

**Department of Climate Change**

**Submission to the  
Productivity Commission Inquiry  
into government drought support  
arrangements in Australia**

September 2008



# **Australian Government**

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## **Department of Climate Change**

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# 1 Overview

The Australian Government has initiated a review of National Drought Policy to ensure it meets the needs of farmers in a changing climate.

The recent BOM/CSIRO (2008) assessment of future predictions of drought has indicated climate change is likely to result in a marked increase in the future frequency and severity of drought events.

In this context, the Productivity Commission has been requested to (Productivity Commission, 2008):

- report on the appropriateness, effectiveness and efficiency of the Commonwealth, state and territory governments' business support and income support measures
- identify the most appropriate, effective and efficient responses by Commonwealth, state and territory governments, to build self-reliance and preparedness to manage drought
- identify impediments to improving self-reliance and preparedness for periods of financial difficulty

Changing climate patterns will affect the resilience of farm enterprises and the resilience of the natural systems. There are strong inter linkages between the management of individual farm enterprises and management of natural resources (NLWRA, 2001; SoE 2006). Agriculture also plays an important role in supporting rural and regional communities.

Consequently, drought policy in a changing climate will form a large part of an overall climate change adaptation policy for agriculture and must consider the economic, social and environmental dimensions of resilience. For the purposes of this submission, resilience is defined as the ability to cope with and respond to a wide range of climate change impacts and to minimise economic, environmental and social risks.

Within the Australian Government, the Department of Agriculture Fisheries & Forestry (DAFF) is responsible for providing policy advice and administering programs aimed at the development of internationally competitive and sustainable primary industries and has carriage of national drought policy.

The Department of Climate Change (DCC), within the Prime Minister's portfolio, leads the development of Australia's climate change policy. DCC advises on emissions reduction policies (including carriage of Australia's international climate change negotiations and design and implementation of a domestic emissions trading system) and policies on adaptation to the impacts of climate change.

Of particular importance in assisting climate change adaptation in agriculture, is the question about the mix and balance of instruments.

*Does Australia have the 'right' set and mix/balance of drought policy instruments to address the circumstances likely to unfold in the future regarding the incidence of drought (and other climate change impacts) and to support effective climate change adaptation responses in agriculture?*

This submission discusses the likely impacts of climate change and the role of government in assisting the development of effective adaptation responses. The final section of the submission

discusses areas for better policy alignment to support the goals of drought and climate change adaptation policy. Key points in this submission are:

- Australian agriculture has operated historically under highly variable climatic conditions (including periodic extremes such as drought) relative to other major agricultural producing countries; drought policy has evolved as a consequence of Australia's highly variable climate.
- Changes in the severity and frequency of drought, as well as changes in the pattern of rainfall seasonality, are likely to be the most significant climate change impact on Australian agriculture. However, other effects of climate change (for example, relating to temperature and increased carbon dioxide levels) will require a broad approach to climate change adaptation in agriculture and in rural/regional Australia.
- The rationale for government intervention with regard to drought is similar to the rationale for government intervention in climate change adaptation. Common aspects of government intervention relate to the balance between the responsibility of private agents and the public good responsibilities of government in managing economic, environmental and social dimensions of risks.
- An effective drought policy which incorporates adaptation to the emerging impacts of climate change should link together climate change science, economic management of agricultural enterprises, natural resource management, and social policy.
- Current drought policy is predicated on: i) the need to foster economic/financial self-reliance and sustainable land management; and ii) a recognition that, despite preparation and planning, there will be extreme drought circumstances where people engaged in agriculture will require emergency financial assistance.
- Applying this distinction, this submission suggests a number of areas that could be strengthened to enhance financial self-reliance and the resilience of agricultural and natural systems:
  1. Fostering climate change adaptation responses in rural and regional Australia to assist preparation for drought
  2. Improving access to and use of robust projections of drought to assist climate change adaptation policy (including training in scenario-based decision making to manage future drought risk)
  3. Increasing support for climate change adaptation research and development, and
  4. Enhancing complementary interaction between future drought policy and the other Australian Government initiatives.
- With regard to emergency relief measures:
  5. Exploring the extent to which social and economic welfare for farming families should be consistent with broader social welfare assistance, and
  6. Examining the extent to which the provision of business support may facilitate or undermine the achievement of national drought policy objectives and climate change adaptation in Australian agriculture.

