National Farmers' Federation

Submission to the

Productivity Commission Inquiry into

Barriers to Effective Climate change Adaptation

16 December 2011

National Farmers' Federation

Member Organisations

AGFORCE

Australian Dairy Farmers

ADFA

Australian Livestock Exporters' Council ALEC

ALPA

Australian Veterinary Association

Pure Beechworth Honey 100% Pure Australian Honey

CANEGROWERS

Cattle Council of Australia

Corporate Agricultural Group

Cotton Australia

Goat Industry Council of Australia Inc.

Grain Growers Real benefits. Real results.

GrainCorp

NSW Farmers Association

Northern Territory Cattlemen's Assoc. N.T.C.A

Agricultural Excellence & Sustainability RGA Ricegrowers' Association of Australia Inc

RIDLEY

Sheepmeat Council of Australia

Agriculture's Future Your Future ↔ Our Future TFGA

The Pastoralists' Association of West Darling

Victorian Farmers Federation

WAFARMERS The Western Australian Farmers Federation

WOOLPRODUCERS AUSTRALIA

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1. The National Farmers' Federation

The National Farmers' Federation (NFF) is the peak national body representing farmers and, more broadly, agriculture across Australia. It is one of Australia's foremost and respected lobbying and advocacy organisations.

Since its inception in 1979, the NFF has earned a formidable reputation as a leader in the identification, development and achievement of policy outcomes - championing issues affecting farmers and dedicated to the advancement of agriculture.

The NFF is dedicated to proactively generating greater understanding and better-informed awareness of farming's modern role, contribution and value to the entire community.

One of the keys to the NFF's success has been its commitment to presenting innovative and forward-looking solutions to the issues affecting agriculture, striving to meet current and emerging challenges, and advancing Australia's vital agricultural production base.

The NFF's membership comprises of all Australia's major agricultural commodities. Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations collectively form the NFF.

The 2009 re-structure of the NFF has enabled a broader cross section of the agricultural sector, including the breadth and the length of the supply chain, to become members through an associate member category.

Each of the state farm organisations and commodity council's deal with state-based 'grass roots' issues or commodity specific issues, respectively, while the NFF represents the agreed imperatives of all at the national and international level.

2. Introduction

The NFF welcomes the opportunity to make a submission to the Productivity Commission Inquiry into the barriers to effective climate change adaptation (the "Inquiry"). The NFF notes that this Inquiry is broad ranging and covers policy issues across the economy. In this context, NFF's submission will deal with only those issues pertinent to agriculture.

Picker, 2010 notes that the challenges of climate change adaptation are uncertainty (nature, severity and timing of impacts); likely scale of impact is unclear; how to balance the risks among diverse ecosystems, sectors, and communities; there are only rudimentary analysis tools available; and the rationale for targeting resources is consistently politically loaded. For governments, the tools are largely to provide information, deliver incentives and compel action across sequestration, mitigation and adaptation. Policies specifically around adaptation are particularly thin on the ground.

NFF recognises that governments can only do so much, and this is usually focussed on addressing market failures and facilitating change in behaviour to promote adaptation, mitigation and sequestration. For climate change adaptation, the uncertainty for farmers is also a factor for governments, i.e. when, how, and where climate change adaptation requires government intervention.

It is important to recognise that agricultural industries will not experience climate change in a consistent way. Maps illustrating the projected impacts of climate change clearly show that different locations will experience different impacts, and that there is considerable uncertainty around the magnitude of these impacts. The uncertainty for farmers flows on to uncertainty for towns and communities in rural and regional Australia, infrastructure planners as well as associated industries. It is important that Government provide an environment that maintains and encourages flexibility to support industries to respond to climate change, but also policy that encourages and promotes adaptive behaviour and innovation in agriculture and the associated industries to overcome the impacts of climate change and build resilience within industries.

The Productivity Commission Inquiry into the barriers to climate change adaptation is timely. NFF notes that adapting now to climate variability is the basis for reducing vulnerability to long-term climate change in an incremental way. For agriculture, there has been significant focus and investment in climate change adaptation – and a focus for the farm gate has been on whole of business performance as a way to be better positioned for climate change and to have adaptable and resilient businesses.

For agriculture, adaptation is likely to focus on adaptation in the existing location or region (e.g. purchasing a property nearby but with slightly different soils and climate). There are many reasons for this, but it is highly linked to the way farmers see themselves as part of the local community of interest. Therefore, adaptation measures must necessarily focus on appropriate policies for skills/labour, taxation, the provision of infrastructure and the supply chain (tipping points for regionally established processing facilities).

The NFF has identified a number of opportunities in this submission that might better position the Australian community and agriculture for resilience to climate change adaptation. Additional roles have been identified for the Government, Productivity Commission and COAG, with a focus on regulatory issues to deliver flexibility for future decision-making. In summary, these opportunities are:

- Investment in R,D&E particularly anticipating the research needs of the future and implement this today to ensure the results are available when required;

- Understanding the ability and capacity for communities to adapt, including those which are highly sensitive and vulnerable, and the transitional support options (financial, material, alternative livelihood options, retraining etc);

- New policies and institutions to enable the agricultural industry to support changes, particularly when farm assets are largely fixed – and further exploration of the regulatory and other impediments (such as entry and exit) preventing adoption of transformation relocation as a viable alternative;

- Implementing a national investment plan for reliable social and business infrastructure for the future;

- Options to achieve better environmental outcomes using all public land conservation areas (improving cost effectiveness by reducing regulatory red tape around risk and OHS) while avoiding cost shifting between governments or between governments and the private sector;

- Reducing inconsistent and conflicting regulation (e.g. the impact of the carbon tax on rural and regional transport and movement where there is little public transport) across the different levels of government by introducing consistent national legislation across a range of policy areas to increase flexibility and policy responsiveness;

- Improved data and knowledge (including accessibility) to underpin monitoring and decisions (costs, benefits and effects), including social and environment (e.g. the legacy lag effects when overlaid with adaptation impacts) and weather forecasting;

- Further investigation of products like multi-peril crop insurance to spread risk and the taxation system to support and enable change in rural and regional Australia;

- Review of criteria for a range of government assistance programs to help farmers manage climate risk (e.g. drought support and NDRRA), especially in the light of recent disasters and with a view on future circumstances and improved flexibility.

3. Agricultural Adaptation

Australia's farmers have been adapting to climate change since European settlement. This is the genesis for the highly innovative and technologically perceptive farmers today.

Moreover, the extremes of Australia's climate have been the driver for the development of world leading technology and innovation. Australia is a developed economy operating in developing country climate. The climate in which Australian agriculture has operated in until now will provide the impetus for other countries to adapt to climate change. There is much that the world can learn from Australia that will allow the world to produce more food from less land and water in an environment of an increasing world population.

Australia's farmers are adapting to our climate, but it is essential that this adaptation continue to be underpinned by additional investment in the research, development and extension (R, D&E).

