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**Standing Committee on Primary Industries and Resources
Inquiry: Adapting farming to climate change**

RM Consulting Group submission

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1 Introduction

1.1 RMCG background

RM Consulting Group (RMCG) was formed in 1989 as an agricultural consultancy providing agronomic, financial and management advice to farmers across south-eastern Australia, primarily in the irrigation areas of northern Victoria. The strong knowledge and understanding of farmers and rural communities in Australia underpins our current work which has broadened to cover consideration of a variety of issues, for a variety of clients across a variety of work areas.

Our clients include individual farmers, community-based farmer groups, local environment groups, industry representative bodies and all levels of government. Our work areas span strategic planning, engineering, natural resource management, rural land use planning/strategies, economics, farm business management, community consultation, facilitation and training.

The driving force behind RMCG is its commitments to the sustainable use of natural resources and to the viability of regional communities. As a result of our sustained involvement in agriculture and rural communities for 20 years, RMCG is now one of Australia's strongest regionally-based consulting groups with strong credibility across a range of stakeholders.

1.2 This submission

Over 20 years of consulting to the farming sector and to rural communities, RMCG has amassed a detailed understanding of farmers, their decision making in times of change and the impact of them on their community and their community on them. This is complemented by recent work on two large projects: 'Grain and Graze' for Meat and Livestock Australia, Grain Research and Development Corporation, Australian Wool Innovation and Land and Water Australia, and 'Critical Breaking Point' for the Birchip Cropping Group.

The purpose of this submission is to bring our understanding of farmer decision making to bear how they will be affected by and how it will affect their response to climate change. In preparing this submission, RMCG has focused on contributing its own knowledge and research and tried to avoid repeating information which is in the public domain and of which RMCG assumes the committee is aware.

The submission first discusses the findings of this research for farmers' decision making and how that will be affected by climate change, followed by RMCG's analysis of potential strategies for adaptation. Implications for farmers' needs and the role for government in investing are then drawn.

2 The operating environment for farmers

'It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change' (Charles Darwin).

Two aspects of how farmers and the farming sector operate, learn and change and their current environment influence how they will adapt to climate change. They are: the pace of change in farming over recent decades and the compounding effect this has on the complexity of farm decision making; and the drivers for farmers' decisions and the implications of drought and climate change for decision making.

2.1 Change and complexity

The first aspect of farmers' environments important to understand is the pace, intensity, extent and diversity of changes that rural sectors and communities are currently facing and the consequent complexity of decisions modern farmers face. The farming sector has and is experiencing unprecedented environmental, economic and social change. Progressive deregulation of agricultural sub-sectors since the 1980s has increased competition. Droughts have depressed production and caused considerable stress in rural communities while environmental limits have been reached leading to a number of soil health and water supply problems. In response, governments have introduced regulations and established environmental markets, most notably for water which has seen the movement of water out of some districts to higher value uses or removed from consumptive use. The combination of these factors have affected local communities as the geographic location of production and employment has shifted.

The federal government's current buyback of water entitlements has the potential to dramatically increase the pace of change by effectively changing a community from irrigation to dryland almost overnight. The shift in employment and production will only increase as the effects of this initiative are felt and it is expanded.

Meanwhile, genetic modification, development in computer technology and broadband communications, growth in developing countries, and biofuels policies in North America and Europe have radically changed management techniques and products. The upshot is that this list of changes places a lot of pressure on the farming community as well as on those who serve them, and contributes greatly to the complexity of farming decisions (discussed below).

Most farms in Australia, especially rainfed ones, are family owned and managed and are mixed systems, with livestock and cropping enterprises using the same land and complementing each other. As discussed in McGuckian and Rickards (2008), this introduces a vast array of factors that need to be considered for a farm in a calendar year. As an example, farmers interviewed as part of RMCG's social research for the 'Grain and Graze'

project¹ mentioned the following production-related topics and decisions to be considered: lambing time, fertilisers for crops and pastures, calving time, reproductive management, crop choice, seeding method, leasing or owning a harvester, labour requirements, grazing crops, planting trees for erosion control, shelter for lambs, targeting lamb markets, animal health, climatic risk, cash flow, and capital purchases. Additionally, farmers must consider 'family' elements, such as family labour availability, family preferences and direction, services and opportunities available in the local area, off-farm income, large family expenses, if and when to have a holiday and farm succession. All of these considerations are entwined and interact continuously as farmers react to changing circumstances and in doing so create new circumstances to respond to.

