The Secretary
Senate Standing Committee on Rural and Regional Affairs and Transport
PO Box 6100
Parliament House
CANBERRA ACT 2600

CLIMATE CHANGE AND AUSTRALIAN AGRICULTURAL SECTOR

March 31, 2008

Dear Secretary,

It is with pleasure that I make this submission to the Senate Standing Committee On Rural And Regional Affairs And Transport on behalf of the Agricultural Alliance on Climate Change.

The Alliance was established in 2007 to provide a focus on the challenges and solutions for securing our rural future in the face of a changing climate.

The Alliance comprises AgForce, Australian Conservation Foundation, Country Women's Association of Australia, South Australian Farmers' Federation, The Climate Institute, Visy, West Australian Farmers' Federation and Westpac.

In the determination of your findings and recommendations, The Alliance has requested that I draw your attention to two other documents:

- CSIRO report prepared for the Agricultural Alliance on Climate Change – *Rural Australia Providing Climate Solutions*; and
- The Climate Institute's submission to the Garnaut Review for Land Use Land Use Change and Forestry.

Please note that these documents are published at www.climateinstitute.org.au

We wish you the very best with this worthwhile inquiry.

Yours faithfully,

Nicolette Boele

NICOLETTE BOELE
The Climate Institute

SENATE STANDING COMMITTEE ON RURAL AND REGIONAL AFFAIRS AND TRANSPORT

CLIMATE CHANGE AND THE AUSTRALIAN AGRICULTURAL SECTOR

Submission by
The Agricultural Alliance on Climate Change

Comprising:

AgForce
Australian Conservation Foundation
Country Women's Association of Australia
South Australian Farmers' Federation
The Climate Institute
Visy
West Australian Farmers' Federation
Westpac

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Table of Contents

1 Introduction

This submission is made by a group of organisations called the Agricultural Alliance on Climate Change, comprising: AgForce, Australian Conservation Foundation, Country Women's Association of Australia, South Australian Farmers' Federation, The Climate Institute, Visy, West Australian Farmers' Federation and Westpac.

The Alliance was formed in 2007 to explore climate change opportunities for the agricultural sector and the communities that support it[i].

The Alliance commissioned the CSIRO to explore what it meant for the agricultural sector as Australia took a national approach to constraining greenhouse gas emissions. The report explores the benefits flowing from:

- providing clean energy and electricity;
- mobilising agricultural mitigation and greenhouse offsets; and
- undertaking environmental stewardship on private land and improving the resilience of farming systems to climate change.

Some of the key findings are included in Section 3.4; the full report is included with this submission and can be found at www.climateinstitute.org.au.

In its submission to this inquiry, the Alliance addresses each area of inquiry in sequence.

> (i) the scientific evidence available on the likely future climate of Australia's key agricultural production zones, and its implications for current farm enterprises and possible future industries;
>
> (ii) the need for a national strategy to assist Australian agricultural industries to adapt to climate change; and
>
> (iii) the adequacy of existing drought assistance and exceptional circumstances programs to cope with long-term climatic changes.

The submission concludes with a summary of recommendations to the Commonwealth to assist with removing barriers to the sector's engagement in climate change adaptation and early action in greenhouse abatement.

2 Science

2.1 Scientific evidence available on the likely future climate of Australia's key agricultural production zones

Scientists attempting to model the likely future impacts of climate change on various geographical and industry sectors produce ranges of probability for their outputs. Predicting the future is no easy task so in addressing the question at hand, it is worth examining actual observed changes in local and global climate.

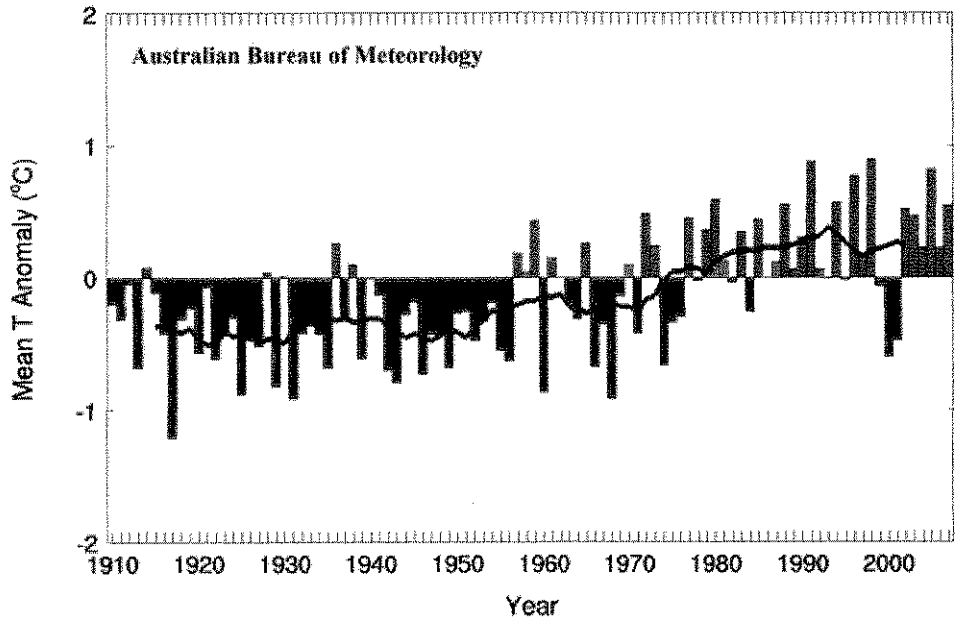
Scientific studies focusing on change impacts of particular relevance to the agricultural sector have focused to date on the following aspects:

- Increasing mean temperatures;
- Changing trends in rainfall and increasing water scarcity; and
- The adaptive capacity of human and natural systems to respond to climate change.

A number of scientific reports[ii] show that climate change impacts for some areas of Australia are tracking on the worst-case climate scenario offered by the Intergovernmental Panel on Climate Change (IPCC). Australia's annual average temperature has risen 0.9 degrees Celsius in the past century compared with a global average increase of 0.7 degrees Celsius[iii]. Nine of the ten warmest years on record have occurred in the past decade.