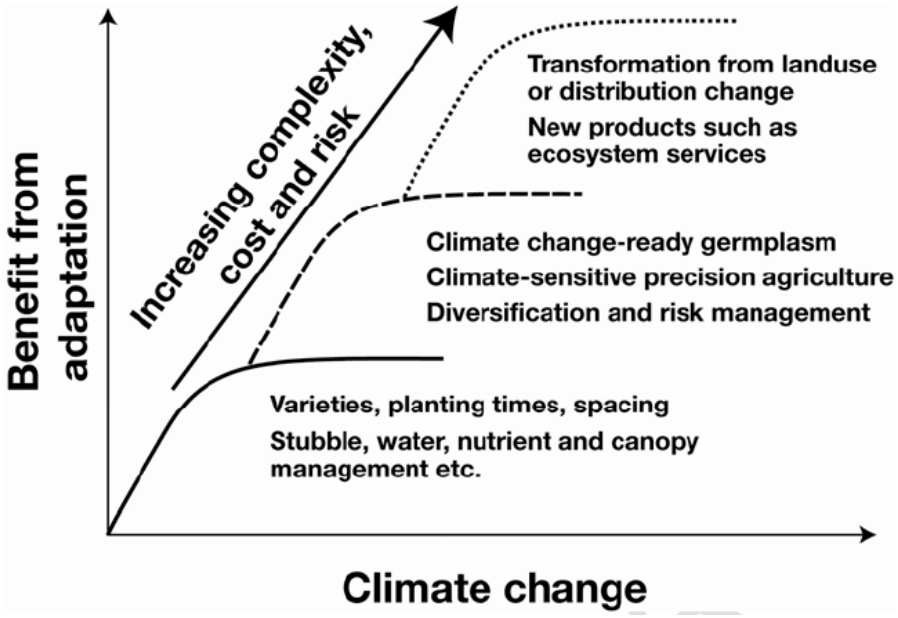
Adapting agriculture to climate change has certainly attracted significant attention, particularly through the work of the Climate Change Strategy for Primary Industries (CCRSPI) and the work of many leading agricultural scientists. In particular, NFF notes the 2010 publication "Adapting Agriculture to Climate Change" (CSIRO, 2010) which brings together the latest research that will assist agriculture in meeting the challenge of adaptation to climate change. The book deals with industries as well as cross cutting policy areas.

Dr Michael Robinson's forward has two key messages – Australia's adaptive response must be supported by good science and that access to good quality information by all parties is essential to address the challenge of climate change.

Moreover, the final chapter in this book notes the priority challenges for agriculture as being managing risk and uncertainty, balancing incremental adaptation and transformational change, considering mitigation-adaptation interactions, conserving biodiversity and natural resources and building adaptive capacity.

It is worth noting that for agriculture, adaptation to climate change will occur at three levels. Initial adaptation will be at the farm scale such as changing planting times. Industry-based adaptation then follows for example, through the development of new genetics. Finally, there is transformational adaptation in which commodities may shift to better match climate (e.g. peanuts from Queensland to Northern Territory and rice into Kununurra) or perhaps introduce new varieties into existing location of farms (e.g. wheat into southern Victoria). This model is contained in the National Climate Change Adaptation Research Framework – Primary Industries research plan (NCCARF, 2010) – see Figure 1 below.

Figure 1 Relationship between climate change impacts, adaptation responses and the potential benefits from adaptation (Howden et al 2010 in NCCARF, 2010)



CSIRO (2010, p.249) also notes that the major barrier to adaptation for agriculture as being the desire to wait until more reliable information is available and that if timely, proactive action is taken it will be crucial to find ways of making decisions with imperfect information. The book takes this further (adapted from Howden et al 2007) and suggests:

- The need to convince farmers that the projected climate changes are real and likely to continue, this being dependent on existing trends being consistent with projected changes (particularly at decadal levels).

- Farmers need to be confident that the projected changes will significantly impact their enterprise(s) and that they understand the range of consequences of different options – this requires research, systems analysis, extension capacity, industry and regional networks and modelling capabilities. Farmers also need to know the limitations of adaptations so as not to underestimate potential vulnerability.

- The availability of existing technical, investment in new technical and other options, and management strategies to respond to the changes.

- Transformation change may require support in the transition, e.g. industry adjustment and enterprise relocation, through direct financial and material support, creating alternative livelihood options and supporting community partnerships (e.g. retraining).

- New infrastructure, policies and institutions to support the changes in management and land and water use arrangements. Difficulty may occur because of lag effects, where there are significant tradeoffs, impact on social welfare and deal with infrequent climatic extremes that require substantial up-front investment.

- Farmers, industry and government must have the capacity to make continuing changes and improvements underpinned by monitoring, costs, benefits and effects. This includes participatory engagement between farmers and decision makers.

CSIRO (2010, p.247-248) also notes that Governments and other institutions that support primary industries have an essential role to play in assisting adaptation to climate change. But intrinsic to this is understanding the capacity for communities and individuals to adapt, and which communities or individuals or industries that may be vulnerable – requiring additional assistance. This is similar to the work undertaken by the Murray-Darling Basin Authority in attempting to map the sensitive and vulnerable communities that may be negatively impacted by the proposed Basin Plan.

However, NFF does support comments made in CSIRO (2010) that there is a clear need to avoid conflicting priorities and perverse outcomes that could result in impediments, barriers, perverse incentives and create maladaptations.

The work of CCRSPI and the Primary Industries Adpatation Network (PIARN) associated with NCCARF represent key programs to understand the impact of climate change and options for adaptation and mitigation. Both of these programs are currently hosted by the University of Melbourne and their work should should inform the findings of this Inquiry.

Specifically the NCCARF (2010) framework notes that one of the major barriers for primary industries is the signficant capital investment in land, water and infrastructure which creates a situation of exit and entry barriers (termed asset fixivity) for extensive agriculture and horticulture.

4. Natural Resource Management

The Australian Government has a large investment in natural resource management (NRM) and is implementing climate change policies to provide adaptation for the environment. Recent policy reform in this area include the Australia's Biodiversity Conservation Strategy 2010-30 (Natural Resource Management Ministerial Council, 2010), Strategy for Australia's National Reserve System 2009-2030 (Natural Resource Management Ministerial Council, 2009), the soon to be announced National Wildlife Corridors Plan, and a number of other policies around vegetation, rangelands, pests and weeds. The Australian Government's strategies are implemented through subserviant state based strategies.

In 2002, the Australian Government released a report on the impacts of climate change on biodiversity (Howden, Hughes, Dunlop, Zethoven, Hilbert, & Chilcott, 2003) and implemented an action plan from 2004-07 (Natural Resource Management Ministerial Council, 2004) – although the latter is yet to be updated. In 2007, a report was released identifying the research needs for biodiversity (Hilbert, et al., 2007). It also identified limitations – the ability to measure and predict specific impacts, how to determine the best biodiveristy management approach as the climate changes and how to provide effective information for managers and policy makers.

The 2011 Australian State of Environment Report ("SOE 2011") (State of Environment 2011 Committee, 2011) notes that the key drivers for environmental change are climate change, population growth (the highest proportion of threatened species coincide with the highest density populationa areas) and economic growth. In particular, climate change is noted as becoming more prominent for current and future pressure. However, the Committee notes that the availability of information to determine the trends in climate change impacts on biodiversity are poor nationally and poor at a case study level. The SOE 2011 notes that the most vulnerable species to climate change would appear to be less mobile species.

The Australian Government's main policy response is the National Reserve System (NRS) as a method to protect "representative sample of remaining intact, native ecosystems" (State of Environment 2011 Committee, 2011, p.650). The NRS strategy focus is on ecosystem resilience.

The National Wildlife Corridors Plan will focus on climate change resilience through enhancing connectivity between the NRS estate and on private land. An ongoing policy issue is that of "buffer zones" to provide additional areas of biodiversity protection from the impacts of normal agricultural activites such as the application of fertilisers and pesticides. NFF is concerned about the possible perverse impacts on agricultural production should "buffer zones" become mandatory in any way, i.e. it is perceived as being a "free grab" of additional land for conservation at the expense of agricultural production.

The above must be considered along with societal expectations of biodiversity protection and particularly society's expectations of private land management and the impacts to agriculture. The interaction between agriculture and biodivserity is important from a policy and political perspective.

The SOE 2011 notes the major agricultural activities impacting on biodiversity are land clearing (largely under control but with positive and negative legacy effects) and grazing, particularly in the rangelands, in conjunction with changed fire regimes and drought.

Yet there is signficiant and ongoing pressure to either convert agricultural land to the conservation estate through the targeted NRS acquisitions or through voluntary protection on private land of high value ecosystems. This is despite the entire conservation estate not delivering the full value to the Australian community in terms of environmental outcomes. Moreover, there

continues to be legislative and regulatory pressures on agricultural activity to deliver environmental outcomes on private land.