Such an array of considerations, constantly changing and with many of the factors involved being unknown, difficult to quantify or having relationships with other factors that are poorly understood, is the embodiment of complex decision making. Mixed farming systems are especially complex because of the number of enterprises involved and the relationships between them.

Because mixed farming systems are complex, changing them is also complex, as the farmer has to 're-juggle' many interacting components. Adopting a suggested new technology or practice within a single enterprise or a change in the balance of the enterprises is not simply about the technical and financial merits of that change; it is about how that affects the balance of the system as a whole.

Although this complexity makes decision making difficult, farmers have a proven capacity to adapt to circumstances and to be innovative. Australia has always had an extremely variable climate. Over the last hundred years, average rainfall, for example, has fluctuated between three and eight metres, with regional rainfall showing even greater variability (BoM 2009). Over this time, farmers have adopted a range of techniques to prosper in such a climate. These include being flexible in what they sow and when, combining enterprises which prosper in different conditions, and using financial instruments to spread their income across good and bad years. Australian farmers have also demonstrated an ability to adapt to increasingly dry climatic conditions. Crop varieties which cope better in drier conditions have been developed and adopted; practices to retain soil moisture, such as working the soil less and building up organic matter, are increasingly being used; and in some cases farmers have changed enterprise types to better meet new local conditions.

Behaviourally, the farming industry is characterised by a relatively collaborative exchange of information between farmers, particularly in the broad-acre sectors. This creates a farming-specific market dynamic in which the opportunity for sectoral-wide change is enhanced and has led to rapid uptake of such advances as raised bed cropping in Victoria's south-west and minimum tillage cropping in the Mallee and Wimmera. RMCG's social research has shown there has been recent and rapid practice change to no-till farming systems in the Mallee where only 10 per cent of farmers interviewed were using no-till sowing systems five years ago compared with 75 per cent sowing at least part of their crop using no-till in 2007. With reasons cited including desires to reduce soil erosion, to increase flexibility of sowing

¹ 'Grain and Graze' is a current research, development and extension program working to improve the economic, environmental and social sustainability of mixed farms in southern Australia. A five year project that started in 2003, the program involves an extensive social research component that aims to improve our understanding of the social dimensions of mixed farming systems. In particular, it strives to understand better how farming families make decisions on and about their farms. As part of this research, approximately 100 in-depth interviews with farming families running mixed farms and advisors have been conducted.

time (so they can change their cropping plan as the season unfolds), to obtain agronomic gains (for example, increased water use efficiency, improved weed control, better targeting of inputs) and soil health improvements, this can be considered an early adaptation to climate change. Farmers not only adapt quickly but are already planning for drier and more variable conditions.

2.2 Decision making, adoption and adaptation

The second aspect important to understand is the factors influencing farmers' decisions and the implications of drought and climate change for decision making.

The complexity of decision making in mixed farming systems outlined above means that rational approaches such as cost-benefit analyses need to be complemented with 'non-rational' tools such as gut feel or intuition. A farmer's decision may be in response to a mix of financial, management and social reasons that cannot easily be captured in a tool, making it less useful to and less used by farmers. This is reflected in the range of responses from farmers interviewed as part of the 'Grain and Graze' project which can be summarised as:

- The tools to make decisions are either not well understood or are not adequate to make complex mixed farming decisions.
- Because the decisions are complex and have many unknown variables and risks, a detailed assessment of the costs and returns is considered of little value.

Rather, this research suggested mixed farmers decisions are driven by four main factors:

- hassle reduction – the desire to keep a system simple and avoid complexity
- labour – the desire to use labour more efficiently and the ability to find it when required
- recreation – the desire to find time for recreation
- personal preference – the desire for a system that (predominantly) consists of the enterprises a farmer enjoys.

Additionally, research suggests that farmers draw on many sources of advice and guidance from both the public, private and community sectors. There particularly seems to be a trend amongst 'leading' farmers to operate their businesses in a 'CEO' mode, with them outsourcing the multiple areas of specialised advice they do not have the time or ability to become expert in (McGuckian 2007). 'Teams' of experts are needed to support such farmers in making decisions in the complex environment they operate within.