According to figures from the Bureau of Meteorology, Western Australia's annual mean temperature has largely remained above average since the early 1970s[iv]. This increase in temperature has been matched with a changing trend in rainfall patterns providing uncertainty for farmers in deciding when and when not to plant crops.

2.1.1 Western Australia Annual Mean Temperature Anomaly (base 1961-90)



Source: Australian Bureau of Meteorology

In New South Wales after three months of Summer rains, 46 percent of the state remains drought declared, while other parts of the state have been declared "disaster zones" after riparian and coastal flooding in the north east[v].

According to the Mike Young of the University of Adelaide talking about the Murray River System:

> "Recent rain is helping, but the amount of water necessary to fill this system back up to 'empty' is more than has flowed into the southern River Murray System during the past year. Several years of above-average rainfall are needed[vi]".

So looking forward, the IPCC predicts that production from agriculture and forestry by 2030 is projected to decline over much of southern and eastern Australia due to increased drought and fire. It is also notes that region has "substantial adaptive capacity due to well-developed economies and scientific and technical capabilities, but there are considerable constraints to implementation and major challenges from changes in extreme events. Natural systems have limited adaptive capacity".[vii] One of these constraints is Australia's availability of fresh water.

2.2 Agriculture's relative vulnerability and adaptive capability to climate change

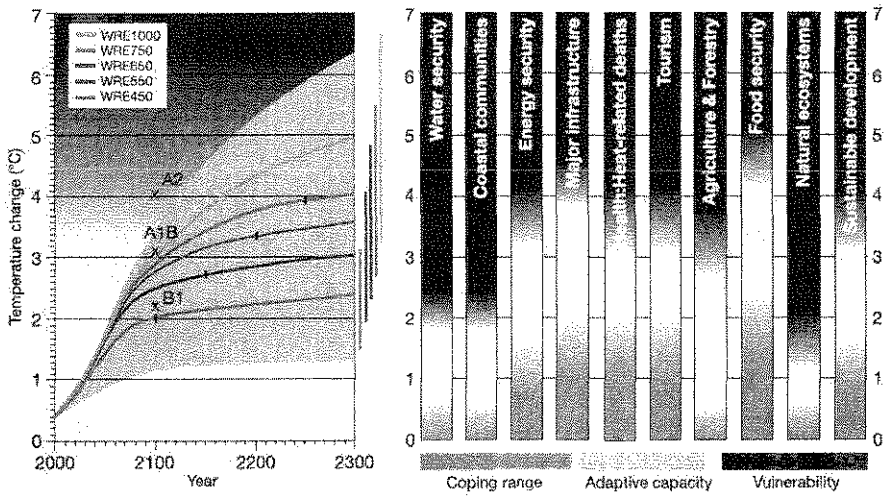


Figure 11.4. *Vulnerability to climate change aggregated for key sectors in the Australia and New Zealand region, allowing for current coping range and adaptive capacity. Right-hand panel is a schematic diagram assessing relative coping range, adaptive capacity and vulnerability. Left-hand panel shows global temperature change taken from the TAR Synthesis Report (Figure SPM-6). The coloured curves in the left panel represent temperature changes associated with stabilisation of CO_2 concentrations at 450 ppm (WRE450), 550 ppm (WRE550), 650 ppm (WRE650), 750 ppm (WRE750) and 1,000 ppm (WRE1000). Year of stabilisation is shown as black dots. It is assumed that emissions of non-CO_2 greenhouse gases follow the SRES A1B scenario until 2100 and are constant thereafter. The shaded area indicates the range of climate sensitivity across the five stabilisation cases. The narrow bars show uncertainty at the year 2300. Crosses indicate warming by 2100 for the SRES B1, A1B and A2 scenarios.*

According to the IPCC's Fourth Assessment Report, Working Group II, Australia New Zealand Chapter, other relevant aspects to dealing with adaptive capacity include human and natural systems and the extent to which the sector will experience an increase in extreme events in particular areas.

- *Most human systems have considerable adaptive capacity:*

The region has well-developed economies, extensive scientific and technical capabilities, disaster mitigation strategies, and biosecurity measures. However, there are likely to be considerable cost and institutional constraints to the implementation of adaptation options

(high confidence). Some indigenous communities have low adaptive capacity (medium confidence). Water security and coastal communities are the most vulnerable sectors (high confidence).

• *Natural systems have limited adaptive capacity:*
Projected rates of climate change are very likely to exceed rates of evolutionary adaptation in many species (high confidence). Habitat loss and fragmentation are very likely to limit species migration in response to shifting climatic zones (high confidence).

• *Vulnerability is likely to rise due to an increase in extreme events:*
Economic damage from extreme weather is very likely to increase and provide major challenges for adaptation (high confidence).

• *Vulnerability is likely to be high by 2050 in a few identified hotspots:*
In Australia, these include the Great Barrier Reef, eastern Queensland, the south-west, Murray-Darling Basin, the Alps and Kakadu wetlands (medium confidence).

2.3 Implications for current farm enterprises and possible future industries

The physical risks resulting from climate change will have substantial impacts in the agricultural sector in areas such as changing patterns of agricultural production, water availability, structural adjustments and in the flow on impacts in secondary industries. These are summarised here by the Australian Greenhouse Office.

