being either more than 12 months duration or at least two consecutive failed seasons, depending on the nature of the production systems being considered. Although most commonly enacted as a result of a rare and severe drought, EC events may include a combination of events such as drought and frost.

Key to the decision-making process is the involvement of the National Rural Advisory Council, an independent body comprising agribusiness professionals who assess and help verify the on-ground conditions in a region. In assessing an EC application, the Australian Government considers the scientific and economic advice provided by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). ABARES is a research bureau within the Department of Agriculture, Fisheries and Forestry that provides professionally independent research, analysis and advice to inform decision-makers on current and future policy challenges affecting Australia's primary industries.

The ABARES advice includes a scientific assessment of the rarity and severity of a meteorological event and an analysis of the event itself, including the effectiveness of rainfall and the impact it has or will have on specific production systems within a region. ABARES economic information is used to assess the impact on farm production and income.

ABARES draws on data supplied by government agencies such as BoM, the Australian Bureau of Statistics (ABS) and state agriculture departments; models such as soil moisture and crop and pasture growth; satellite-derived data such as vegetation greenness anomalies; and economic farm survey data from the ABARES Australian Agricultural and Grazing Industries Survey.

If a region is EC declared, farmers within it are eligible to apply for a range of assistance measures. Farmers in EC-declared areas may apply for income support (equivalent to the unemployment benefit) if they pass income and assets tests, and for business support (in the form of interest rate subsidies on operating costs) if the farmer can demonstrate that they operate a long-term viable enterprise. EC assistance is available for up to two years, with a review undertaken before the declaration period expires.