As demonstrated above, farmers have a desire to reduce the vulnerability of their systems to the effects of drought. Other research conducted by RMCG for Birchip Cropping Group as part of the 'Critical Breaking Point?' project² supports this, but has found that while the drought creates this desire it simultaneously can remove the ability to act on it. By adding a large degree of uncertainty and introducing an increasing number of issues for farming families to deal with, drought significantly increases farmer stress and reduces their ability to cope with complexity. This stress is compounded by an uncertain policy environment

² 'Critical Breaking Point' was a 1.5 year social research project into the effects of drought and other pressures on farming families in the Wimmera Southern Mallee region of western Victoria in southern Australia during 2007 and 2008. Organised by the award winning Birchip Cropping Group, it involved in-depth real time interviews with approximately 60 predominantly mixed farming families about their experience of drought. Six month follow up interviews with a sub-set of 20 families are currently being conducted and these will be repeated in another six months to help us understand how farming families' experiences are changing over time and the decisions they are facing and making.

(something the Drought Policy Review did not alleviate) and the perception that agriculture and rural Australia are not valued by governments and the urban population. Concurrently, drought reduces the financial, physical and social reserves needed to invest in change, and ultimately leads to the stalling of decision making.

Climate change and adaptation to it may do two things. It may exacerbate the impacts of drought with a more variable and on average drier climate putting continual pressure on the financial, physical and social reserves and by creating exponentially more decisions and options and yet more stress. And, by fundamentally altering what the future holds and what 'best management' looks like, climate change is throwing into question the value of past experience or local knowledge; knowledge that all farmers have traditionally relied on to a degree – often a great degree – in making their decisions. This devaluing of past experience and local knowledge as a reliable guide to the future is undermining farmers' confidence and increasing their reliance on often complicated external information at a time when confidence is badly needed and attention is short.

3 Potential adaptation strategies

There are a multitude of adaptation strategies that can be adopted by farmers to lessen the impacts of climate change on their production. At the broadest level, strategies could include adopting a risk management approach. At the specific level, strategies range from changing cultivation and sowing practices, through changing crop types to changing the system as a whole. The list of decisions and options climate change could stimulate is endless.

3.1 Risk management approaches

Picking up on the potential for climate change to increase the uncertainty of the future and thereby devalue the relevance of hard and fast plans, farmers will need to learn how to be adaptable in real time. This will include monitoring performance on the go and adjusting as necessary. This will make training in the application of decision trees and other decision making tools essential.

Training in financial risk management models is a related need. Many farmers interviewed as part of the 'Critical Breaking Point?' research were badly burnt in their first foray into futures markets. If these, and insurance products, are to be important instruments for farmers in managing risk, a thorough understanding of and ability to use them is essential.

Another way to manage risk is to outsource some decisions of the multiple complicated components of their business to external sources of expertise. This would free farmers up to focus on managing the complex whole.

3.2 Specific practice changes

In its work for clients, RMCG has explored the following specific practice changes:

- **Increasing the extent of pasture/fallow.** This ensures greater retained moisture in the soil profile at the start of the next year's cropping season and so enhances early season growth.
- **Decreasing planting density.** This means that a greater percentage of the residual moisture and of any rainfall is available for each plant.

- **Shorter season varieties.** This allows producers to maintain a productive cropping regime within a shorter growing window.
- **Greater stubble/residue retention.** This retains soil moisture.
- **Frost-resistant cultivars.** This allows short season varieties to flower during periods of frost risk without risk to plant yield.
- **Combining enterprises that prosper in different conditions.** This allows the risk of variable conditions to be managed by combining enterprises that prosper in these different conditions.

In a study for Birchip Cropping Group of the financial implications of climate change and adaptation strategies for a selection of farms, RMCG found that there were financial benefits of adopting such strategies. Results showed climate change increased the risk of poor yields and reduced farm viability, particularly in low rainfall years. Implementing an adaptation strategy based on increased pasture and fallow led to an increase in the overall farm viability with a reduction in yields in the best growing seasons, as a greater percentage of the property has been allocated to pasture/fallow, being more than offset by the reduction in risk in poorer years, as residual moisture from the previous year's pasture/fallow provides enhanced growth early in the season.

However, climate change will affect much more than grain yield. It will also have an affect on grain prices as production declines and it is likely input costs will rise due to the emissions trading scheme. Analysing a case study farm using a simple model it developed to explore the impact of these multiple changes on whole-of-farm profitability, RMCG found the net worth to increase with higher input costs (from \$170 to \$230 per hectare), lower yields, and high grain prices (from \$200 to \$300 per tonne for cereal grain).

4 Farmer needs and the role of government

4.1 Farmer needs: information and advice

To adapt to the new and evolving circumstances that climate change will create, farmers will need a range of assistance from external sources.