2.3.1 Changing patterns of agricultural production and other implications[viii]

	Extensive livestock	**Intensive livestock**	**Annual crops – F&V; Perennial hort. – pome, stone viticulture**	**Annual broadacre crops**
Exposure	Many regions highly exposed due to increased temp, reduced rainfall or reduced water for plant growth. Increased extreme events (eg drought) will limit capacity for pastures in some regions. Temperate areas will likely be more exposed to impacts than tropical grazing lands.	Moderate exposure to the availability of high quality water and feed. More extreme events could increase production costs. Industry sensitive to: heat stress, availability of good water, pests and diseases, supply of high quality feed, and frequency of very hot and humid days	Exposed to lower rainfall, increased temp, increased frequency of droughts, a reduction in frost days and increased frequency of extreme events, especially hail and very hot days, and summer rainfall. These industries are more exposed in the temperate regions than in the tropics.	Many regions highly exposed to increased temp, reduced rainfall or reduced water for plant growth. Increased extreme events (drought and hail) limit capacity in some areas. Highly likely that areas currently considered marginal will be the most vulnerable to climate change.
Adaptive capacity	Few adaptive options available across most rainfall zones. Main option is the introduction of drought-tolerant pasture species and animal breeds. Extensively grazed animals can be fattened in intensive feedlots during droughts or dry seasons.	In general the industry is well placed to secure supplies of water and feed needed to sustain production, or make structural adjustments such as; introducing shading to reduce heat stress, and the control of pests and diseases. A major concern is the high cost of feed over a prolonged period such as that produced by	Due to intensive nature and high value these industries have the capacity to secure water or improved shade protection or protection from hailstorms and pests and diseases. Access to new varieties that are drought tolerant or have a shorter growing season will allow the industries to adapt to climate change in the	The industry has few options to adapt. Introducing drought tolerance into new plant varieties will increase the adaptive capacity within a limited range of increased temp and reduced soil moisture conditions. In addition, improved water use efficiency through better soil management

		more frequent droughts.	short to medium term.	will increase the capacity to adapt to small changes.
Related impacts	Removing animals from extensive grazing systems could lead to proliferation of invasive weeds. A reduction in grazing could have a negative impact on regional communities.		May have wide reaching affects on the viability of secondary food production that relies on fresh outputs.	Any adverse impacts of climate change will have a significant detrimental impact on regional communities.

According to a report by Cambiar commissioned in 2007 by The Climate Institute[ix],

> Agricultural production in virtually all areas will be affected by climate change, with the level of impact varying from low to high. Some production activities will be better able than others to respond; generally speaking it will be the more intensive activities that are more capable of adapting to a changing climate. However for the extensive livestock industry there is the option of destocking and restocking to match the availability of feed as conditions change from year to year.
>
> Some agricultural activities will be able to physically re-locate themselves so they effectively move as the climate does, but they will be in the minority. Others will be able to make relatively minor changes in management practices, such as introducing more drought tolerant pasture and breeds, or more drought-tolerant crops. For some farmers the changes required will be more profound, as they involve dealing with current assets that may lose their value as farming practices change, and become stranded.
>
> One of the most obvious challenges will be dealing with reduced water availability in some areas of the country. For example in recent years water availability in the Murray-Darling system has been reduced through a combination of drought and reforms designed to rectify the past over-allocation of water rights. As availability has declined, allocations have been cut and the price of surplus water has gone up, and many farmers have not been able to secure the water they need.
>
> All changes will have implications for the communities and secondary processing industries that service farming. Population decline resulting from less intensive farming practices, particularly in areas that are already marginal, could have flow-on effects for the level and type of services available in rural centres. This also has economic implications, as those farmers who can successfully adapt to climate change need to start sourcing services and products from further a-field, which implies added costs.
>
> All farmers will need to adapt to the changes in climate in some way by becoming better able to manage climatic risks.

The issues paper also singles out processing industries that may require structural adjustment assistance if production declines sharply. These industries have generally been established close to areas of production, because their economic viability can be sensitive to transport costs. If climate change causes a long-term shift in the availability of food or fibre inputs, processing industries may struggle to compete. The closure of such industries can have wide ranging effects, including:

- stranding on-farm assets, as farmers adapt their production to the new climatic regime;

- forcing those farmers that are still able to produce the food or fibre inputs to seek alternative markets; and
- the loss of jobs and economic activity in regional centres, creating adverse social and economic outcomes.

For example, the impacts of climate change could force changes in secondary food production industries and in regional communities in the Goulburn Valley in Victoria and Riverina of NSW[x]. In the absence of creating plans to buffer the impacts of sudden climate shifts that impact on production, government-backed industry assistance packages will likely be needed to help with the necessary adjustments on farms, within the community and for processing industries.

ABARE[xi] highlights the range of adaptation options available to agriculture (and forestry) supporting IPCC's analysis that the Australian agricultural sector has a strong adaptive capacity. What remains uncertain are the marginal costs and benefits of implementing these options relative to each other and as applied to respective commodity sectors.

2.3.2 Climate change adaptation options in agriculture and forestry

box 1 **climate change adaptation options in agriculture and forestry**

cropping and horticulture
- alter the variety or species planted to those with more appropriate thermal time and vernalisation requirements and/or with increased resistance to heat, frosts or drought
- alter application times and amount of fertiliser or irrigated water to maintain growth and quality
- alter timing and location of cropping activities
- enhance water efficiency by using zero tillage, retaining crop residues and changing planting patterns
- in lower rainfall areas, enhance water management by implementing or expanding water harvesting technologies and acting to conserve soil moisture; in higher rainfall areas, improve water management to prevent waterlogging, erosion and nutrient leaching
- enhance pest, disease and weed management practices through integrated pest and pathogen management and using more pest and disease resistant varieties
- reduce potential for soil erosion by retaining stubble, reducing fallow times, etc

livestock
- adapt annual production cycle to better match feed production
- alter pasture rotations and modify grazing times
- alter forage and animal species or breeds
- provide supplementary feeding
- provide alternative housing infrastructure – for example, winter housing or increased shading
- change or improve feed concentrates

planted forests
- change management intensity, harvesting patterns, and rotation periods as appropriate
- select a variety of species
- manage landscape to reduce fire risk
- undertake prescribed burning to reduce vulnerability to fire damage

sector-wide
- use seasonal forecasting to reduce production risk.
- diversify farm income by integrating other farming activities or increasing off-farm income
- move to alternative income sources outside of agriculture
- minimise high input costs in high risk areas or time periods
- have emergency response plans in place for fire, flood, hail and heavy rain etc
- offset increased costs of managing climate change by reducing other costs
- use financial risk management tools or options to manage risk – for example, futures contracts, water trading, carbon offsets, income stabilisation, insurance
- spread risk through multiple holdings in different climatic regions
- increase resilience of land systems through landcare and stewardship initiatives.

