NCCARF
National
Climate Change Adaptation
Research Facility

Synthesis and Integrative Research
Final report

Creating a climate for food security: Governance and policy in Australia

Christine Slade and Angela Wardell-Johnson

CREATING A CLIMATE FOR FOOD SECURITY

Governance and policy in Australia

University of the Sunshine Coast

AUTHORS

Christine Slade

Angela Wardell-Johnson

Department of
Agriculture and Food

Published by the National Climate Change Adaptation Research Facility 2013

ISBN: 978-1-925039-70-2 NCCARF Publication 99/13

Please cite this report as:
Slade, C & Wardell-Johnson, A 2013, *Creating a climate for food security: Governance and policy in Australia*, National Climate Change Adaptation Research Facility, Gold Coast, 34 pp.

Acknowledgement
This work was carried out with financial support from the Australian Government and the National Climate Change Adaptation Research Facility (NCCARF). NCCARF is an initiative of and funded by the Australian Government Department of Climate Change and Energy Efficiency, with additional funding from the Queensland Government, Griffith University, Macquarie University, Queensland University of Technology, James Cook University, The University of Newcastle, Murdoch University, University of Southern Queensland and University of the Sunshine Coast.

The role of NCCARF is to lead the research community in a national interdisciplinary effort to generate the information needed by decision-makers in government, business and in vulnerable sectors and communities to manage the risk of climate change impacts.

The authors would like to thank the team members of the NCCARF Integration and Synthesis Project: 'Creating a climate for food security: the businesses, people and landscapes in food production' who have contributed through discussion to the conceptualisation of this report. A/Prof Nazrul Islam, Dr Tanmoy Nath (Department of Agriculture and Food WA), Dr Nasir Uddin (University of the Sunshine Coast), and Brian Stockwell (Department of State Development, Infrastructure and Planning Queensland Government) provided insights into the translation of food security conceptualisation through to the practicalities of implementation in governance and practice. In addition, the numerous contributors in Queensland and Western Australia as experts in food through the broader research agenda have provided significant insights through the Food Security research.

Table of contents

List of figures

List of tables

List of case studies

List of shortened forms

AFGC	Australian Food and Grocery Council
AFMA	Australian Farmers' Markets Association
COAG	Council of Australian Governments
DAFF	Department of Agriculture, Fisheries and Forestry
FAO	Food and Agriculture Organization
FFDI	Forest Fire Danger Index
FZANZ	Food Standards Australia New Zealand
MDBA	Murray–Darling Basin Authority
NAQS	Northern Australia Quarantine Strategy
PMSEIC	Prime Minister's Science, Engineering and Innovation Council
SCL	Strategic Cropping Land
TBL	Triple Bottom Line
UK	United Kingdom
VFMA	Victorian Farmers' Markets Association

ABSTRACT

Macro and micro policies shape decision-making processes for government and industry across the food system. Economic cost/benefit measuring of food policy is no longer sufficient due to new broader health, social and environmental drivers. In the complex governance structures today policy development is required both horizontally and vertically (Barling et al. 2002: 557). Currently, policies are developed across a broad number of government departments and regulatory authorities in a silo approach, which severely restricts their effectiveness. Due to this fragmented approach inconsistencies, overlap and gaps are highly probable (DAFF 2011a: vi). This report contributes to the understanding of the relationships between food policies, food security and climate change. It focuses on six main food security areas that may be significantly impacted by climate change in Australia: agricultural production; biodiversity and ecosystems; land use; resilience to natural disasters; water scarcity; and biosecurity (Garnaut 2011). Food policies need to consider the impacts of climate change through a triple-bottom-line lens. Current regulatory systems need to be simplified through the unbundling of bureaucratic layers and would benefit from a consistent and integrated food policy approach and a diverse food system approach which includes regional and local scales.

EXECUTIVE SUMMARY

This report explores links between three major research, governance and policy areas that impact food systems. Relationships between food policies, food security and climate change are emerging in Australia and require improved articulation. This report contributes an introductory insight into these important connections Similarly, contemporary understanding of the governance implications of criteria for food security is in its early stages. Enabling food policies, collaboratively devised and implemented by governments, could effectively drive climate change and food security solutions that are benchmarked to the triple-bottom-line. Understanding of the relationship between these three areas is still emerging in light of continuing research into climate change impacts, mitigation and adaptation.

The report provides a brief overview of the current food policy within the context of human-induced climate change that impacts food security. The journey of the Australian government towards a National Food Plan contributes direction; but linking climate change, food security and food policies requires further attention. Examples of food-related policy structures are provided in this report to indicate the complexity between levels of governance arrangements that define and impact food system sectors. Additionally, it briefly explores six main food security areas that may be significantly impacted by climate change in Australia: agricultural production; biodiversity and ecosystems; land use; resilience to natural disasters; water scarcity; and biosecurity (Garnaut 2011). Case studies demonstrate issues, inconsistencies and gaps within the food policy area while also presenting future food policy areas in need of enabling policies.