4.1.1 Research, information and skills

At the broadest level farmers will need new technologies and practices to be developed and their technical and financial integration into current farming systems researched. This will include not just the development of new varieties of plants, new practices to retain soil moisture, and in some cases new enterprises to better meet evolving local conditions, but an analysis of their interactions with existing elements of the farming system and their impact on the viability farming system as a whole.

Sectoral and regional information is also integral to assisting farmers to understand the environment in which they are living and working and to plan for the future. Research into the impacts of climate change on local rainfall and temperature patterns and therefore yields is incredibly important. This should include observable examples of change on model farms. Such localisation of the science would enable farmers to accurately assess how they will be affected by climate change and what they can do to act on it.

Equally important to farming families interviewed as part of the 'Critical Breaking Point?' research was information regarding how their communities and regions may change as a result of climate change. Given the interconnectedness of a farming family's local community, family and business, changes to key services, agribusiness, employment opportunities and schools all affect their on-farm decisions.

Finally, with the financial and business environment in which farm enterprises are operating becoming more complex and arguably more difficult, financial and business management and decision making are key areas for skill development. As discussed above, this could range from training in the use of tools such as decision trees to training in the use of financial market instruments such as derivatives.

It could also include help developing skills in selecting adaptation strategies. The analysis of impacts under climate change that RMCG has conducted so far shows a wide divergence in findings, from being worse off to benefiting overall once all potential changes are taken into account. This divergence demonstrates the difficulties in assessing what the impacts of climate change will be and in analysing and selecting adaptation strategies to mitigate these. Assisting farmers to trial and observe the outcomes could be used in this area to significantly enhance farmer behaviour change and decrease the risk that any one adaptation strategy represents.

These skills have not been an emphasis of past formal agricultural education or extension efforts which have tended to focus on science and production issues. Drier conditions have so far created painful financial and business management problems that farmers feel less skilled to deal with. 'Best management practice' more broadly, including managing risk through diversified investments, is particularly needed as farmers face superannuation and succession issues.

4.1.2 Extension and advice

Extension and advice have a critical role to play in facilitating the transfer of information and skills to farmers and helping them sort through the information available. The above discussion should not lead one to conclude that there is no information available to farmers regarding new technologies and practices, changed climatic conditions and management of finances and the business. There is in fact an increasing amount of information available. Sorting through this 'information glut' for the most credible and pertinent pieces of information is one of the most important services advisors can provide.

Extension and advice can also help farmers set the 'bounds' of complex decisions by helping them streamline their farming or business systems. There is a range of tools that can highlight the pertinent information about a business and thus help farming families better understand their status quo and options for the future. For example, RMCG has designed a simple spreadsheet which helps farmers to see on one page what their finances suggest about three central questions: Am I profitable enough? Can we afford to expand/contract? Can we afford to retire? The 'Grain and Graze' research confirms RMCG's belief from years of consulting that these three questions encapsulate much of the complex decision making that many farming families commonly face.

Finally, extension and advice will need to take into account what we know about farmers' decision making. They must be offered with a deep understanding of the complex array of

factors that farming families are taking into account. For this reason, the advisor may only be providing information and advice on particular complicated 'bits' of complex decisions. This is important in assisting the farmer, but should not be taken to mean that the advice will form the ultimate decision, as that rests with the farming families involved who are considering a range of intangible elements.

The extension should also be offered through a range of participation options. One-on-one advice is useful, but RMCG's investigation of best practice extension indicates there is huge value in discussion groups when farmers are under stress. At these times, the peer-to-peer learning and social interaction such groups provide is highly beneficial to maintenance of farmer well-being and their ability to make decisions. They can also provide relaxed environments for farmers to explore scenarios and to meet potential advisors.

4.1.3 Infrastructure for change

At the community and sector levels, farmers would benefit from the provision of appropriate infrastructure. The future distribution of agriculture and pattern of enterprises will be influenced by what resources, such as road and rail facilities, are available in different areas. There is a valuable opportunity to not only help agricultural industries distribute themselves in a climate change-ready manner, but to take a lifecycle view and reduce the carbon footprint of their products and the food system at large. The potential for decentralised systems of climate-appropriate food production, processing and consumption to concurrently fulfil environmental, economic and social goals deserves close attention.