Sources: Government of South Australia (2007); Smit and Skinner (2002); AGO (2007); IPCC (2007); PMSEIC (2007).

2.4 Implications for the communities that support farm enterprises[1]

According to Cambiar and The Climate Institute[xii], as the climate changes, it is likely that existing farming practices will become progressively more marginal in some established rural areas. Farmers will need to change their farming practices to adapt to new conditions.

This process will not be straight-forward. All farmers will need access to information about the direction and rate of change and adaptation responses, and the capital in order to finance changes required to adapt to the changing climate. Further, all farmers will need to become sophisticated managers of climate risk, because uncertainty will increase with a changing climate.

Some farmers will struggle with these changes, and as is happening still in some areas of Australia gripped in drought, some farming families and communities will experience financial hardship and chronic social pressures, especially mental health issues[xiii].

The recently established NSW Rural Mental Health Network identified climatic change impacts, such as drought, as a key external driver of mental health problems in rural Australia[xiv]. At the Blueprint's launch, the NSW Farmers' Association highlighted that deaths from suicide of male farmers and farm workers are now double that of any other group in the male population. [xv]

If adapting to climate change proves too difficult in some areas, populations will decline and the abandonment of rural towns and farming areas could follow, with the consequent loss of local history, culture and dire natural resource implications. The advent of weeds, pests, disease and erosion could be considerable resulting from the exodus from certain rural and remote areas. Policies that support farmers to adapt to and build in resilience to climate change impacts are preferred to those that prescribe certain areas of the landscape unsuitable for agricultural industries.

2.5 Changing patterns of supply and demand in global markets

Climate change will directly affect future food and fibre availability and is likely to exacerbate difficulties in feeding the world's growing population. Changes in the global climate will influence patterns of agricultural production and population and economic changes will influence patterns of demand. These changes represent both opportunities and risks to Australia's rural sector.

Climate change will threaten food security in many parts of the world, according to the UN Food and Agriculture Organisation[xvi], and as the world works to improve food security, agricultural exporting countries such as Australia will be presented with new export opportunities. For example, grain production in China could be significantly reduced as a result of rising temperatures. A report from the Chinese Ministry of Science and Technology, Meteorological Administration and the Academy of Sciences has projected China's production of wheat, rice and corn to fall by up to 37% after 2050[xvii]. Against the back-drop of falling

[1] Most of the text in this section is lifted verbatim from the original research work by Cambiar and The Climate Institute: *Agricultural Alliance on Climate Change: Issues Paper*, July 2007. The published report can be found at http://www.climateinstitute.org.au//index.php?option=com_content&task=view&id=53&Itemid=51

domestic supply, China's rising population and economic growth will only increase food and fibre demand locally. The value of Australia's food exports to China is growing annually and reached almost $530 million in 2003-04.[xviii]

Changes in the global climate may also increase the agricultural productivity of some regions, particularly in high latitudes where "low-end" climate change (increases in global mean temperatures of about 1-2°C) could actually increase yields. In turn this could strengthen their ability to compete against Australia in export markets.

Australia's agricultural exporters will need to monitor these sorts of changes in patterns of supply and demand, and encourage Government trade negotiations to be mindful of how climate change will influence Australia's comparative advantages in export markets.

Fortunately there is a wide range of research currently being undertaken to deal with both adaptation and mitigation solutions for the sector. Around 65% of the research is summarised in the forthcoming review of the National Climate Change Research Strategy for Primary Industries (CCRSPI) coordinated by Land and Water Australia. Unfortunately there remain gaps in the research and some duplicating efforts leading to inefficiencies in research investment. Recommendations to address these gaps are set out below.

2.6 Recommendations

Key *research* priorities for the Commonwealth should include:

1. provide a focus for climate change adaptation and mitigation research, drawing on the Research Strategy presented in the CCRSPI assessment and other private research being undertaken in Australia, New Zealand and internationally;
2. resource the coordination of knowledge sharing on these topics;
3. develop robust and effective decision making tools for land managers;
4. align water, natural resource and carbon research frameworks to streamline the information flow to farmers and remove duplication of, and potential contradictions between, different policy streams;
5. explore opportunities for environmental stewardship and other sequestration activities; and
6. develop, resource and implement policies based on the science as reported under the collective efforts of the research community.

A key *outreach* priority is making accessible current global climate change modelling data as it relates to various commodity sectors in Australia's agricultural zones.

On a macro-policy level, there is a need for national interim targets for cutting greenhouse pollution, consistent with the science and commensurable to the relative physical impacts of climate change on the Australian continent and its agricultural sector.

3 A national strategy to assist Australian agricultural industries to adapt to climate change

3.1 Adequacy of existing national strategy and measures – need for a government articulated vision

Launched in late 2006, the *National Agriculture and Climate Change Action Plan 2006 – 2009* (the Plan) has quite modest objectives, priorities and resources given the current and potential impact of climate change on the agricultural sector. Of the five million dollar budget for coordinating and delivering projects contained within the Plan only some of this money appears to have been spent. Some projects include:

- The Queensland Farmers' Federation ($857,000) to improve the capacity of agriculture to manage the impacts of climate change, identify climate change tools and models for incorporation into farm management systems;
- Birchip Cropping Group and Land and Water Australia ($785,000), and WestVic Dairy ($120,000), to communicate the risks and opportunities presented by climate change;
- Australian Farm Institute ($593,000) to develop an understanding of the economic implications for farm businesses of climate change and analyse the range of measures available to mitigate farm emissions;
- Dairy Australia ($155,000), and Meat and Livestock Australia ($30,000) to help farmers improve productivity and profitability while at the same time improving greenhouse gas abatement;
- Rice Growers' Association of Australia ($145,000) to understand the impacts of climate change, adaptation options and the long-term implications for the Riverina irrigated cropping districts;
- BRS ($85,000) to inform decision makers on soil carbon, its function and role in emissions trading schemes;
- BRS ($200,000) to develop a National Marine Fisheries and Aquaculture Climate Change Initiative;
- Australian Plantation Products & Paper Industry Council ($200,000) to develop the Forestry and Climate Change Action Plan.