## 2 Significance of drought and climate change for Australian agriculture

Australian agriculture has operated historically under highly variable climatic conditions (including periodic extremes such as drought) relative to other major agricultural producing countries. Drought has a significant impact on agricultural productivity through reduced soil moisture levels and reduced availability and reliability of stored water in reservoirs and farm dams.

The variability of Australia's climate is projected to increase as a consequence of climate change. The consequences of some of these climate changes are already becoming evident in changed rainfall patterns in parts of Australia. Experience over the last decade or so in south west Western Australia and in the Murray Darling Basin highlight how climate change interacts with historical over-allocation of water to increase pressure on Australia's scarce water resource, and threaten the resilience of natural systems.

Changes in the severity and frequency of drought is likely to be the most significant climate change impact on Australian agriculture. However, other effects of climate change (e.g. relating to temperature and increased carbon dioxide levels) will require a broad approach to climate change adaptation policy in agriculture.

### *Implications of climate change*

The most recent report of the Intergovernmental Panel on Climate Change (IPCC 2007a) concluded that (i) warming of the climate system over the past century is unequivocal, and (ii) it is very likely that anthropogenic greenhouse increases caused most of the observed increase in globally averaged temperatures since the mid-20<sup>th</sup> century. Globally, temperatures have increased on average 0.7°C during the last hundred years (IPCC 2007a), while Australian average temperatures have increased by 0.9°C since 1950 (CSIRO/BOM 2007). The momentum in the global climate system means the Earth is committed to a further warming of around 0.4°C by 2040, regardless of future human actions to reduce global emissions of greenhouse gases (IPCC 2007a).

In addition to changes in temperature, rainfall patterns are expected to change with northern Australia possibly receiving more rainfall while south and south-eastern Australia likely to receive less. Reduced precipitation and increased evaporation are likely to lead to water security problems in southern and eastern Australia, for example, annual stream flow in the Murray Darling Basin is likely to fall 10 to 25 per cent by 2050 and 16 to 48 per cent by 2100 (IPCC 2007b). Changes in the seasonality of rainfall are likely to further exacerbate annual stream flow. Rainfall deficits in the current drought are not as severe as for the 1937-45 drought, yet inflows are 21% below those of that previous drought (SEACI 2008). The significant reduction in rainfall-fed stream flow is thought to be a result of a shift in the long term pattern of seasonal precipitation over south east Australia, notably a reduction in autumn rainfall, that appears to be driven by global warming (SEACI 2008).

Climate change has also been attributed to some of the step fall reduction in rainfall in south west Western Australia experienced since the 1970s. Findings from the Indian Ocean Climate Initiative (IOCI) indicate it is increasingly *unlikely* that the observed warming in south west Western Australia is the result of natural variability. Consistencies are beginning to emerge between synoptic changes, which explain a significant component of observed rainfall decline, and the modelled atmospheric response to anthropogenic forcing (IOCI 2006). South Eastern

Australia Climate Initiative (SEACI) research is indicating a high likelihood that the current rainfall deficit in the south east (current drought conditions) is linked to current global warming (SEACI 2008).

### *Drought and climate change*

Climate change is likely to result in a marked increase in the frequency of extreme events (BOM/CSIRO 2008). There is evidence that the rate of change in the trends relating to extremes and means, shows greater absolute trends in the extremes than the means across Australia (Alexander et al 2007). In this context, the trends of the *most* extreme events (of both temperature and precipitation) are changing more rapidly than are the trends for *more moderate* extreme events (Alexander et al 2007).