The NRS comprises of around 13% of the land mass, but NFF calculates that the entire conservation estate is some 43% of the land mass[1]. The remaining 30% of the conservation estate is in poor condition[2]. The SOE 2011 notes that despite acquisitions, significant gaps remain in the "comprehensiveness, adequacy and representativeness" of the estate.

In more recent years, Governments have "purchased" environmental outcomes on private land through initiatives such as the Environmental Stewardship Program (Caring for our Country) and in the near future through the $964 million Biodiversity Fund.

However, full delivery of all the Australian and State Government objectives for environmental outcomes may still result in society's expectations not being met due to legacy lag effects and climate change. In this, farmers cannot be portrayed as the "bad guys". Research shows that farmers highly value their biodiversity and in many cases protect this without any government incentives or funding (Barclay, 2008).

The latest Australian Bureau of Statistics surveys (Australian Bureau of Statistics, 2011) show that 65% of farmers reported having around 224 million ha of native vegetation on farm of which 29.7 million ha (or 13% of vegetation) is protected specifically for conservation purposes by around 36% of Australia's farmers. In addition, nearly half report having river or creeks with 55% protecting these and 12% of farmers had wetlands of which 57% of farmers protected the wetlands.

Given every opportunity, farmers will need to be supported in delivering public good outcomes on private land. The key is flexibility and forward thinking.

In terms of this Inquiry, the NFF supports flexibility in the regulation of significant environment matters and government thinking. To deal with current and future impacts on biodiversity from climate change will require innovative thinking, for example, how farmers can assist management of improved environmental outcomes on public land (the entire conservation estate) by being paid to manage these lands as an additional activity to agricultural production.

The adjoining landholder could be paid to manage pests, weeds, disease, border fencing and fire. Moreover, funding programs can then be targeted to rehabilitation of the environment using organisations such as Greening Australia, Landcare and Conservation Volunteers Australia.

Policy options that may normally be considered may no longer be appropriate and any red tape that impinges this thinking must be removed. For example, the highly bureaucratic approach to managing public land, such as risk management and OH&S, and the lack of management plans for the conservation estate must be overcome to increase the likelihood of the limited funds available getting targeted to on ground outcomes.

The NFF supports Government investment in delivering better enviornmental objectives by improving the entire conservation estate – not just a focus on protecting and expanding the NRS estate and implementation of a National Wildlife Corridors Initiative. This must be undertaken

[1] This is based on estimates on additions to the NRS from Caring for Our Country purchases, as well as private land protected for conservation. Official Government estimates are currently reliant on 2008 data from Collaborative Australian Protected Area Database, i.e. pre-date Caring for Our Country and other initiatives.

[2] Pers. comm. with various people representing environmental NGOs.

in conjunction with delivering environmental outcomes on private land in partnership with farmers rather than penalising good farm management that over generations has enable biodiversity to endure.

The major issue in achieving the above is one government seeing this as an opportunity to shift costs to other governments who view this as a threat. It is time for COAG to step in and deliver a holistic management program for all public lands to ensure full delivery of environmental expectations of society.

5. What does adaptation to climate change mean?

How is effective adaptation best defined? How can it best be assessed? In other words, is the rate of adaptation "too much" or "not enough", "too soon" or "too late"? What other considerations may be relevant for maximising the net benefits to the community from adaptation?

Effective is "*causing...the desired or intended result*" and adaptation means the "*process...of changing to fit a new environment or different conditions*". Farmers are adept at adapting and have done so since European settlement very effectively.

Moser & Ekstrom (2010) published an article outlining a framework for determining barriers to climate change adaptation. In this they have adopted a different meaning for adaptation because "*adaptation must consider, but may not be justified by, climate change alone and may be initiated or undertaken in the context of nonclimatic windows of opportunity (e.g., land-use plan updates, infrastructure replacement, renovating a building)*". They noted that the Independent Panel on Climate Change (IPCC) definition assumes effectiveness is an outcome but that this assumption is premature. The definition adopted by Moser and Ekstrom is:

> *"Adaptation involves changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting nonclimatic changes. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations, aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities."*

Perhaps the term effective adaptation is incorrect. However, in terms of climate change and preparedness for climate change, the correct terminology may be "resilience" to climate change.

Resilience can be defined as "*the ability to recovery quickly from setbacks*" and "*the ability of Government to identify, assess and respond to potentially disruptive situations to avert crisis to disaster*". For the farm sector, resilience to climate change infers positioning agriculture to have "sound and responsive management practices" (CSIRO, 2011).

In other words, adaptation implies reacting to circumstances that exist whereas resilience implies that the business is already positioning with the appropriate capacity, skills and resources. This would also be appropriate given that the biggest barriers for farmers is uncertainity about climate change and that current knowledge is imperfect particularly at local and regional scales.

Farmers will position their businesses to be profitable and adept at reacting to changes, regardless of how subtle these are, and to continue to be profitable in the face of a range of uncertainties from international markets to climate.

As an example, if one bad season is enough to bankrupt a farm business, it is clearly not resilient. Therefore adaptation to climate change may not even be an option. If a farm is resilient, some examples of adaptation might include changing land use (e.g. if climate becomes drier move to cropping as has occurred in some parts of Victoria) or new on farm infrastructure (e.g. having increased water storage).

What kinds of adaptation to climate change (and variability) have proven most effect to date?

For the agricultural sector, the most effective adaptation strategies have been those targeted to efficiency and delivering a better "bottom line", particularly financial. Farmers are always likely to take up any new strategies aimed at improving production while at the same time delivering more financially stable and competitive farm businesses.

However, the best practice management advocated by Governments have been, in reality, already implemented by farmers. Precision agriculture, particularly no or zero till technology, is now "old" technology having been implemented over the last 20 or so years. In 2009-10, nearly 19 million ha of land was prepared using no or zero till (Australian Bureau of Statistics, 2011) while the OECD has noted that 70% of Australia's arable farmers have adopted zero or no till between 1974-75 and 2004-05 (OECD, 2008). In this respect, governments tend to lag behind agriculture. Demonstrating the uptake of new innovation and technology may be difficult as this is now largely business as usual.

At the industry scale, there has been significant investment in adaptation around new germplasm, and genetics to ensure this is ready in sufficient time for agricultural uptake when it is actually needed. This recognises the significant lag time between the commencement of research and delivery of the viable options to the farm business can take over a decade. It also comes at increasing cost at the industry level.

A particular focus in agriculture has been the better management of climate variability, as variability in annual and seasonal conditions have significant bearing on the profitability of farm businesses and farmers will experience climate change through climate variability. The Managing Climate Variability program, as research partnership between a number of the Rural Research and Development Corporations, has been an important initiative in developing tools and climate information that are directed at farmers needs and allow an improved understanding of climate and implications for production.

In some cases, there has also been investment in transformational adaptation strategies. However, it should be acknowledged that these are fraught with significant start up costs and higher risks. A good example is the expansion of the Australia's rice industry into the Ord Irrigation Scheme in Western Australia. Challenges have included a lack of suitable genetic material for northern Australia's climate, lack of infrastructure to distribute, receive and mill the rice harvested and the need to have five different jursidictions approvals to transfer plant and equipment between southern NSW and the Ord. The last harvest also saw the emergence of rice blast in the final stages of rice crop ripening, creating significant challenges in harvesting the rice, future rice viability and stranded plant and equipment.

Of note is that the Australian Government does not have a formal policy position on adaptation, with the exception of research and development programs.

Australian farmers have a proud record of productivity growth, driven primarily through the take up of new technologies. According to ABARES, technical change has been the primary driver of long-run productivity growth over thepast three decades. Australia-wide, technical change

increased, on average, by 1.5 per cent annually over the period 1977–78 to 2007–08 through development and adoption of new technology and management practices. This demonstrates that Australian farmers are only too wiling to adapt their production practices (Hughes, Lawson, Davidson, Jackson, & Sheng, 2011).

How can uncertainty be addressed in the context of adaptation to climate change?