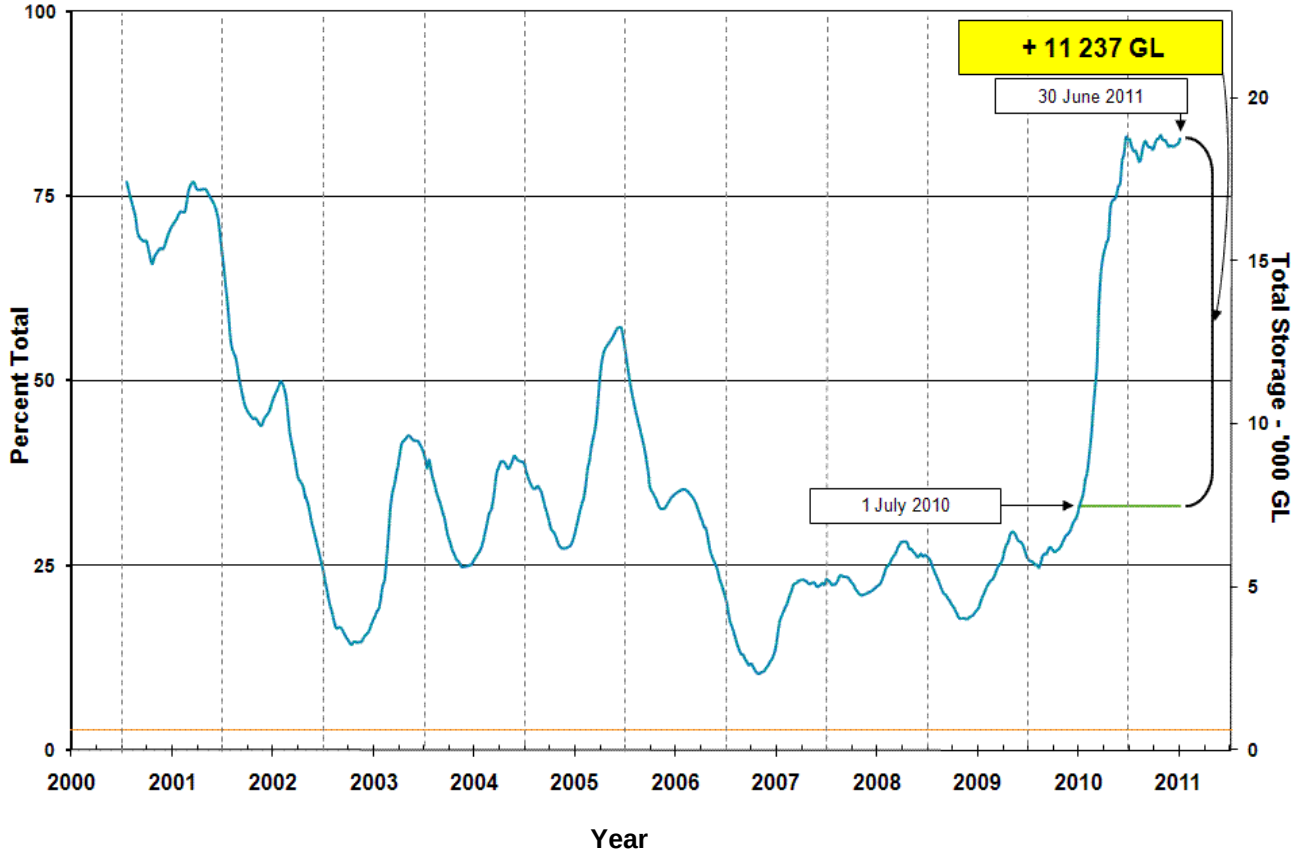
The 2002–2007 drought

Australia has recently experienced one of its most severe droughts on record (table 1). The most severe part of this drought, in terms of geographic extent and rainfall deficit, occurred between March 2002 and January 2003, and covered most of Australia's agriculturally productive regions. Indeed,

the most important agricultural regions generally experienced severely deficient (5th percentile) rainfall, with a number of regions recording their lowest rainfall on record.

The 2002–2007 drought, or 'big dry', was actually two separate droughts, each of about 12 months duration, 2002–03 and 2006–07, which resulted from two separate El Niño events. Crucially, there was no significant wet period between the two events to alleviate the rainfall deficiencies. Not only did the 2002–2007 drought significantly reduce farm production during the event but ongoing effects continued to be felt in many regions following the return of 'normal' rainfall patterns. For example, soil moisture was severely depleted in many areas and by mid-2010 water storages had not yet returned to pre-drought levels. Irrigated industries that rely on water storages were particularly affected as major reservoirs in the Murray–Darling Basin, Australia's most important irrigation region, fell to 17 per cent of capacity in 2003, and remained below pre-drought levels until late 2010 (figure 1).

Figure 1. Water storage levels in the Murray–Darling Basin (NSW, Victoria and Queensland)



The recent drought resulted in a record number of applications for EC assistance, with around 70 per cent of Australian agricultural land receiving some level of support by 2007. Because of the persistence of the drought, additional measures were developed to provide ongoing support for regions that had clearly not recovered from the impacts of the drought after their initial two years of support came to an end. Assistance packages included exit grants for farmers who had been

affected by extreme events and who wished to sell their property. Support was also available in the form of advice and retraining. By mid-2010, the Australian Government had paid approximately $4.4 billion in direct drought assistance to affected farmers.

Review of the National Drought Policy

Following the onset of the 2002–2003 drought, a series of national drought workshop was held around the country to discuss with stakeholders the efficiency of the measures dealing with drought and to consider improvements to the delivery of drought assistance. One of the issues raised was that the current system of applying for EC support was complex and time consuming and often led to support being provided well after the worst impacts of the drought had been experienced.

Another concern was that the application process was cumbersome and that the state and territory governments who prepared the applications didn't have access to consistent data and information. This meant that before the Australian Government could assess an EC application, it needed to spend significant time and resources to analyse and verify the integrity of the data being used in the application, leading to further delays.

To address these concerns, Australian agricultural ministers, through the Primary Industries Ministerial Council (PIMC), agreed to develop a national monitoring system to assist in the development of EC applications and to facilitate decision-making for government intervention and policies related to drought and other climate impacts. It was envisaged that such a system would provide an agreed set of data for use by both the EC applicants and assessors, and that these data would be readily available via the internet.

The National Agricultural Monitoring System

To meet the agreed PIMC objectives, ABARES undertook the design, development and ongoing service delivery of the national monitoring system. The rationale behind this system, called, the National Agricultural Monitoring System (NAMS), was to automate the creation of a report that formed the basis of an EC application via the internet. The intent was to streamline the application and assessment process for EC through the online collation of agreed and nationally consistent datasets.