Extreme drought events pose significant challenges to the economic base of agriculture through its impacts on agricultural productivity. The availability of reliable water in soils and/or storage reservoirs and farms dams is a key determinant of farm performance and is also plagued by non-linear relationships. For example, small reductions in rainfall often result in disproportionately larger reductions in stream flow; in south west Western Australia a 10% reduction in rainfall results in a 30% reduction in stream flow and to water storage (IOCI 2005). Similarly, CSIRO's best estimate of the impact of climate change on rainfall and runoff levels in 2030 for the Murray river indicates a 3% reduction in rainfall (compared with historical levels) is likely to result in a 10% or 11% reduction in runoff (CSIRO 2008a). However, the worst case scenario suggests that a 19% decrease in rainfall could result in a 37% decrease in runoff (CSIRO 2008a).

Extreme events also pose significant risk to natural systems and have greater potential for species mortality and significant disruption – critical thresholds are more readily breached, and impacts amplified due to non-linear relationships.

The recent assessment by BOM/CSIRO (2008) of the impact of climate change and exceptional circumstances events provides a synopsis of hotter temperatures with the potential for, what are currently regarded as 'exceptionally hot years', to occur on average every one to two years by 2010-2040, generally less rainfall, and consequent increases in intensity and frequency of exceptionally low soil moisture years. It may also be of significance that global emissions are currently tracking at the highest IPCC emission scenario (A1F1), well above the mid range emission scenarios used by CSIRO/BOM in those simulations (CSIRO/BOM 2008).

The CSIRO/BOM (2008) work also highlights the limitations of climate change science capability and key gaps in our understanding of, and ability to project, changes in drought severity and frequency as a result of climate change. Studies of possible trends in Australian droughts are complicated by the lack of information about trends in soil moisture – in the absence of such information, droughts are usually diagnosed simply by rainfall deficiencies (Nicholls 2008). Further investment in climate change science to develop more reliable future rainfall trends and consideration of the implications of those trends for stream flow is also needed.

Even under medium greenhouse emission scenarios, the impacts of climate change on agricultural and natural systems will increase over the course of coming decades. The recent IPCC assessment (IPCC 2007a) has identified natural ecosystems as the most vulnerable sector to climate change, with agriculture and forestry having a similarly low 'coping range', but a

larger potential for adaptive capacity. Climate change is expected to impact agricultural and natural systems through a multiplicity of impacts including from water availability, temperature and carbon dioxide concentrations. Climate change will also exacerbate existing stressors such as fire regimes, pests and invasive species.

The impact of drought often relates to many conditions, not just climate. The type of agricultural activity undertaken can determine how soon and for how long drought impacts might be felt, with cropping enterprises feeling the effects of dry conditions much sooner, while graziers feel the effects of drought longer at the back end of the cycle as time is needed to rebuild stock numbers. The geographic scale of dryer weather is also important, impacting on the availability of fodder and the extent of changes in farm input and output prices. Additionally individual practices, such as the level of risk management and drought preparedness, resource management practices and financial management practices will also influence the impact of dry conditions on an individual enterprise (see Nelson et al *in press*). Indeed, inappropriate management practices can induce drought-like effects in even normal years.

Other climate variables may also affect the severity of impacts from drought, with some anecdotal evidence suggesting impacts of dry conditions have been exacerbated through a series of unusual climate events. As an example, a report on drought in the NSW North Coast notes the uniqueness of the 2001-04 drought in that it was preceded by widespread flooding in March 2001, a record series of frosts occurred during the winter of 2002, and from March 2001 to September 2002 there was an 18 month period of historically low rainfall (NSW DPI 2005).

While changes in the severity and frequency of drought are likely to make it the most significant climate change impact on Australian agriculture, the combined effects of other climate change impacts (e.g. relating to temperature and increased CO<sub>2</sub> levels) will require a broad approach to climate change adaptation policy in agriculture. This broad approach will need to reflect a balance of roles and responsibilities between government, industry and community in managing climate risk.

### **3 Drought, climate change adaptation and the role of government**

The rationale for government intervention with regard to drought is similar to the rationale for government intervention in climate change adaptation. Common aspects relate to the balance between private agents and public good responsibilities of government in managing economic, environmental and social dimensions of risks from a changing climate. Government roles in adaptation include facilitating access to information, and supporting research and development; providing institutional settings to support effective markets; and addressing issues of (in)equality, for example, where low income households bear a disproportionate adaptation burden or where structural adjustment is needed in an industry sector.