For agriculture, adaptation that is closely linked to business viability and profitability have always proven to be most effective, i.e. it is not solely about climate but about the range of internal and external drivers affecting the farm business, of which one is climate. Such adaptation is really a "no regrets" approach.

Uncertainty can be addressed in this area by providing a consistent, predictable, regulatory environment that gives confidence to Australian farmers that they can make reasonable changes to their operations in a timely manner. Red tape must be removed from the regulatory environment in areas such as environmental approvals, transport, chemical approvals and taxation in order to take away unnecessary uncertainty from decision-making.

6. Are there barriers to adaptation?

What is the most useful way to classify, define and identify barriers to adaptation? Are the categories set out appropriate? Are there other types of barriers?

While the four categories (market failure, regulatory, behavioural and cultural, and organisation) appear appropriate, the United Nations Development Program (2011) ("UNDP") has classified barriers into systemic and discrete (see Box 1 below). It would appear that the UNDP barriers would include a range of other barriers that may not necessarily be relevent to governments but are certainly relevent to organisations, businesses and individuals.

Box 1. Barriers to Climate Change Adaptation (amended from Pittock & Johns, 2000 in United Nations Development Program, 2011)

Systemic barriers

Institutional barriers typically involve the absence of appropriate institutional arrangements; governance structures; mandates; technical and managerial capacity of staff in key institutions; and coordination and partnerships across various institutions, agencies, and civil society needed to create or contribute to an improved enabling environment for managing the uncertainties of climate change.

Policy barriers typically concern national, sub national and local regulations, policies, directives and other formal and informal declarations for managing key sectors and/or regions to support both planned and autonomous management of the uncertainties of dynamic climate change risks and opportunities.

Barriers to behavioural change include lack of awareness, understanding, capacity and incentives at the individual and community level that hinders uptake of adaptive practices. Systemic behavioural adjustments are also concerned with compliance measures, accountability, organizational structures and procedures.

Financial barriers typically involve the allocation of resources within national and sectoral budgeting mechanisms and systems to incorporate climate change risk reduction; regulatory and fiscal structures to promote low-emission climate-resilient growth; access to innovative financial and risk transfer mechanisms; and sustainability of the financing sources that support long-term adaptation.

Discrete barriers

Technological barriers include the absence or failure to use climate-resilient soft and hard technologies and practices such as efficient irrigation systems, drought resilient seeds and improved livestock management techniques. Lack of scientific and technical capacity also hinders access to and promotion of climate-resilient technologies and practices.

Informational barriers involve the lack of access to the information necessary for the planning and management of climate change uncertainty, including climate scenarios; results of integrated (science, biophysical and economic) modelling; vulnerabilities; and risks. This includes barriers in technical capacity to generate and incorporate this information and in management and planning systems.

UNDP goes further in suggesting a need to operationalise the removal of barriers and suggest the following as initiatives to be considered:

- Systemic – "*revising or formulating policies and frameworks to mainstream adaptation...; capacity building in technical skills, management and decision-making to improve climate-sensitive planning; facilitating coordination and partnerships through engagement of multiple stakeholders; promoting awareness, education and training at individual and community levels to build capacity and effect behavioural changes; dissemination of knowledge and best practices for adaptation to facilitate system-wide learning; and access to financing and risk transfer mechanisms such as credit and index-based insurance to ease costs of adaptation*".

- Discrete – "*involves supporting generation, use and codification of information and knowledge such as climate scenarios, risks and vulnerabilities in decision-making and planning, and demonstration of technologies and adaptation practices to promote technology transfer and increase absorption rate*" (United Nations Development Program, 2011).

Moser & Ekstrom (2010) define barriers as "*obstacles that can be overcome with concerted effort, creative management, change of thinking, prioritization, and related shifts in resources, land uses, institutions etc*". They note that "malleable" barriers can be overcome with sufficient political will, social support, resources and effort.

On the other hand, Moser and Ekstrom note that many barriers can make adaptation less efficient or less effect or may require costly changes leading to missed opportunities or higher costs. Indeed many barriers may appear as "de facto limits" but not questioning the changeability itself may be an obstacle.

Moser and Ekstrom further note that barriers are simply impediments that can stop, delay or divert the adaptation process and overcoming all barriers will not necessarily lead to a better outcome. Adaptation may be an iterative process and ignoring best practices, (e.g. stakeholder involvement) could lead to maladaptation.

Moser and Ekstrom link barriers to the understanding, planning and managing process and have classified the barriers accordingly (see Table 1 below). They note that barriers vary across temporal (contemporary or legacy) and spatial/jurisdictional (remote and proximate) scales but there are a number of "cross cutting" barriers that are repeated – including leadership, resource, information and communication, and deeply held values and beliefs.

The ability to overcome barriers depends on capabilities and the source of the barrier. For example, the decline in Government investment in agricultural research, development and extension over recent years may be a legacy temporal barrier to future adaptation. Ultimately, the nature of the barrier, its source, and the location of influence over the barrier provide a "road map" to design strategies to circumvent, remove, or lower the barriers – in the most efficient and effective way.

Table 1. Common Barriers to the adaptation stages

Stage	Phase	Barrier
Understanding	Detect problem	Existence of a signal
		Detection (and perception) of a signal
		Threshold of concern (initial framing as problem)
		Threshold of response need and feasibility (Initial framing of response)
	Gather/use of information	Interest and focus (and consensus, if needed)
		Availability
		Accessibility
		Salience/relevance
		Credibility and trust
		Legitimacy
		Receptivity to information
		Willingness and ability to use
	(Re)define problem	Threshold of concern (reframing of the problem)
		Threshold of response need
		Threshold of response feasibility
		Level of agreement or consensus, if needed
Planning	Develop options	Leadership (authority and skill) in leading process
		Ability to identify and agree on goals
		Ability to identify and agree on a range of criteria
		Ability to develop and agree on a range of options that meet identified goals and criteria
		Control over process
		Control over options
	Assess options	Availability of data/information to assess options
		Accessibility/usability of data
		Availability of methods to assess and compare options
		Perceived credibility, salience, and legitimacy of information and methods for option assessment
		Agreement on assessment approach, if needed
		Level of agreement on goals, criteria, and options
	Select option(s)	Agreement on selecting option(s), if needed
		Sphere of responsibility/influence/control over option
		Threshold of concern over potential negative consequences
		Threshold of perceived option feasibility
		Clarity of authority and responsibility over selected option
Management	Implement option(s)	Threshold of intent
		Authorization
		Sufficient resources (fiscal, technical, etc.)
		Accountability
		Clarity/specificity of option
		Legality and procedural feasibility
		Sufficient momentum to overcome institutional stickiness, path dependency, and behavioural obstacles
	Monitor outcomes & environment	Existence of a monitoring plan
		Agreement, if needed, and clarity on monitoring targets and goals
		Availability and acceptability of established methods and variables
		Availability of technology
		Availability and sustainability of economic resources
		Availability and sustainability of human capital
		Ability to store, organize, analyse, and retrieve data
	Evaluate effectiveness of option	Threshold of need and feasibility of evaluation
		Availability of needed expertise, data, and evaluation methodology
		Willingness to learn
		Willingness to revisit previous decisions
		Legal limitations on reopening prior decisions
		Social or political feasibility of revisiting previous decisions

Another method of classifying barriers is espoused in Jones (2010):

- Human and informational – knowledge, technological and economical;
- Social – normative, cognitive and institutional; and
- Natural – ecological and physical.

Jones notes that the social aspects in particular are often neglected but are important as these dictate how organisations and societies react in the face of climate stress and change. Jones notes that this was recognised by the IPCC as not being well researched and that insufficient attention may result in restricted entitlement to access resources, constrained behaviour to deal with adapation and maladaption.

Jones notes that key elements to overcome social barriers included awareness, education and empowerment; mainstreaming social policy within the wider adaptation policies; combining adaptation with other parellel approaches; and supporting autonomous adaptation.