Current activities helping prepare farmers for climate change and/or mitigating emissions from agricultural production are more likely to come from measures being run in parallel to the Plan and include:

- *Managing Climate Variability Program* – Land and Water Australia;
- *Climate Change Research Strategy for Primary Industries* – coordinated by Land and Water Australia involving around 15 rural development corporations;

- *Methane to Markets* - methane capture from waste research program for dairy, beef and pig industries ($1m Gov; $1.25m private) coordinated by RIRDC;

- *Greenhouse Action in Regional Australia* aiming to lead and coordinate abatement strategies in partnership with industry ($20.5 and $9.4 until 2008);

- CSIRO *Climate Change Adaptation National Research Flagship* ($43.6m over 4years);

- *National Centre for Climate Change Adaptation* ($25m start, plus $100m over 5y), but most adaptation focus is on urban infrastructure;

- Tax changes in carbon sink forests (Budget '07) enabling the depreciation of assets used for creating carbon sink forests, excluding Managed Investment Scheme projects; and

- *Spatial Toolsets* for managing climate risk for agricultural production – Bureau of Rural Sciences and Meat and Livestock Australia.

The list of programs and initiatives remains loosely focused, without priority and in some cases duplicating efforts while under-resourcing others. Of particular concern is the interface between the knowledge being created through research and development projects (often run by Research Development Corporations or Co-operative Research Centres for example) and officials responsible for making and implementing policy (within government bureaucracies).

Outside of government-backed research and policy making bodies, there is strong support for a focused and well-resourced effort to assist agricultural industries to adapt to climate change impacts and provide profitable opportunities to mitigate greenhouse gas emissions.

In its General Section Council meeting in February 2008, WA Farmers officially recognised:

> the reality of climate change and will lobby both state and federal governments to acknowledge that farmers, as managers of a large part of Australia's land mass have a massive role to play in carbon trading, offsets and sequestration and need to be at the table now to ensure that these opportunities are realised, not brought in at the last minute to find that the opportunities have turned in to expectations.
>
> ... WAFarmers supports and will lobby the Federal Government to establish a Research and Development Corporation for climate change whose responsibilities will be to establish and fund research into Agriculture's role in greenhouse gas mitigation and abatement[xix].

Other state farming organisations such as Queensland's AgForce have employed staff specifically to assess the risks and opportunities for the agricultural sector in dealing with policies set to mitigate greenhouse gas emissions, such as the upcoming Australian Emissions Trading Scheme.

Westpac has supported new innovative initiatives aimed at exploring the opportunities presented by bio sequestration through avoided deforestation and afforestation. One example is Westpac's funding for the development of Landcare's CarbonSMART program. CarbonSMART is an enterprise launched as a subsidiary of Landcare Australia Limited (LAL) to pool carbon rights from landholders for on-selling as carbon credit offsets to corporations.

Not-for-profit organisations have also engaged. The Country Women's Association of NSW and The Climate Institute co-sponsor a climate solutions award for young women involved in climate solutions.

The broad-array of projects confirms the heterogeneity of the sector and the range of solutions on offer. Solutions could be even more effective if they helped deliver on a vision articulated by government and determined with input from stakeholders. With such limited

resources allocated to dealing with climate change, providing priorities and incentives to support these will maximise the likelihood of synergistic benefits flowing from the efforts of all involved in the agricultural industry and the communities that support it.

3.2 Preparing for climate change requires a cross-sectoral approach

In the area of 'mitigation' there is – as yet – no overall transparent and detailed national plan presented by the Commonwealth.

There is a range of issues associated with 'adaptation' 'resilience building' and 'mitigation' that could represent risks or opportunities to the sector, depending on how they are managed and the type of policies that are implemented. These extend to operating rural enterprises in a changing climate, associated industry and social policy needs, and through actions taken to reduce emissions including:

- Changing patterns of agricultural production, including accessing new markets for existing commodities and shifting to new commodities supported by a new climate;
- Industry assistance programs;
- Social policy that supports rural communities through the changes that are ahead;
- Changing patterns of supply and demand in global markets;
- Northern Australia, a potential new region for agriculture;
- Emissions trading, including opportunities to supply credits to emerging carbon markets, including overseas;
- On-farm activities such as non-food-competing biofuel production – renewable energy for transport – and biomass, renewable energy for electricity;
- Hosting non-agricultural renewable energy infrastructure, such as wind, solar and geothermal generators;
- Managing non-organic fertiliser use and soil carbon more broadly;
- New models for agriculture including ongoing energy and resource efficiency gains.

Government and industry responses to climate change must be made mindful of the impacts that they create between and across different public policy issues.

3.3 Mitigation often results in increased productivity and adaptive capacity

In its submission to the Garnuat Review on Land Use, Land Use Change and Forestry, The Climate Institute[xx] makes the point that most sources of greenhouse gas pollution originating from the agricultural sector are in fact a result of inefficient conversion of solar energy via photosynthesis to protein. With enteric fermentation emissions responsible for two-thirds of the sector's total emissions[xxi], opportunities to improve livestock conversion efficiency would most likely result in productivity improvements per kilogram of protein produced. While increased farm productivity and hence profits is desirable, policy makers need to be aware of the risks associated with this, particularly where increased profit results in the re-investment of livestock, increasing total sector emissions.

Soils, the second largest emissions sector at nearly 20% of total emissions also provide promising results. Improvements in inert organic soil carbon, such as through the application of bio-char, can reduce greenhouse gas emissions, improve moisture retention and provide

more agriculturally productive soils. Soils rich in these types of carbon also require fewer inputs such as in-organic fertilizers thereby reducing input costs to farming systems.

Prescribed burning of tropical savannas and temperate grasslands for pasture management are responsible for 9% of sector emissions. Controlled early burning in May can reduce emissions by around 30% and assist settlements and natural systems with their adaptive capacity to climate change impacts.