The rationale for government intervention is different for each of the National Drought Policy objectives. The government's role in fostering financial self-reliance relates to its role in providing optimal conditions for the emergence of market (or market-like) responses. Providing incentives to promote the resilience of natural systems addresses aspects of market failure/public good. In providing social support in times of economic crisis, government is addressing the responsibility for social welfare that applies to all Australians.

The differing roles of government highlight the importance of interaction between drought, economic management of agricultural enterprises, natural resource management and social policy in developing climate change adaptation policy in agriculture. Further, there is also an important role for government to invest in advancing the science to underpin climate change adaptation responses, including for science outputs needed to manage drought. The current level of knowledge and understanding about drought and climate change is limited and constrains the application of scenario-based approaches to the development of drought and climate change adaptation policy in Australia.

### *National climate change adaptation policy*

National climate change adaptation policy seeks to increase Australia's economic, environmental and social resilience to a changing climate. Australia's approach to climate change adaptation under the National Climate Change Adaptation Framework, agreed by the Council of Australian Governments in 2007<sup>1</sup>, recognises requirements for an effective climate change adaptation response. These are:

- increased understanding of climate change impacts and options to adapt to these,
- reducing vulnerability and building response capacity of individuals, businesses, communities and governments,
- improving the ability of decision makers (individuals, businesses, communities and governments) to manage climate risk, including the use of scenarios in managing uncertainty,
- action to address unavoidable impacts of climate change, and
- assessing the effectiveness of adaptation responses through monitoring and evaluation to inform future climate change adaptation.

Building and linking capability to monitor trends in climate and agricultural conditions with analytical modelling/forecasting capability to assess policy and management options will be fundamental in managing climate risk. This will be particularly important as past trends become less suitable for guiding future management under a changing climate. DCC notes the development of a robust national environmental information system possessing these general characteristics would provide an important opportunity and base for assisting the development of adaptive climate change policy for agriculture.

Flexibility and feedbacks will be key elements of policy responses to address adaptation challenges. Policy design should ensure this flexibility is retained through:

- avoiding decisions that constrain future adaptation options, and
- regular review of adaptation strategies and their outcomes.

## **4 Enhancing national drought policy to assist climate change adaptation in agriculture**

The objectives of National Drought Policy (NDP) are to:

- encourage primary producers and other sections of rural Australia to adopt self-reliant approaches for managing climatic variability;

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<sup>1</sup> The COAG Adaptation Framework is available at [http://www.coag.gov.au/coag\\_meeting\\_outcomes/2007-04-13/index.cfm#fragment-3](http://www.coag.gov.au/coag_meeting_outcomes/2007-04-13/index.cfm#fragment-3)).



- maintain and protect Australia’s agricultural and environmental resource base during periods of extreme climate stress; and
- ensure early recovery of agricultural and rural industries, consistent with long-term sustainable levels.

These objectives of National Drought Policy appear to provide a sound basis for guiding drought policy assistance in a changing climate. They address issues that are relevant to climate change adaptation policy.

Another point of similarity between drought policy and climate change policy is the increased importance of effective national coordination, improved linkages and complementarity between different strands of public policy. A challenge for policy makers is the extent to which drought and climate change adaptation policy cut across conventional sectoral institutions and policy-making processes. This underscores the importance for strong policy leadership by the Commonwealth. Similarly, decision makers will be challenged in trying to reduce the risk of mal-adaptation - that is when decisions are taken that unintentionally make an activity or region more vulnerable to climate change, including by slowing or preventing appropriate individual responses.

### *Key elements of future drought policy to support climate change adaptation*

Current drought policy is predicated on i) the need to foster economic/financial self-reliance and sustainable land management; and ii) a recognition that, despite preparation and planning, there will be instances where people engaged in agriculture will require emergency financial assistance.

It is important that national drought policy measures be effective and not undermine the achievement of drought and climate change adaptation policy goals regarding increasing financial self-reliance and maintaining resilience of the natural and environmental resource base.