On the other hand, Nolan (2009)[3] notes the social barriers as being ethics, knowledge, attitudes to risk and underappreciation of cultural values. Nolan poses that these social barriers impede adaptation and must be considered in decision making. He further notes that action will occur at different scales but regardless, "*the actions taken depend on how societies, communities and individuals perceive the risks associated with climate change and how much we are prepared to change*". Jones notes that "*it is largely us who impose the limits to adaptation*".

In summary, it would appear that there is any number of ways in which to classify the barriers to adaptation. What is perhaps needed is an appropriate agreed framework relevant to Australia in which the complex barriers to adaptation can be clearly identified and understood. Furthermore, for the context of governments, it would appear that it is necessary to know what barriers ought to be the focus of government effort and action.

Moreover, NFF would support reviewing categorisation of barriers in terms of initial farm scale adaptation, industry based adaptation and transformational adaptation, particularly given that these mostly relate to different time scales of impacts and implementation.

What market failures could inhibit adaptation in any specific sector or region?

NFF does not believe that market failure is a current barrier to adaptation for the agricultural sector. The major impediments are institutional, regulatory and social barriers.

As a specific example, investment in processing infrastructure may present difficulties, particularly in transformational change in the agricultural industries. There have been many examples of industries, which have not developed in a region because of lack of access to facilities, such as abattoirs, and a 'chicken and egg' situation can exist. Farmers may not move to a new crop or livestock system without access to these facilities, and investment in the infrastructure does not occur because sufficient business does not exist for the processor.

Social barriers are certainly a focus for agriculture. As previously stated, farmers see themselves as strongly embedded and connected to their community. Some of the findings of the proposed Basin Plan social and economic analysis might be relevant to climate change adaptation, particularly the consideration of transformation adaptation:

[3] Summarising from Adger, W.N., Dessai, S., Goulden, M., et al. (2008). Are there social limits to adaptation to climate change? Climatic Change. 93: 335-354. Contact: n.adger@uea.ac.uk For further information on climate change adaptation in the EU, please see: http://ec.europa.eu/environment/climat/adaptation/index_en.htm

- Changes in agricultural production could result in important social changes including loss of population and change in population mix, change in community identity, increased demand for social services and psycho-social impacts;

- The exact scale and distribution of impacts cannot be ascertained because there is considerable uncertainty around key policy issues that will affect the extent and location of those impacts;

- Reduction in agricultural production…can create adverse effects for many other parts of the economy and community. There are also likely third party impacts on irrigation supply companies and on farmers who remain, from abandoned or neglected farms infested with pests and weeds; and

- Investments in infrastructure modernisation have the potential to make contributions to the local economies. (EBC, et al., 2011)

It may be useful for governments to understand the social effects of climate change adaptation at the different scales of farm, industry and transformational to ensure that the regulatory and policy settings avoid the perverse reactions accorded to the Guide to the proposed Murray-Darling Basin Plan.

As previously stated, the fixed nature of a farmer's land, water and infrastructure (silos, sheds etc) makes it also difficult to adapt when this decision might result in the relocation of the farm business elsewhere. The decision to spread the climate change risk to other regions while maintaining the original property has challenges.

From a regulatory environment, this includes the:

- Taxation arrangements for the sale and purchase of properties;

- Availability of appropriate infrastructure to support agricultural pursuits in the new location;

- Availability of suitable crop and livestock genetics in the preferred location;

- Availability of knowledge, information and capacity to support the relocation elsewhere;

- Regulation around the transport of farm plant and equipment between locations (especially where this involves more than one jurisdiction); and

- Availability of labour, skills, supporting businesses and social services (health, education etc).

Are there examples of policy or regulatory barriers that could inhibit adaptation? What are these? Could the objectives of these policies or regulations be met in alternative ways that have greater benefits and/or lower costs and distortions?

Also see previous section.

There are significant issues for adaptation regarding policy or regulatory barriers, particularly as these affect land use change. There are continuing pressures to put additional land into conservation estates particularly to deal with climate change resilience. Yet 40% of Australia's

land mass is managed for conservation outcomes. At the same time, the world's population is growing exponentially and food security is a global problem. While urban and peri-urban encroachment results in both biodiversity impacts greater than those of agriculture, and the loss of prime agricultural food producing land. Combine these with the expansion of mining and onshore petroleum and there is a miss-match of land use and increasing land use conflicts.

As a society, Australia is yet to have a discussion about multiple use landscapes and designing planning and other regulatory arrangements around such a futuristic landscape.

However, at present, there is policy and regulatory conflict abounding, for example, the Australian Government's *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) existing use provisions, state based native vegetation and planning rules.

All of this regulatory burden and its costs end up coming off the farmer's bottom line, i.e. it reduces farm profitability and this may not be affordable if the farm is not resilient.

Macro-scale adaptation policy barriers may arise from Governments and politicians being far more interested in building new things than maintaining or improving old ones (i.e. there is a photo opportunity in the former not the latter). Moreover, many policies are reactionary; depending on whatever the big issue is now that will provide votes and improve the polling of the political party (this was also observed by Picker, 2010). This may mean adaptation comes after it is needed, once the damage is done.

Severe frustrations are felt by farmers when regulations impose unnecessary costs on the way in which they do business and in doing so, inhibit flexibility in the way they can adapt to external factors. Too rarely is it recognised that a one-size-fits-all approach is not an appropriate basis in which to regulate. Flexibility is often needed to account for the multitude of circumstances and hugely varied scenarios faced by the farm sector.

With escalating rationalisation occurring within the agricultural processing sector, farmers are increasingly crossing state borders when taking their produce to the point of sale or delivery. This intensifies the importance of providing consistency between the regulations imposed by the various tiers of government. Yet the same factors can also inhibit farmers' ability to undertake transformational change in adapting to climate change through moving interstate.

What other significant barriers (e.g. behavioural or organisational) might inhibit adaptation? What effects might these have on decisions about whether and how to adapt to climate change?

For agriculture, behavioural barriers (uncertainty about the impacts of climate change) would appear to be the biggest barrier, likely followed by regulatory (e.g. planning) and organisational.

Farmers are used to dealing with uncertainty. However, the issue with climate change is the potential for a higher degree of climate variability, and therefore greater uncertainty. The discussion paper acknowledges that farmers have dealt with drought and declining terms of trade and still come out pretty well.

In terms of organisational, possibly both Government and industry ought to be considered here. For agriculture, the Australian, State and Territory Governments have done a lot in terms of climate change mitigation and sequestration policies (including the Carbon Tax and relating initiatives), and a focus for adaptation on the funding of research into adaptation and investment in capacity through the provision of information and extension services. Although there are plenty of programs and initiatives, the NFF cannot ascertain one government policy relating to

climate change adaptation. This was also noted in a review of the adaptation policies (Picker, 2010) of developed countries including Australia:

- Countries can make decisions if they have effective governance arrangements;
- Current focus on information provision (collection of data and dissemination); and
- Focus of interventionist policies is on coastal planning issues around sea level rise, storm surge and flooding.

However, in a summary of progress by the developing countries, Picker (2010) notes that there is:

- Increasing recognition of size of problem;
- Devilishly complex issue with significant policy challenges;
- Action has commenced and deepened more recently;
- Responses by governments and international community remain superficial and haphazard; and
- The financial and insurance industry may provide a non-governmental impetus for action.

This last one may be opportune for agriculture in that the NFF has been advocating, backed up by OECD reports (Wreford, Moran, & Adger, 2010), a multi peril insurance product as a drought measure.

While the NFF has policies around mitigation and sequestration, adaptation has been the "poor cousin" to date. However, the NFF is considering a policy on adaptation with a focus on resilience rather than adaptation per se.

7. What policy instruments could be used to address the barriers?

a. Broad-based reform

Which broad-based reforms also offer potential benefits for facilitating adaptation to climate change?