4.2 Broad principles for the role of government

The components above should not be considered a list that government should fund and deliver for farmers. The principles for government intervention in agriculture are articulated well in the Victorian Department of Primary Industries' Strategic Plan 2008-12 which describes its role as:

'... to be an agent of beneficial change, to address the large challenges and opportunities of the future. In doing so, [it seeks] to complement, not compete with, the private sector. [It acts] where markets have failed or are likely to fail, and important public benefits are likely to arise.' (DPI Strategic Plan 2008-12: p.10)

This passage highlights four important points for government's role in assisting farmers adapt to climate change:

- 1. There is a role for government where a high-level, long-term view is required.** Government remains the only sector that has the unique advantage of a high-level and long-term view. This is required when considering the future development of an industry and the contribution it will make to the country's economy.
- 2. Government should only intervene where there is market failure.** Market failure occurs when a market does not deliver the optimal amount of a good or service. Those often cited in relation to agriculture are:
 - where the good, such as research, is a public good, that is, it is not possible to exclude anyone from using its findings and that one person's use does not reduce that available for use by others

- where production of the good creates negative external impacts that are not costed as part of the production process and therefore more of the good is produced than would be if all costs were accounted for
 - where, although information is available, it is difficult to use or decisions are too complex resulting in suboptimal decisions being made
 - where farmers, because of their isolation and size, cannot create a strong enough demand signal to encourage suppliers to the market.
- 3. Government investment should not exceed the level of public benefits that arise.** Intervention will often produce a mix of benefits, some that will accrue to the wider community and some that will accrue to individuals or firms. The degree of market failure and level of public benefits that arise from a particular good or service should be used as a guide to the extent of government investment. Beyond this, it is important for government to develop cost-sharing arrangements with the private parties who benefit from the intervention.
- 4. Where it intervenes, government should be careful not to compete with the private or community sectors.** Should government intervene in areas of private benefit, it can easily 'crowd out' private provision of a good or service. That is, by delivering private services at little or no cost, government effectively subsidises that service to farmers who in turn seek it from government instead of private service providers. This has been the case in agricultural industries for some time and research by RMCG suggests that some private enterprises have been reluctant to develop businesses in areas with a perceived strong public sector presence. This not only negatively effects the private service providers, but the farmers themselves by stymieing the market for information for farmers, decreasing farmers' willingness to pay for services and in turn reducing their self-reliance.

Considering the areas in which farmers need assistance, there is a strong rationale for governments to invest in research and development of new technologies and practices and sectoral and regional information of changes to farmers' environment, communities and regions. In the case of new technologies and practices, research of these is clearly a public good. So too is information regarding how the physical and community environment farmers operate in will change. In fact, government is the only party that can inform farmers as to what is likely to happen to key government services in the future.

The rationale for assisting farmers with making sense of available information and with skills and processes to streamline decision making is less clear cut. It could be argued that public benefits will arise from better on-farm management of natural assets and ecosystems. The size of the change in short timeframes in some areas, especially irrigation districts where reduced access to irrigation water is rapidly changing irrigation communities and government buyback is hastening this, could also form a rationale for government assistance. That is, the speed of change will reduce the capacity of these communities to develop alternative sources of employment without assistance and it is more cost effective for government to invest now to develop new industries than to re-train workers down the track.

Finally, the Garnaut Climate Change Review (2008) and others have noted the constraints 'bounded rationality' places on people's ability to make decisions where information is available but difficult to use and where decisions are complex. This can result in biases

towards the status quo and high rates of discounting of future costs and benefits. This will be particularly troublesome in the case of climate change where past rules of thumb may no longer be relevant.

However, farmers are also likely to benefit significantly by developing better systems for managing information, managing their finances and their business, and making decisions. On balance, there is a role for government in developing programs and policies to assist farmers in these areas, but the cost of such programs should be shared by the farmers themselves.

5 Conclusions

This submission has detailed findings from research conducted by RMCG for the 'Grain and Graze' and 'Critical Breaking Point?' projects that showed farm decision making is complex with many interrelated factors to be considered and many 'right' answers. In such an environment, rational tools are only so useful, and need to be complemented by 'non-rational' decision making frameworks. Climate change, like drought now, will likely make decision making difficult by putting continual pressure on the financial, physical and social reserves available to invest in change and by creating exponentially more decisions and options.

Despite this complexity, farmers have managed to respond and adapt to many changes in recent decades and have demonstrated a willingness to 'get on with the job' of adapting to climate change. To do so, RMCG believes farmers need a range of assistance including research into new technologies and practices, provision of sectoral and regional information regarding environmental and community change, assistance with making sense of available information, and development of financial and business management and decision making skills and farming systems that streamline decision making.

There is strong rationale for government investment in such assistance, however, given historical involvement of government in this sector, it should be mindful to: focus on taking the high-level long-term view, intervene only where there is market failure, invest only up to the level of public benefits that arise and avoid competing with the private and community sectors.

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