Successful deployment of the system reduced the time and cost associated with assessments and made the process publicly transparent and equitable. NAMS provided up-to-date climatic and production information that helped identify regions that might be coming into drought, and also provided climatic and production information that could be used by decision-makers and producers to

better prepare for and manage climate risks. This addressed the key issue of many producers not being fully aware of the variability in climate for their locality (White and Karsies 1999).

To simplify and streamline the existing EC application process, the NAMS website was designed to produce reports providing a complete set of contextual, climatic, production and economic analyses (Bruce et al. 2006). From this base, state and territory governments added their own interpretive text to the provided analyses and any additional supporting information. The strength of this approach was the standardisation of the analyses used for all applications and the transparency of the process through public access to all the analyses used (Leedman et al. 2008).

2008 National Drought Policy review

In early 2008, the PIMC met specifically to consider further improvements to the National Drought Policy in the context of responding to climate change, enhancing productivity and improving market access. Ministers agreed that current approaches to drought and EC were no longer the most appropriate in the context of a changing climate and agreed to improve the policy to create an environment of self-reliance and preparedness, and to encourage the adoption of appropriate climate change management practices.

A comprehensive review of the National Drought Policy was undertaken, comprising three separate assessments (DAFF 2011):

- an economic assessment of drought support measures by the Productivity Commission (PC)
- an assessment by an expert panel of the social impacts of drought on farm families and rural communities
- a climatic assessment by BoM and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of likely future climate patterns and the current EC criteria of a 1 in 20 to 25 year event.

A key finding of the PC report was that the National Drought Policy's EC declarations and related drought assistance programs have not helped farmers improve their self-reliance, preparedness and climate change management. Most farmers are sufficiently self-reliant to manage climate variability, with about 70 per cent of farms in drought-affected areas receiving no assistance.

The panel set up to assess social aspects (Social Panel) noted that existing policy responses were not working in all cases and that EC policy had created feelings of division and resentment. The Social Panel considered that there is a role for governments and that future policy should seek to move people towards an acceptance of, and planning for, drought (SP 2008).

The BoM/CSIRO assessment (Hennessy et al. 2008) indicated that observed trends in exceptionally low rainfall years are highly dependent on the period of analysis, due to large variability between decades. If rainfall were the sole trigger for EC declarations, then the mean projections for 2010-2040 indicate that more declarations would be likely, and over larger areas in some parts of Australia. Projected increases in the geographic extent and frequency of exceptionally low soil moisture years were slightly clearer than those for rainfall. If soil moisture were the sole criterion for EC declarations, then the mean projections indicate that more declarations would be likely by 2030. The BoM/CSIRO assessment further indicated that the current EC trigger, based on historical records, has already resulted in many areas of Australia being drought declared in more than 5 per cent of years, and that the frequency and severity of droughts are likely to increase. The principal implication of the findings of this study is that the existing drought trigger is not appropriate under a changing climate (Hennessy et al. 2008).

In response to this review, the Australian Government, in partnership with the Western Australian Government, implemented a pilot of drought reform measures in part of Western Australia, which commenced in July 2010. The pilot is testing a range of measures that are designed to help farmers move from a crisis management approach to a risk management approach, and to better support farmers prepare for future challenges. A key aspect of the drought reform measures is training for farmers to help them prepare strategic business plans that integrate risk management and preparedness. Grants are also available for strategic plan activities that help farm businesses prepare for the impacts of drought, reduced water availability and a changing climate, and for activities with a natural resource management focus that have broader public benefits. The pilot will continue until June 2012 and is currently being reviewed by an independent panel comprising agribusiness professionals. The review will examine the early outcomes and make recommendations to government about how individual programs might be improved.

Drought triggers

Drought decision points, or triggers, are the threshold values of an indicator that distinguish a level of drought and potentially determine when management actions and/or government intervention should begin and end. Ideally they should specify the value, time period, spatial scale, drought level, and whether conditions are progressing or receding (Sims et al. 2009).