This submission suggests a number of areas of policy that could be strengthened to assist climate change adaptation in agriculture by *enhancing financial self-reliance and sustainable land management*. These are:

1. Fostering climate change adaptation responses in rural and regional Australia to assist preparation for drought
2. Improving access to and use of robust projections of drought to assist climate change adaptation policy (including training in scenario-based decision making to manage future drought risk)
3. Increasing support for climate change adaptation research and development
4. Enhancing complementary interaction between future drought policy and other Australian Government initiatives relevant to climate change adaptation.

With regard to *emergency relief measures*, DCC suggests:

5. Exploring the extent to which social and economic welfare for farming families should be consistent with broader social welfare assistance; and

6. Examining the extent to which the provision of business support facilitates or undermines the achievement of national drought policy objectives and climate change adaptation in Australian agriculture.

## Enhancing financial self-reliance and sustainable land management for maintaining the resilience of agricultural and natural systems

The vulnerability of Australia's natural resource base and agriculture to the impacts of climate change suggests that future drought policy consider a number of fundamental aspects to underpin effective climate change adaptation in agriculture.

### *1. Fostering climate change adaptation responses in rural and regional Australia to assist preparation for drought*

To complement drought assistance measures, regional climate change adaptation planning needs greater attention of governments and industry to assist agriculture and rural and regional communities adapt to climate change. Climate change adaptation planning promotes a proactive approach to climate risk management.

Achieving the goal of building self-reliance depends on the ability of individuals and industry sectors to envision the future and understand the range of management strategies that may be required, potentially including reorientation and transformation of the farming business in regions. Adaptation planning that defines the future challenges, sets priorities and identifies strategies will be necessary. This planning is likely to be most effective at a regional scale: it is large enough to identify significant challenges and trends, but small enough to make adaptation planning feasible and the outcomes relevant for local enterprises (see also CSIRO 2008b).

### *2. Improving access to and use of robust projections of drought to assist climate change adaptation policy (including training in scenario-based decision making to manage future drought risk)*

In a changing climate, future drought policy will need to make effective use of climate change and drought information to enhance climate change adaptation in agriculture. While there has been significant investment in climate change science in Australia over the last decade, the state of the science and level of knowledge about the localised impacts of climate change and the relationship between climate change, rainfall and soil moisture is limited. It is important that Australian governments continue to invest in climate change science and adaptation research to provide a more robust basis for the application of scenario-based approaches to drought and climate change adaptation policy in agriculture and other vulnerable sectors.

A challenge for the Australian Climate Change Science Program is in meeting the increasing demands across all sectors for information to underpin effective adaptation action. DCC is working with CSIRO, the Bureau of Meteorology, universities and other research organisations to develop a National Framework for Climate Change Science. The Framework will identify Australia's research priorities and assist in coordinating the climate change science community to address them.

Training in the use of scenario-based decision making to manage future drought risk could be a key component of the climate change training provided through the Australia's Farming Future

initiative. This will ensure that best available science is used when making decisions about risk management in agriculture.

Farming industries and farmers will need sound and well designed information and tools that meet their needs - a practical way to make key decisions regarding how to adapt to climate change including how to manage periods of drought.

### *3. Increasing support for climate change adaptation research and development*

To ensure that Australian agriculture has an appropriate mix of options available to include in climate change adaptation responses, increased investment in the advancement of adaptation research and development will be important. To underpin key parts of the National Climate Adaptation Framework (2007), the Australian Government has committed \$50 million to the formation of a National Adaptation Research Facility with a substantial funding capacity to support effective adaptation research in Australia. Its focus will include primary industries, and a range of associated sectors as well as looking at adaptation in a regional context.

The research and development component of Australia's Farming Future can potentially provide support for climate change adaptation research and development on future farm production options.

### *4. Enhancing complementary interaction between future drought policy and other Australian Government initiatives*

Drought and climate change are likely to accelerate changes in land use in regional Australia. As mentioned earlier, the farming sector is experienced at adapting to and managing climate variability through, for example, modifying the suite of management practices or altering the mix of commodities produced. In situations of drought, changes may be more significant and potentially involve a consideration of total enterprise change. For example, selling and relocating or changing farming systems to one less exposed to drought. Under climate change, there may be greater need for government leadership in assisting the transformation of land use in a region through structural adjustment.