Most activities undertaken to mitigate emissions in the agricultural and forestry sectors result in productivity improvements or help to increase climate change impacts resilience.

3.4 Moving beyond adaptation

Understanding climate change forecasts and making business decisions that include this information is an important part of the sector's future viability. Equally government policies and resources that address climate change issues for rural Australia need to include building resilience and mitigating emission from the agricultural sector.

The key areas of opportunity are:

- Rewarding early moving individuals and organisations that mitigate emissions from agricultural products, processes and services; and
- Creating market opportunities for improving carbon stocks within agricultural sector operations.

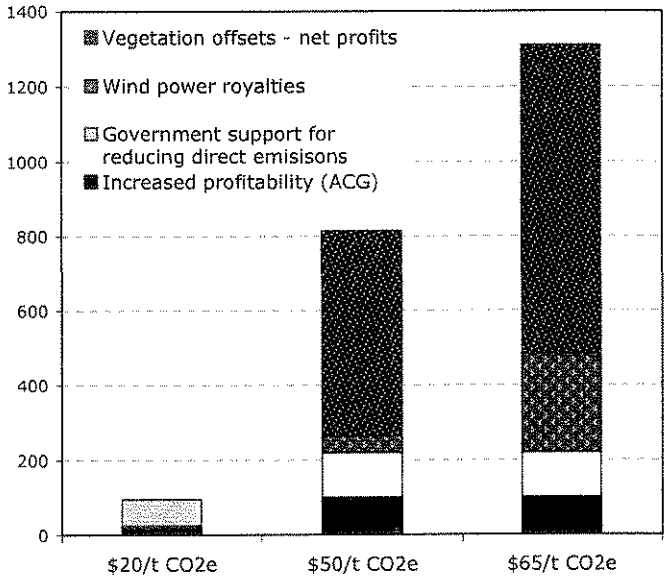
According to the CSIRO[xxii], the size of the financial opportunity is a function of the scale of commitment set by the Commonwealth in the short and medium term – the larger the commitment, the larger the opportunities in these areas.

Specifically

> The interests of rural businesses and landholders are likely to be best served by scenarios involving more ambitious mid-term emissions reduction targets, along with higher carbon prices and policies that support renewable energy deployment in the near-term.
>
> Rapid and effective global action to reduce emissions is important to reduce the direct risks and impacts of unmitigated climate change, such as lower rainfall, higher temperatures and evaporation, increased drought and fire risk, and more severe extreme events.
>
> At a national level, the analysis presented in the report suggests that carbon prices of $15 to $30/t CO_2e are unlikely to open up widespread new opportunities for rural business and communities, while carbon prices of $50 to $75/t CO_2e could unlock significant financial revenues, help diversify rural income streams, and promote rural employment. Estimates of the potential revenues associated with different opportunities suggest that carbon prices around $50/t CO_2e could generate around 10 times more revenue for rural businesses and communities than prices around $25/t CO_2e.

This is of particular importance to the consideration of the Commonwealth's forthcoming announcement concerning emission reduction targets for 2020.

3.4.1 Net new income or profit for rural communities at Different carbon prices, 2020-2025 (A$2005 millions)



Source: CSIRO report for the Agricultural Alliance on Climate Change[xxiii]

Research commissioned by the AACC also included the following key findings:

1. Rewarding early moving individuals and organisations that mitigate emissions from agricultural products, processes and services

Towards the end of 2007, the public was invited to comment on a paper which outlined the challenges of rewarding early action ahead of the commencement of a national emissions trading scheme. The Commonwealth is yet to release a response galvanising views and/or recommending actions that would encourage early action. A lack of clarity is a disincentive for the agribusinesses and farmers seeking to act early to capitalise on the early-mover advantage.

Similarly, management of the phased in entry of industry sectors into the AETS should reward early action and not inadvertently create disincentives for early action.

2. Enabling the large-scale re-vegetation of marginal agricultural land and land of high conservation value

There is a significant opportunity for the farming sector to be part of a large scale re-vegetation effort. The new *Caring For Our Country* package which attempts to refocus and centrally coordinate the allocation of Commonwealth conservation resources could provide an opportunity for large-scale permanent re-vegetation occurring across key parts of the Australian continent. However given that it will only provide 60% of historical average allocation, there may the need for additional future resources to "fill the gap".

In parts of WA, Oil Mallee is proving a promising "technology" for a number of carbon and conservation products including but not limited to oil, biomass coppicing, salinity and erosion management and carbon offsets.

In its report to the AACC, the University of Queensland – as part of the CSIRO-led team – proposes that for less than $1.4 billion per annum the area under active conservation could at least double from six to 14 percent providing valued habitat for threatened species, building resilience into landscape and "permanently" abating greenhouse gas emissions.

3. Leveraging private sector investment

Consistent with the intention of the recent *Caring For Our Country* package, public investment in climate change solutions will go further if leveraged by investment from the private sector. According to a new report by Paul Martin from the University of New England and published by Land & Water Australia[xxiv] leverage can take many different forms including but not limited to:

- Ensuring conservation investment deduction;
- Allowing conservation Managed Investment Scheme prepayment deduction;
- Tax-support conservation gifts;
- Encouraging conservation pooled development funds;
- Conservation technology investment flow-through;
- Tax holidays for conservation investment.

Involving the private sector brings extra financial resources to the challenge of conservation and carbon storage. However it also brings innovative solutions to the opportunities presented from policies aimed at cutting greenhouse pollution.

4. Creating market opportunities for improving carbon stocks within agricultural sector operations

There remains uncertainty around whether or not agriculture will be included in the AETS and if it is how and when this will happen. At the time of writing it appears that at the earliest agriculture will be covered under the AETS in 2013; but it is more likely to be included around 2015, giving Australian agriculture a couple of years to observe the impacts on New Zealand's agricultural sector as it participates fully in the New Zealand Emissions Trading Scheme. In its submission to the Garnaut Review on LULUCF, The Climate Institute argues for a range of complementary measures to be explored providing a transition for abatement technologies and systems from the agricultural sector to be tested and adopted as part of the AETS or in a parallel measure.