To be effective, the triggers should ideally meet a number of criteria (Cash et al. 2003), although there may be trade-offs between them:

- salient—they serve the needs of decision-makers, and are applicable at appropriate levels, cost-efficient and easy to administer

- credible—the measures are scientifically and technically adequate, satisfy valid sampling, statistical and consistency methodologies, have historical data available for identifying trends and have accessible and accurate data
- legitimate—they respect stakeholders' values, are unbiased and fair, relate unambiguously to defined issues, have relative simplicity for public understanding of outputs, and have wide acceptance of the integrity of the measure.

The National Drought Policy has an entry threshold of 5th percentile rainfall (that is, rainfall in the lowest 5 per cent of the historic record), combined with a scientific and economic assessment of the production conditions within the region. In determining the initial rainfall threshold, applicants have the ability to set their own beginning and end time for a drought event, within the constraints of the event being at least 12 months long. A 'moving window' threshold such as this can have unintended consequences, as there are no longer only five 'exceptional' (1:20) events in the 100 years, there are a possible 60 (simply because in 100 years, each having a possible 12 beginning months for an event, there are possibly 12 x 5 the number of 'exceptional' events). While this does not occur in practice because most events last longer than a month, it can unintentionally increase the frequency of 'drought' events.

An important, sometimes neglected, aspect of the drought declaration framework is to specify when the declaration should finish (Stafford Smith and McKeon 1998). In principle, decision points should specify thresholds for both entering and exiting drought declarations, which may be quite different. Exit decision points should be designed to accommodate the desired management outcome. The current EC guidelines use an exit threshold based on whether or not producers have begun to carry out typical farm practices.

Realities of implementation

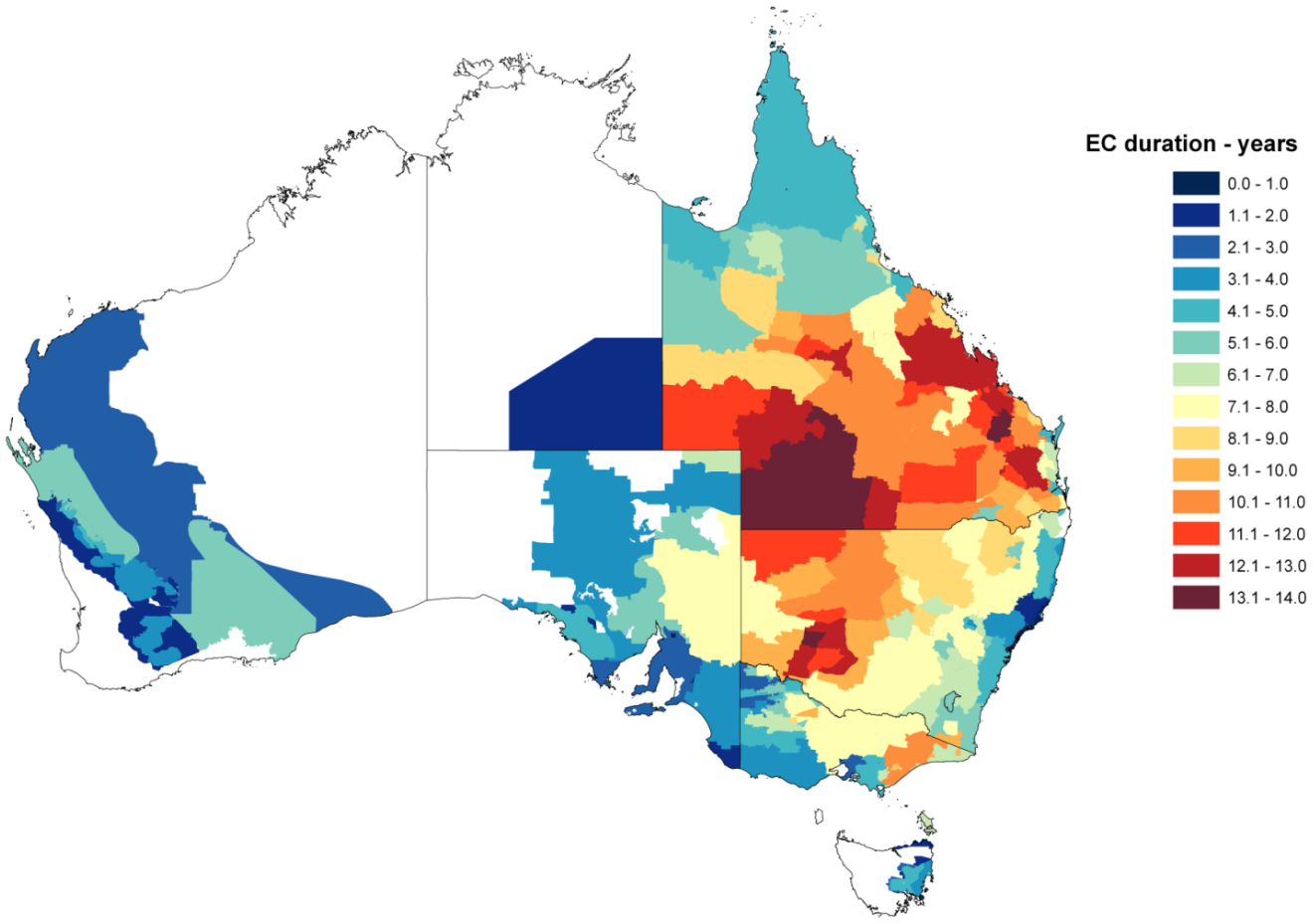
Despite good intentions of the National Drought Policy objectives, the recent social, economic and meteorological assessments highlight some difficulties in implementing the policy intent. These assessments clearly indicate that the current EC declaration process is not delivering a drought preparedness and risk management approach and that the current EC trigger is not appropriate under a changing climate (Hennessy et al. 2008). The economic assessment highlighted that the application of the EC criteria has failed to distinguish between droughts defined as those expected to be managed and those beyond the ability of the most prudent farmer to manage (PC 2009).