The Australian Government's Australia's Farming Future initiative managed by the Department of Agriculture, Fisheries and Forestry includes a climate change adjustment package to provide assistance for primary producers considering their future.

The Australian Government is committed to a Carbon Pollution Reduction Scheme that will commence in 2010. In a Green Paper issued in July 2008, the Government set out for purposes of consultation its intentions for the design of this emissions trading scheme. While the government is disposed to maximal coverage of economic sectors and emission sources, it concluded that it is not practical to include agriculture at the commencement of the scheme. The Government therefore decided that the earliest agriculture should enter the Carbon Pollution Reduction Scheme should be 2015.

An emissions trading scheme would provide economic incentives to reduce greenhouse gas emissions and to build carbon stocks (in soils and vegetation). Typically, this outcome would provide co-benefits in terms of more productive farms (for example through improved soil fertility) and more resilience in natural resources (for example, through greater incentives for vegetation retention).

Effective adaptation to climate change in Australian agriculture will increasingly be dependant on sustainable natural resource management measures. There may be significant opportunities for a closer integration of drought and climate change adaptation policy in relation to natural resource management outcomes. The public good dimension of natural resource management issues and extent of market failure suggest a significant role for government. A review of the mix of incentive for better natural resource management and their role in future drought policy would be an important contribution to the development of effective climate change adaptation policy for agriculture.

For example, a forthcoming CSIRO paper (Hatfield-Dodds and Proctor *in press*) argues that there is significant potential for allowing biodiversity stewardship payments to provide new options for improving management of climate risks and variability, including through providing a new farm income stream, allowing ‘drought clauses’ in stewardship contracts, supporting regional scale land management options with biodiversity and drought management benefits (such as the use of ‘grass banks’ in the US prairies), and considering cross-compliance mechanisms. There may also be scope to develop a range of suitable market based instruments to achieve drought preparedness as well as natural resource management objectives.

Victoria has explored this integration to some extent with a new Drought Employment Scheme announced in early 2007. Under this scheme, \$10 million was committed in 2007 to address degradation of environmental assets, with roll out coordinated by Catchment Management Authorities (Victorian Minister for Environment and Climate Change 2006).

## Emergency relief measures

### *5. Exploring the extent to which social and economic welfare for farming families should be consistent with broader social welfare assistance*

There will be instances where people engaged in agriculture will require emergency financial assistance despite preparation and planning for drought.

The assessment by BOM/CSIRO (2008) provides a basis for considering the appropriateness of a climate-based trigger for drought assistance. It concluded the current trigger for exceptional circumstances considerations (of a 1 in 20 year event) is no longer adequate under a changing climate. DCC supports this view. If the trigger is maintained, the BOM/CSIRO report suggests drought affected areas could be declared as much as one in every two years, government assistance at this level of intervention is clearly not appropriate in the context of self reliance. If the definition of the trigger is maintained (i.e. a one in 20/25 year event) the reference would need to be applied to future climate conditions (not based on past climate data). Methodological issues aside, there is no evidence to indicate whether a one in 20/25 year ‘trigger’ under future climate scenarios would be an appropriate or effective point to intervene.

Taking away a climate ‘trigger’ would suggest that social welfare assistance be provided in a manner consistent with broader social welfare assistance. The ramifications of this warrant careful consideration

### *6. Examining the extent to which the provision of business support undermines the achievement of national drought policy objectives and climate change adaptation in Australian agriculture.*

It would be helpful if the Productivity Commission were to encompass in its review a consideration of the effects of business support arrangements on the achievement of national drought policy objectives and the extent to which these measures facilitate or undermine NDP objectives. For example, this type of support may limit the effectiveness of incentives provided to promote natural resource management practices as well as undermine efforts to enhance self-reliance, thus constraining climate change adaptation in agriculture. A clear rationale for emergency business assistance during drought is warranted.

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