Of particular note is the opportunity for soil carbon to both increase agricultural productivity and to abate greenhouse gas emissions from inert carbon stores such as bio-char. Before such a technology could be sold into a market, a number of things must first happen. It is the role of the Commonwealth to prioritise and coordinate the delivery of these actions as well as advocate for the harmonisation of global carbon markets. It is important for Australian farmers that agriculture is recognised in comparable carbon markets currently operating in the European Union and other forth coming jurisdictions, such as the United States of America.

a Soil carbon fluxes must be counted in future "Kyoto Accounts" requiring direct advocacy for this by the Australian Copenhagen negotiating team;
b An inventory of all soil carbon research needs to take place; this data must have a central repository;
c Findings from all soil carbon research needs to be shared and disseminated from the central repository (possibly via an RDC or like institution);
d Emission abatement/fluxes resulting from the use of technologies such as bio-char need to be measured and verified so as to create acceptable proxies for use in Commonwealth greenhouse gas accounting methodologies;

e These technology proxies must be delivered in such a way as they are acceptable for use by Greenhouse Friendly or like carbon off set registration entity;
f All of these steps above must be undertaken mindful of developments in international soil carbon research and markets.

For these technologies to find a place in upcoming carbon markets, the Commonwealth needs to play a lead role now and into the future.

Additional to the CSIRO report, the Alliance notes two issues relevant to assisting the sector to move beyond adaptation.

5. Other issues – provision of highly localised climate data to facilitate the provision of farm finance

Consistent with its submission to this Inquiry, Westpac notes that many investment decisions in the agricultural sector are based in part on historical climatic/weather data. In determining financing for new commercial enterprise or investment, Westpac also considers "knowledge and application of appropriate risk management tools and strategies, including environmental risks as well as long term sustainability of the enterprise and matching of enterprise with appropriate land use capability"[xxv].

There is increasing recognition that business risk assessment will have to be tempered with additional future focused climatic data, so as to factor in potential impacts of climate change in risk assessment. In order for the finance sector to provide appropriate financial products and services to the industry, the Commonwealth could assist with the provision of highly localised data on weather or climatic trends and likely future impacts.

6. Other issues – effective extension regarding the impacts of new government measures

In June 2007, the Westpac & CSU Agribusiness Index specifically surveyed the impact of carbon trading on the agribusiness sector. It found that while 78% of agribusiness operators are aware of federal government plans to introduce a carbon trading scheme, only 41% had an understanding of how a proposed scheme would operate.

The broad diversity of farmers, coupled with the mixed enterprises that they operate, makes extension into the agricultural sector a challenge. To enable farmers to make innovative and responsive contributions to provide goods and services into a low-carbon economy, the Commonwealth needs to target resources at vastly improving existing extension networks.

4 Existing drought assistance and exceptional circumstances programs – adequate to cope with long-term climatic changes?

Many sectors of the economy are facing similar questions to the one posed by this inquiry regarding the adequacy of current policies to deal with a changing climate.

Weather events are predicted to become more extreme and/or frequent in certain different parts of the country. While our "average" weather patterns no longer reflect the shift that is occurring due to climate changes, policies need to be updated to insulate and protect settlements and human life from the predicted climate related impacts.

As an example, Building Codes of Australia has begun a process of reviewing construction standards based on new data showing that 1 in 100 year floods are occurring once in 50 years and in some cases once in 25 years. Ensuring that all new construction, buildings, transport infrastructure etc. complies with the standards will maximise the readiness of settlements in dealing with the changing climate impacts. In turn this puts less strain on the insurance sector and ultimately the economy as a whole.

In a similar way, the NSW Government has followed other governments in diversifying water supply and undertaking demand management programs. Sydney Water pumps water from the Illawarra to Sydney when its main water sources are low and is currently commissioning a desalination plant to "future proof" itself against prolonged drought and its impact on the urban water supply for Sydney.

Current drought policy creates as many problems as it seeks to ameliorate. Australia is a society that seeks to protect the vulnerable and so welfare remains justified for those that have limited self-determination. Having experienced a second prolonged cycle of drought in a decade, Australian agriculture is now facing some serious questions around the need for structural adjustment and the role that welfare plays in this.

According to Phillip Glyde, of ABARE[xxvi] drought assistance in some instances is propping up unsustainable farming practices and impeding the sector's total potential productivity improvement gains. More productive farm managers are unable to purchase less productive farms due to market distortions created by drought relief and exceptional circumstances payments.

In discussing the appropriateness of Australia's drought policy, a team comprising researchers from the CSIRO, ABARE and Wageningen University in the Netherlands[xxvii] write:

> "Income variability is a much more appropriate and relevant measure of the capacity of rural communities to adapt to the effects of climate variability. Historical rainfall and temperature analyses provide some insights into the exposure of rural communities to climate risk, but few insights into their ability to cope with it. To our knowledge, there are currently no reliable policy options for making it rain, or changing the temperatures that rural communities experience, at least in the short-term. In contrast... bioeconomic models can be used to establish a direct relationship between the effect of climate variability on farm incomes, and the diversity of farm income sources. This means that building the resilience of rural livelihoods by increasing the diversity of farm income sources is likely to be an effective and measurable objective for drought policy.

> "We have demonstrated that models that integrate the biophysical and socioeconomic effects of climate on rural livelihoods can be used to turn seasonal climate forecasts into relevant and timely policy advice. The evolution of this technology provides an opportunity to refocus the data, tools, and institutions that comprise the analytical support for Australian drought policy towards the rural livelihood effects that matter most to governments and rural communities."

Current Australian drought policy is entirely reactive with no funding for activities to prevent or reduce adverse impacts of climate variability. Drought policy provides little or no active support for the adoption of locally appropriate drought management strategies. A key report to Prime Minister's Science, Engineering and Innovation Council (PMSEIC)[xxviii] found that the cost of prevention in relation to national environment priorities was generally 1:10 or less the value of the benefits achieved[xxix].