The move towards consistent national regulation provides an opportunity to facilitate elements of transformational change, where individuals are seeking to change location in order to continue work in the same industry, or where farmers are seeking to spread the climate risk by farming in different climatic zones requiring the need to cross state borders. Consistent legislation and regulation on a raft of issues, including environment, transport and planning, across regions would assist farmers seeking to move to take advantage of better climate conditions. Greater consistency would make this process easier, less costly and time consuming.

See also the section on "*What other reforms would improve the overall flexibility of the Australian economy and thus contribute to efficient adaptation?"* on page 21.

What taxes affect the mobility of capital and labour and may therefore affect adaptation?

Currently, on many gauges a number of our regions do not offer an attracting alternative for Australians to live and work. The majority of this stems from the fact that the cost of doing business and living in rural and regional Australia is high.

Research commissioned by the Australian Farm Institute (National Institute of Industry and Economic Research, 2009) and carried out by the National Institute of Industry and Economic Research (NIEIR), compares the costs of essential services between metropolitan, urban and rural residents. The research showed that:

- On average, it costs rural residents five times as much to access essential services as it does metropolitan residents;

- The biggest access cost disadvantages faced by rural residents are for hospitals, residential care services, secondary schools, TAFE colleges and universities; and

- Over recent decades, people living in rural communities have found it increasingly difficult to secure or retain access to essential services, because of Australia's unique demographics, which United Nations statistics identify as one of the most urbanised nations on earth.

This factor affects people's ability to shift to less populated areas of the country for fear of having access to a level of service that is significantly lower than that which they currently enjoy.

In addition, the possible future extension of the carbon tax onto transport fuel will further increase the cost of living for regional populations who have less access to public transport and are required to travel greater distances. This risk will further erode the capacity and willingness for people (both metropolitan and regionally based) to relocate to more remote parts of the country.

Existing State and Australian Government policies have exacerbated the problems agriculture faces in attracting labour from metropolitan Australia.

For example, progressive income taxation penalises relatively more volatile incomes more harshly than relatively stable ones. Tax averaging and farm management deposits are available to farmers to mitigate this penalty at least to some degree, but the same facility has not been available to commercial input suppliers or suppliers of household goods and services in the regions where these volatile agricultural industries are located.

A flatter (less progressive) tax rate structure lessens these distortions and this has been the direction of policy in relation to income tax in recent years. Nevertheless, a source of bias against country living has, perhaps inadvertently, remained.

The NFF also believes that the artificial boost to city real estate values is provided by the exemption of the family home both from capital gains tax and from most of the means tests that are applied to social security benefits.

Australian city dwellers have responded to this distortion by making what by international standards are massive investments in their dwellings. This has not only diverted capital from regional Australia at significant cost to national welfare, but in a general way has artificially made city living more financially attractive than country living.

Finally, local council planning rules artificially reduce the scope for innovative adjustment. Arguably, they do so more in the country than in the city.

Are there any other impediments to capital and labour mobility that are particularly relevant to adaptation? For example, if climate change results in some jobs or business activities no longer being viable, or less profitable, is there anything that discourages businesses or workers from changing locations, undertaking new economic activities, or changing occupations?

International policy-makers to date have not given significant consideration to labour mobility as a possible coping strategy for populations exposed to climate change or stress. However, some analysts are beginning to argue that immigration is both a necessary element of global redistributive justice and an important response to climate change; and that greenhouse gas emitters should take an allocation of climate migrants in proportion to their historical emissions. Andrew Simms of the new Economics Foundation argues: "Is it right that while some states are more responsible for creating problems like global climate change, all states should bear equal responsibility to deal with its displaced people?" (Pielke (Jr), Prins, Rayner, & Sarewitz, 2007).

This raises the old debate about the societal costs and benefits of labour mobility. Relaxing immigration rules as part of a concerted policy to "release the population pressure" in areas affected by climate change could accelerate the brain drain of talented individuals from the developing world to the developed—and worsen the "hollowing out" of affected economies, which is itself a driver of migration. On the other hand, shutting borders undermines remittance economies (which can themselves help build resilience to climate change) and denies developing countries the benefits of access to the international labour market (Pielke (Jr), Prins, Rayner, & Sarewitz, 2007, p. 598).

The international regulation of labour migration, adaptation to climate change and capacity building in vulnerable countries are inherently intertwined. Some households in vulnerable countries will use migration as a means of adapting to climate change and sea level rise. Clearly, there has to be a balance of policies that promotes the incentives for workers to stay in their home countries while not closing the door on international labour mobility and changing locations, undertaking new economic activities, or changing occupations.

Specific impediments might include:

- Access to essential services (infrastructure, education, telcos etc) - see above;
- Connection with the land on which they reside (generational);
- Skills may be specifically relevant to a geographic area;
- Access to supply chain networks (processing facilities, roads, agents etc); and
- Administration costs of property sale and purchase (stamp duty, legal fees etc).

Are there any other taxes or regulations that may affect adaptation decisions?

NFF has no comment.

What other reforms would improve the overall flexibility of the Australian economy and thus contribute to efficient adaptation?

The NFF believes that a plan must be outlined that addresses and corrects the inequities of doing business and living in regional Australia – enhancing the mobility of our labour force.

Australia needs effective and efficient regional infrastructure, where the development plans mesh – not a set of separate, disparate reports. The requirement of the Government is more than money, and much more than the typical ad hoc spending on an electorate-by-electorate basis. A National Infrastructure Strategy, with a clearly defined regional component, is essential and demands a commitment to a long-term plan. Infrastructure Australia was established to deliver a key part of this integrated approach and NFF applauded its initiation. However, NFF has been disappointed that more has not been done.

The NFF therefore believes that now is the time for the Australian Government to outline its integrated plan for ensuring that Australia's regions will be a viable option for Australians to live and work into the future.

The NFF believes that this plan must take a multi-tiered approach to dealing with the issue that includes:

- Improving access to social infrastructure such as education and health services;
- Improving business infrastructure in the areas of freight transport, telecommunications, energy and water; and
- Improving efforts by governments to compensate rural residents for the lack of access to services.

The NFF believes that reliable provisions of social and business infrastructure are all community service obligations (CSO), or basic essential services that government is expected to deliver. It is vital the Australian Government clearly acknowledge this CSO in determining its infrastructure spend agenda.

The use of the taxation system as an effective tool to address the issue should not be ignored. Taxation should take a more prominent role in driving behavioural change such as that relating to regional development.

The NFF notes that the Australian Government currently has a regional tax rebate scheme for individuals but this is now ineffective in delivering on the desired policy intent. The Government must determine what it sees as being the future of this scheme and the appropriateness of its design and scope in delivering on its future development goals.

For some time, the NFF has advocated for a review of the existing tax zone mechanism and this proposal has been rejected outright by successive Governments despite the potential benefits to national welfare in doing so. These benefits include:

- Stemming the drain of people from inland Australia;
- Creating a net movement of city people to the country and an increasing the share of overseas migrants choosing to settle in country Australia in the first instance;
- Redressing existing policy distortions and inequities; and
- Cashing in piecemeal and relatively selective programs.

Whatever the Government's reason for rejecting the NFF's proposal to review the tax zone rebate scheme, the Government must now acknowledge that the problem exists and that taxation in whatever form, can play a role in the solution. The NFF is now looking for a mandate to engage on the topic.

b. Facilitating insurance markets

Are any existing regulatory arrangements (including state-based insurance taxes and disaster recovery policies) impeding the efficient operation of the Australian insurance market, or reducing incentives to take up insurance?

What kinds of government intervention, if any, would be most appropriate for addressing any market failures or regulatory barriers? What are the costs and benefits of these interventions?

How well are Australian insurance markets coping with climate change and any associated uncertainties? What new insurance products might be developed by the market in response to climate change (for example, insurance for land values or insurance linked to weather indexes)? Would regulatory changes be required to accommodate these, or to improve the operation of the insurance market in a changing climate?

Past Australian governments have considered multi-peril crop insurance as an alternative drought support mechanism. The concept has been rejected largely because of cost of insurance for a variable climate such as that in Australia.