While the current EC criteria use a range of variables, in practice the diversity of the country and variation in production systems require a significant amount of flexibility to deliver the intended results. For example, assessing a region that contains irrigated horticulture and mixed cropping and

grazing systems can be quite complex. A single criterion with insufficient flexibility to account for this diversity may not always deliver consistent outcomes (White et al. 1998). This is because the different systems use rainfall in different ways and at different times, which requires individual measures (White and Walcott 2009). Furthermore, the different industries differ in their requirements and timing for government assistance, depending on whether they need funding for sowing the next crop, for rebuilding their flocks/herds, or for current expenditure.

Under the current EC process, while declarations are made in a relatively timely manner, determining the end of a declaration is problematic to the point where some regions have been EC declared for 14 out of 17 years (PC 2009) (map 3). Under the National Drought Policy, EC regions were to be declared for up to two years, the premise being a year of assistance and a year to recover. At the end of the declaration period, EC assistance would cease for a region.

Map 3. Duration of EC declarations, 1992–2010



During the prolonged 2002–2007 drought, a new review process was implemented to assess whether a region had a chance to recover from the lingering drought or if an extension of the EC declaration was warranted. The EC review criteria differ from the EC criteria and considers whether seasonal, agronomic and resource conditions have provided an opportunity for the majority of

producers to begin to carry out typical farm management practices relevant to their enterprise type and production cycle (DAFF 2011).

Due to the cumulative effects of a prolonged event such as the 2002–2007 drought, determining the opportunity for recovery based on whether producers had begun to carry out typical farm practices was challenging in some regions. The prolonged drought meant that in many areas water storages and soil moisture remained depleted for some time, despite a return to normal climatic conditions. In addition, after many years of drought and failed production, producers in some regions had become more risk averse and found it difficult to take the opportunity to carry out typical risk management practices, despite favourable conditions.