The Minister for Agriculture and Forestry in WA, Hon. Kim Chance recently proposed to re-direct the state's contribution to drought assistance from individual enterprise payments of $7,000 to a fund of $7.5 million to research climate change adaptation solutions. Providing that those in genuine need of financial assistance receive it, this proposal has merit.

WA Farmers, while informally supporting the objective of the Minister's proposal, points out that the success of new climate policies depends on the ability of decision makers to coordinate across jurisdictions; removing barriers to finding and delivering solutions. An example provided by them is their proposal to relax guidelines for a state funded Farm Water Grants Scheme to enable more farmers to drought proof their properties. Their proposal produces a climate change adaptation outcome, but is not supported by the water portfolio of state government.

This example highlights the importance of a comprehensive review of government policies, programs and spending, coordinated across-government to ensure that the opportunities and risks posed by climate change impacts and polices are considered and implemented appropriately.

5 Summary of Recommendations

With consideration to the terms of reference for this inquiry, the following recommendations are made to the Commonwealth.

A. Set science-based national interim emission reduction targets

On a macro-policy level, there is a need for national interim targets for cutting greenhouse pollution, consistent with the science and commensurable to the relative physical impacts of climate change on the Australian continent and its agricultural sector. In the passed century, Australia is already experiencing above average temperature increases being 0.9 degrees Celsius, compared with 0.7 degrees Celsius globally.

According to the CSIRO, science-based targets for 2020 resulting in a higher carbon price will benefit agricultural businesses wishing to provide solutions to market in form of carbon offsets and renewable energy.

B. Provide focus and resource the coordination for climate change adaptation and mitigation research, development and extension

Drawing on the Research Strategy presented in the CCRSPI assessment and other private research being undertaken in Australia, New Zealand and internationally, the Commonwealth should provide a focus and resource the coordination of climate change and agricultural research, development and extension.

Outside of government-backed research and policy making bodies, there is strong support for a focused and well-resourced effort to assist agricultural industries to adapt to climate change impacts and provide profitable opportunities to mitigate greenhouse gas emissions.

Current agriculture and climate change programs and initiatives remain loosely focused, without priority and in some cases duplicating efforts while under-resourcing others. Of particular concern is the interface between the knowledge being created through research and development projects (often run by Research Development Corporations or Co-operative Research Centres for example) and officials responsible for making and implementing policy (within government bureaucracies).

Solutions could be even more effective if they helped deliver on a vision articulated by the Commonwealth and determined with input from stakeholders. With such limited resources allocated to dealing with climate change, providing priorities and incentives to support these will maximise the likelihood of synergistic benefits flowing from the efforts of all involved in the agricultural industry and the communities that support it.

Government and industry responses to climate change must be made mindful of the impacts that they create between and across different public policy issues.

C. As soon as practically possible, provide policy certainty for farmers that act early to abate greenhouse gas emissions

The Commonwealth is yet to release a response galvanising views and/or recommending actions that would encourage early abatement efforts from the agriculture and forestry

industries. A lack of clarity is a disincentive for the agribusinesses and farmers seeking to act early to capitalise on the early-mover advantage.

D. Develop and deliver robust and effective decision making tools for land managers

A key outreach priority is making accessible current global climate change modelling data as it relates locally to various commodity sectors in Australia's agricultural zones.

E. Align water, natural resource and carbon research frameworks to streamline the information flow to farmers and remove duplication of, and potential contradictions between, different policy streams

Polices and programs on these key issues will alter the economies of farm enterprises, competitiveness and provide opportunities. An integrated framework should be adopted to ensure the economic and social consequences are fully considered, with open and transparent consultation and information.

F. Explore opportunities for environmental stewardship and other sequestration activities through AETS and complementary measures

Incentives for private investment in conservation, needs to be more fully considered and included as a part of the development of new carbon markets for land-based industries.

The Land & Water Australia coordinated research project "Concepts for private sector funded conservation using tax-effective instruments" should be fully considered by Treasury and the Department of Climate Change.

Equally resources from *Caring For Our Country* and government revenue from the auctioning of emission permits could go towards funding permanent large-scale revegetation. In its report to the AACC, the University of Queensland – as part of the CSIRO-led team – proposes that for less than $1.4 billion per annum the area under active conservation could at least double from six to 14 percent providing valued habitat for threatened species, building resilience into landscape and "permanently" abating greenhouse gas emissions.

G. Take the lead on coordinating research, development and market creation for new agricultural products and services in a low-carbon economy, including but not limited to soil carbon

Substantial research must happen quickly for Australia to have a meaningful inventory, understanding and negotiating position on soil carbon. With land clearing (Clause 3.7) unlikely to be part of any future climate agreement for Australia, our researchers and policy makers need to determine whether or not soils can make a useful contribution to emissions abatement into the future.

Using the example of the potential opportunities arising from increasing soil carbon, these actions must first happen before soil carbon improvements could be given credit in a carbon market. It is the role of the Commonwealth to prioritise and coordinate the delivery of these actions.

a An inventory of the maximum and likely potential of soil carbon improvements to "permanently" cut greenhouse gas emissions;

b If significant, Australia should join the United States in advocating for soil carbon fluxes to be counted in future "Kyoto Accounts";
c An inventory of all soil carbon research needs to take place; this data must have a central repository and be set up to take place over a long period;
d Findings from all soil carbon research needs to be shared and disseminated from the central repository (possibly via an RDC or like institution);
e Emission abatement/fluxes resulting from the use of technologies such as bio-char need to be measured and verified so as to create acceptable proxies for use in Commonwealth greenhouse gas accounting methodologies;
f These technology proxies must be delivered in such a way as they are acceptable for use by Greenhouse Friendly or like carbon off set registration entity;
g All of these steps above must be undertaken mindful of developments in international soil carbon research and markets.

H. Reform drought policy while maintaining the objective of welfare for those unable to self-determine

Building on Treasury evidence that "prevention is more economically effective than cure", a Commonwealth-led process involving key stakeholders should be undertaken to explore and decide on the restructure of national drought policy.

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