Ernst and Young (2000), on behalf of the Australian Government undertook the last comprehensive study into multi-peril crop insurance. The study findings did not reject multi-peril crop insurance but rather provided guidelines on how Government could proceed down this path if they chose to do so. The report recommended that if Government pursue this option that they subsidise 25% of insurance premiums at an annual cost of $33 million per year. Government did not adopt this.

The NFF argues that a new paradigm has now emerged being climate change adaptation that has become a new policy priority for the Australian Government. This may change the cost to benefit analysis of pursuing government supported multi-peril crop insurance. The OECD has also supported the concept (Wreford, Moran, & Adger, 2010). The OECD report states that insurance can create incentives for adaptation and reducing risk by sending market signals about the climate risk and encouraging risk-reducing behaviour through discounted premiums.

In this light, the NFF is proposing a rethink about the viability of a multi-peril crop insurance scheme for Australian farmers in the context of climate change adaptation and facilitating change by the sector.

c. Regulatory responses

What regulations reduce the flexibility of individuals, businesses and other organisations to adapt to the potential impacts of climate change?

Throughout the submission, the NFF has identified a number of regulatory impediments that reduce the flexibility to adapt to the impacts of climate change. The following summarises those regulations that affect flexibility:

- Environmental regulations on land use change and protection of the environment;

- Lack of harmonisation between jurisdictions in transport, environment, chemical use, mining and onshore petroleum approvals, and land use planning;

- Impacts of carbon tax on the price of fuel in rural and regional Australia which has very little access to public transport;

- Skills and labour;

- Taxation;

- Social and business infrastructure investment; and

- Insurance and drought.

In addition, NFF has also noted the reactionary approach of governments to policy and inconsistent regulation across jurisdictions as also posing impediments to flexibility.

The above must be considered with the biggest impact on the flexibility of the farmer – the relative fixed nature of the most significant business assets: land, water and infrastructure.

What reforms are needed to improve the efficiency of existing regulations? Are there alternative ways to achieve the desired objectives?

The ongoing Productivity Commission review of red tape is a possible starting point. The review is assessing the general efficiency of regulation across various sectors of the economy. For agriculture, this was the first review undertaken some years ago. It is perhaps timely to reassess these reviews on the light of climate change adaptation and consider whether there are opportunities to improve regulatory efficiency.

Moreover, government investigation and resolution to the raft of issues raised by NFF in this submission would be a useful way forward.

Are any new regulations justified to facilitate adaptation? What would be the costs and benefits to the wider community?

NFF does not support regulation for regulation sake. Importantly, use of other (e.g. voluntary) mechanisms is favoured if possible. At present, the NFF cannot foresee the need for new regulation but is supportive of a review of current legislation in terms of efficiency, flexibility or to avoid perverse adaptation and maladaptation outcomes.

How have state and local governments responded to the potential impacts of climate change through their planning and zoning policies? Are there existing planning policies that could constrain the ability for individuals and businesses to adapt, or reduce their flexibility? What reforms may be needed to meet community objectives while facilitating effective adaptation – are there good examples?

NFF has no comment.

What implications might climate change have for local councils' planning policies and development approval processes? Has concern about legal liability restricted the ability of councils to achieve good economic, social or environmental outcomes?

NFF has no comment.

How might building regulation affect the ability of individuals and businesses to adapt to climate change? Are there any inconsistencies across the States and Territories that could impede adaptation?

NFF has no comment.

What would be the costs and benefits of changing the way that the building code is applied across difference geographic or climatic zones, or to establish new zones (for example, to allow for greater variation across regions)?

NFF has no comment.

How might regulation covering network infrastructure affect how infrastructure owners adapt to the impacts of climate change – for example, by discouraging investments in infrastructure upgrades or strategies that give them greater flexibility to adapt? What would be the costs and benefits of any changes to existing regulations?

See comments elsewhere in this submission regarding infrastructure.

d. Government provision of public good

What government provided goods and services might be significantly impacted by climate change? What decisions or trade-offs may have to be made — for example, about the balance between emergency response and preparedness, or the best way to protect natural environments when species may need to migrate?

The biggest issue for governments is the decisions or trade-offs between the various policies, i.e. housing, coastal, infrastructure, agriculture or biodiversity. While this is an issue for governments with input from stakeholders, NFF suggests the need for a whole of government response and transparency in determining how public goods and services might be impacted by decisions and trade-offs.

For the Australian Government, there is an additional issue in that it is a centralised government with little "shop front" in most areas of Australia. Therefore, appropriate consultation mechanisms are integral. The lessons, for example of the Murray-Darling Basin Plan, must not be repeated in its responses to climate change adaptation.

The NFF has posed some suggestion in this submission regarding better outcomes for our environment in terms of public good. However, the current issue around getting better environmental outcomes would appear to be a concern about cost shifting between Governments and by onerous regulation of these properties (e.g. OH&S, risk etc) that reduces the small funding available to levels which prohibit on ground implementation. There is an opportunity to deliver on society's environmental aspirations by getting this right. Perhaps the issue needs to be elevated to the Council of Australian Governments (COAG) to get a reasonable solution to this endemic and perverse outcome.

NFF has also noted elsewhere in this submission the issues around social and information and knowledge gaps. There is certainly a role for governments to obtain a clear baseline of information, e.g. people's capacity to adapt, the vulnerability of communities to climate change, which communities might be sensitive, what are the impacts to biodiversity from legacy lag effects and how will this impact on species adaptation, and what social infrastructure is needed in the future. There is possibly a range of additional questions let alone determining how tradeoffs will be made.

What kinds of information are already provided by governments to help individuals or businesses to understand risks? Is there a case for more government provision of climate-related information, or to disseminate this differently?

Agricultural industries use climate information to understand and manage risks to their production systems. The Managing Climate Variability Research Program[4] is an industry initiative that has led to the development of tools and improved seasonal forecasting (including accuracy, lead-time and ease of use); provided farmers with tools and information for managing climate risk and focussed on getting more farmers and natural resource managers managing their climate risk. This program is funded through the Rural Research and Development Corporations and projects are undertaken in partnership with organisations such as the Bureau of Meteorology and CSIRO. The focus of the program has delivered better information, but also focused on making the information more accessible.

A key challenge is the need to improve seasonal climate forecasts. This requires a move away from the statistical based models used in the past and the adoption of more modern climate modelling approaches, which can incorporate the impacts of climate change. The Bureau of Meteorology and CSIRO are actively involved in this work, but significantly more investment is required to improve the models but also ensure the model outputs are adapted to applications that can be used by the agricultural industries.

To what extent do government infrastructure decisions draw on a 'real options' approach? Are there regulatory, institutional, governance or political barriers that may be discouraging such approaches?

The NFF has some concerns with the 'real options' strategy described, as it presumes that government has an appropriate knowledge base to draw upon. NFF's involvement in transport infrastructure issues indicates that there is a poor knowledge base to inform infrastructure decisions, particularly in rural and regional Australia. This is acknowledged in the work of Infrastructure Australia in the development of its National Ports Strategy and National Land Freight Strategy. This limited information base was highlighted in the recent RIRDC report "Transport Infrastructure for Australia's Agricultural Needs" (Tulloh & Pearce, 2011). Reports from the Rural Roads Group have also highlighted an underinvestment in roads in regional Australia, and further delay in investment to develop 'real options' would further worsen this situation.

Who bears climate-related risks in public–private partnerships and other government contracts? Is there scope to further clarify who bears the burden of such risks in a manner that would have net benefits for the community?

The NFF suggests that private partnerships will likely bear any climate related risks when in partnership with governments, as governments will seek to minimise this risk. As an example, the Australian Government's on-farm water efficiency program, the farmer will nominate the volume of water to be returned to the Government for environmental use. If the project fails to achieve the nominated savings, the farmer bears this risk.