Role of government

Although climate risk management in agriculture is ultimately the responsibility of farmers and agribusinesses, the public sector has a key role to play in developing policy that addresses inadequacies and failures in current risk management strategies. Ideally, government should adopt a holistic approach to policy development by considering not only the specific risk addressed by a given policy, but also the policy impact on, and links with, other related risks (OECD 2009). Nevertheless, there are occasions, such as large floods, fires, and earthquakes, when governments are called on to directly help those worst affected and this appears to apply to droughts in practice.

The agricultural impact and effective management of extreme events such as droughts is of particular importance to government. Australian drought policy has historically provided income support and interest rate subsidies to farmers and agribusinesses affected by droughts (Kimura and Anton 2011). However, the treatment of droughts as ‘exceptional’ delays the development of farm systems that are adaptive and resilient to changing climate risks, and encourages risky practices (for example, overstocking). An important Australian Government initiative has been to move away from a crisis management approach for droughts to an increased emphasis on climate risk management. This initiative will focus on enhancing the ability, preparedness and responsibility of farmers to manage climate risks (Gray et al. 2011).

The economic assessment of government drought support identified that governments should commit to a long-term reform path that recognises that the primary responsibility for managing risks, including from climate variability and change, rests with farmers (PC 2009). However, there is a role for government in facilitating access to appropriate information and tools to support risk management and decision-making. To this end, research, development, extension, professional advice and training to improve farmers’ business management skills and build self-reliance warrant significant government funding where they deliver a demonstrable community benefit. There is a clear need and

role for government to continue to provide information and tools for risk management decision-making. However, similar recommendations from previous reviews of the National Drought Policy have not been adopted (PC 2009).

Key recommendations from the climatic assessment of drought highlighted that farmers and their suppliers need user-friendly, reliable and up-to-date location-specific information on historical climatic conditions and future climate variability (Hennessy et al. 2008). Key requirements include information on the risk of drought on timescales from seasons to decades, with specific needs including improvement of drought monitoring capability and online climate information. Provision of information and tools, such as the NAMS, for the decision-making process has been integral to the consistent and transparent implementation of the Australian National Drought Policy in recent years.

Information and tools

The ABARES tools, models and information systems such as the NAMS, the Monitor, the Rainfall Reliability Wizard and GrowEst (ABARES 2011) provide decision-makers with ready access to information on climate variability, water availability, economic indicators and the impacts on agricultural production systems. These tools and systems support the assessment of drought-affected regions and ensure an equitable assessment process by providing consistent, quality-controlled data. As well as supporting the drought assessment process, the information is used to see where production conditions are deteriorating due to adverse climatic conditions and to help identify where intervention may be necessary.

The NAMS was used extensively by the Australian Government and the Department of Agriculture, Fisheries and Forestry (DAFF) for decision-making for EC and within the broader context of climate impacts. With substantial areas of the country remaining drought declared by 2009, NAMS was withdrawn from public access and resources were directed elsewhere. As DAFF needed a replacement system, ABARES developed and maintained an internal system, the Monitor. Since 2009, the Monitor has been heavily used to support the ongoing implementation of the drought policy and DAFF's assessment and review of EC regions. Without systems like the NAMS and its successor, the Monitor, the recent assessments and reviews of drought-affected regions across Australia would have been significantly more difficult to implement.

The Monitor is undergoing a redevelopment to improve its operational functionality and will be released to the general public to assist a broader range of government decision-makers, industry groups and producers with risk management decisions for climate variability. In this context, the Monitor will add significantly to the tools and information being provided for preparedness and risk management for Australian agriculture.

A significant knowledge gap still remains in terms of projecting future climate change and variability and their impacts on agriculture. Most importantly, this information needs to be communicated to decision-makers to inform future policies and support better risk-management practices.

Conclusions

Recurring drought is a natural component of the Australian climate. The Australian Government has a longstanding National Drought Policy based on preparedness and risk management. While recent reviews have highlighted some difficulties with the practical implementation of the policy, particularly in a changing climate, the intent remains valid.

Effective management of current and future agricultural climate risks will require continued public sector investment and involvement in agricultural research, development and extension. Research into climate change mitigation and adaptation options and the development and extension of strategies, information, tools and practices will be vital in providing farmers with effective solutions to climate risks (Gray et al. 2011).

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