Importantly, there is one formal agreement on climate related risks, i.e. the risk assignment provisions of the 2004 National Water Initiative Intergovernmental Agreement. In this, Government bears the risk for policy and part of the risk (in an agreed formula) for new knowledge. However, it is entitlement holders, including Governments who own water entitlements, who hold 100% of the risks for any changes to entitlement reliability arising from climate change and climate variability.

[4] www.managingclimate.gov.au

The question ought to be is it reasonable for Governments not to share the climate related risks with private sector. If it appears unreasonable, then perhaps this Inquiry ought to consider what and how climate related risks ought to be shared between the public and private sectors.

e. Direct assistance

In what areas or sectors might structural pressures as a result of climate change be greatest? Are there any existing regulatory and policy barriers that might impede adjustment?

For agriculture, the key point for climate change and structural adjustment pressures may be the proposed Murray-Darling Basin Plan (the "Basin Plan) or those areas particularly hardest hit by the recent drought.

Drought and other impacts, as well as those arising from implementation of the proposed Basin Plan, will significantly affect the Basin's irrigation dependent community. The proposed Basin Plan is an important Australian Government initiative primarily driven as a response to future climate change as well as politics and the drought. The key areas within the Basin are those irrigation dependent and vulnerable communities.

Perhaps the social and economic analysis for the proposed Basin Plan might be a useful starting point. However, NFF would note that one of the most contentious issues for the proposed Basin Plan is that the benefits accrue to Australia's metropolitan population, while the impacts affect irrigation communities, i.e. not all the Basin's communities will be affected.

It will be important in looking at the regulatory and policy barriers around climate change that these do not pit different communities against each other as winners and losers.

What pressures might be placed on the existing social safety net as the impacts of climate change are felt by households?

NFF has no comment.

Are current relief payments, such as those funded through the Natural Disaster Relief and Recovery Arrangements appropriate?

The Queensland floods of 2010-11 and Cyclone Yasi demonstrated the value of the Natural Disaster Relief and Recovery Arrangements (NDRRA) but also highlighted a need for improvements to be made to the existing system. Australia's Natural Disaster Relief and Recovery Arrangements were seriously tested because of the disaster.

While the measures under the NDRRA are a welcome boost to many individuals and businesses looking to clean up and rebuild from disaster, the NFF believes that the Queensland floods and Cyclone Yasi highlighted a number of ways that the business support element of the assistance package could be enhanced. These include the following areas:

- **Red tape** – NFF members have commented that accessing the NDRRA business support grants and concessional interest rate loans during the floods was plagued by significant red tape that added unwelcome angst to those in desperate need of accessing assistance. The NFF encouraged the Government to undertake an urgent review of NDRRA systems for rolling out support to those affected by natural disasters, ensuring that systems can cater for those with little or no access to communication facilities or even significant personal identification because of the disaster.

- **Extensions to the grant and loan access criteria** – The NFF understands that under the current NDRRA access criteria, grants are available for clean up and recovery and concessional interest rate loans are available for the repair and/or replacement of damaged plant and equipment, buildings or stock. While welcome, the NFF suggests that the access criteria should be extended to cover reinvestment back into the ongoing productive capacity of the business, e.g. to cover the costs of replanting. Such support would ensure that farm businesses are able to generate income.

  In addition, there is currently ambiguity about eligibility to NDRRA grants when various primary production entities operating as separate standalone businesses are amalgamated under a family trust. The NFF suggests that in such cases, eligibility should be determined separately for each individual entity.

- **Freight subsidy access criteria** – Under the current NDRRA access criteria, freight subsidies for primary producers are available for the movement of foodstuffs, building/fencing materials, restocking of livestock because of the event, fodder, machinery/equipment and fuel. The NFF suggests that freight subsidy access needs to be extended to include taking water to tree and vine crops where critical community or farm infrastructure or where suitable water is not available.

- **Interest rate support** – The NFF acknowledges that the NDRRA provides concessional interest rate loans for small business operators and primary producers to fund the repair and/or replacement of damaged plant and equipment, buildings or stock. The Government is correct in identifying that some small businesses such as farmers will require access to affordable finance in order to fund their rebuild effort following natural disasters.

  However, there is significant reluctance within the Australian farming community, particularly following a disaster of this magnitude, to incur further debt in a time of uncertainty for the business. Australian farmers have suggested that for many farm businesses, support in meeting existing interest repayments would be a more effective relief measure following a natural disaster.

f. Which governments are responsible for addressing the barriers to adaptation

Are there significant overlaps or inconsistencies between the adaptation policies of different levels of government? If so, what are these and what problems might they cause for effective adaptation? Alternatively, where differences exist, are there good examples of cooperative arrangements that could be adopted more broadly?

NFF is not aware of any particular examples here, but there are certainly examples in other areas that have resulted in overlaps or inconsistencies between different jurisdictions. These include environmental law, land use planning, mining and onshore petroleum regulation, transport, chemicals, and drought and so on.

NFF suggests that the Productivity Commission should undertake a review of governments regulation and policies regarding climate change adaptation to ascertain where there are inconsistencies in particular, and make recommendations on appropriate resolutions and ways to improve their flexibility and outcomes.

Is there a need to alter policy responsibilities (or clarify responsibilities) across the different levels of government in order to facilitate adaptation?

Yes – see comments made in other sections of this report, including NRM.

Are local governments adequately resourced and equipped to respond to climate change and implement policies developed by state and territory governments?

NFF has no comment.

What are the most appropriate governance arrangements for overseeing adaptation responses at the local level?

NFF has no comment.

8. Setting the priorities for reform

Are these criteria relevant for assessing reforms to reduce barriers to adaptation?

Climate change adaptation certainly meets all the criteria set out by the Productivity Commission for reforms. It satisfies depth, breadth and cost, i.e. climate change adaptation has the capacity to cause a large distortion, if affects nearly all aspects of the community and the economy, and there is potentially a significant cost to governments, business and the community. These criteria would appear to be feasible and sensible.

Are there other considerations or criteria the Commission should take into account to assess the likely costs and benefits of reform options?

The NFF suggests the following as additional considerations:

- Productivity Commission red tape review – reassessed in the light of climate change adaptation impediments;
- The facilitation role of COAG to ensure legislative consistency across jurisdictions – and the role of Australian Government in this process;
- A national enabling framework to assess adaptation in the light of regulatory flexibility to dealing with the issues and to promote action at different scales; and
- Consideration of "outside the box" policy options, i.e. things that would not normally be considered.

What reform options might satisfy these criteria?

NFF has no comment.

9. Conclusion

For agriculture, climate change adaptation is a complex issue, not only due to the diverse agricultural sector, crossing diverse climates, but also due to the inherent nature of farmers to

want perfect knowledge to underpin good business decisions. Moreover, adaptation can be at three different perspectives:

- Initial adaptation at the farm scale;
- Industry-based adaptation, e.g. through the development of new genetics; and:
- Transformational adaptation, e.g. commodities and farmers may shift locations to better match climate.

Each of these perspectives requires different approaches and investment from private through to public. Farmers manage climate variability on a day-to-day basis, given the resources, information and support available to them. Industry based adaptation is largely supported through R,D&E. However, the opportunity for Governments is to investigate the options around transformational adaptation that will assist the agricultural sector. The issue, however, is that farmers are strongly connected to their community, which makes transformation adaptation that includes shifting locations a difficult personal decision.

In terms of climate change adaptation, the NFF believes that:

- Farmers have lived with climate variability and risk and this is strongly embedded into their business decisions;
- As predictions of climate change vary, what farmers require is a suite of measures to better deal with risk and to cope with future climate change;
- Importantly these measures must include investment in R,D & E to support agriculture; improved drought support measures that deal with preparedness; insurance risk products; appropriate policies for skills, labour and taxation; and the provision of infrastructure; and
- A review of government regulation and policies that will remove red tape and provide increased flexibility to deal with adaptation to climate change in a timely way as well as to support agriculture particularly is the space of transformational adaptation.

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