Finally, the report outlines a set of policy principles which support food security and addresses gaps in current and new food policy areas within a climate change context. These principles highlight the need for:

1. Simplification of regulatory systems and an unbundling of bureaucratic layers before adding climate change adaptation and mitigation strategies;
2. A consistent and integrated food policy approach in existing and future multi-governance arrangements, both horizontally and vertically; and
3. Food policies to vision and incorporate a diverse food system approach that includes regional and local scales rather than an agrifood export/import binary approach that focuses heavily on economic benefits of exporting.

Current food policy is complex and multi-levelled. Regulation, strategic planning and industry requirements are the three overlapping approaches to food policy. Food security is also conceptually diverse with implications across multiple scales and sectors in terms of food availability, accessibility, acceptability and adequacy. Future development of food policy to provide food security within a human-induced climate change context needs to be nested within all governance levels and integrated horizontally across relevant portfolios. Food policies need to consider the impacts of climate change with triple bottom line values as a central focus and allow flexible application of emerging knowledge.

1. INTRODUCTION

Macro and micro policies shape decision-making processes not only for government but for private food enterprises across the food system.[1] Lang (2010 p. 89) points out that post–World War II policy was based on increased output efficiencies to feed a hungry world, but now the situation is more complex. Existing food system concerns now acknowledge foundational environmental issues, including climate change, water scarcity, biodiversity threats, depletion of cheap non-renewable fuels, soil degradation and competing land use priorities (Lang 2010 pp. 90–94). Lang et al. (2009) argue that additional policy challenges come from sustainable food systems now including health, social and cultural aspects in addition to environmental factors. The measure of food policy effectiveness can no longer be based solely on 'value-for-money' but needs to integrate these new broader issues (Lang et al. 2009 pp. 204-205). Food policies at all levels of government need to be flexible, consistent and equitable.

Food policies can have direct or indirect impacts (DAFF 2011a p. 5), with the roots of food system problems often traceable to wider policy areas (UK Cabinet Office 2008 p. x). The authors of *The Future of Food and Farming* report (The Government Office for Science 2011 p. 12) stress the importance of interconnecting policy development as a futuristic buffer against food supply threats and resulting catastrophic implications. In the complex governance structures today, policy development is required both horizontally and vertically (Barling et al. 2002 p. 557). Currently, policies are developed across a broad number of government departments and regulatory authorities in a silo approach, which severely restricts their effectiveness. Due to this fragmented approach, inconsistencies, overlap and gaps are highly probable (DAFF 2011a p. vi).

This report explores links between three major research, governance and policy areas that impact food systems. Relationships between food policies, food security and climate change are emerging in Australia and require improved articulation. This report contributes an introductory insight into these important connections. It provides a brief overview of the current food policy within the context of human-induced climate change that impacts food security. The journey of the Australian Government towards a National Food Plan contributes direction, but linking climate change, food security and food policies requires further attention. Examples of food-related policy structures are provided in this report to indicate complexity between levels of governance arrangements that define and impact food system sectors. Additionally, the report briefly explores six food policy areas directly or indirectly impacted by climate change. Case studies demonstrate issues, inconsistencies and gaps within the food policy area while also presenting future food policy areas in need of empowering policies. Finally, the report outlines a set of policy principles that support food security and address gaps in current and new food policy areas within a climate change context.

[1] A food system is a complex and diverse cyclic process from primary food production through to waste disposal. Food security and increased environmental sensitivity are new elements of a food system. Food systems exist at all scales: local to global (Nath & Islam 2011: 7–8).

2. FOOD SECURITY

Over the past four decades the 'food security' definition has expanded to incorporate a range of elements reflecting diverse perspectives and contexts. Originally coined to encapsulate a response to severe famine in developing countries in the 1970s. the definition of food security focused on global and national increases in affordable food supply. In the next decade, when the global food situation reversed and there was plenteous supply, food security definitions focused on uneven food distribution and the right for all people to food. The terms 'supply', 'access' and 'entitlement' entered the food security vocabulary through the definitions of the 1990s. During the last decade scholars and practitioners have focused on availability, regular access, affordability and cultural appropriateness, with an emerging shift towards sustainability.

Despite this evolution, the most recent and commonly used definition from the Food and Agriculture Organization (FAO) simply reiterates that 'food security exists when all people at all times have both physical and economic access to sufficient, safe and nutritious food that meets their dietary needs for an active and healthy life' (FAO 1996 online). Food security categories provided by Koc et al. (1999 pp. 1–2) emphasise four key elements: availability, accessibility, acceptability and adequacy.

In Australia the term 'food security' can have different emphases across the food system. Recent discussions, such as the DAFF *Issues paper to inform development of a national food plan* (2011a) have recognised the sectoral nature of food security issues involving multi-governance scales. In economic terms, food security can be explained as 'supply' and 'demand'. For example, at a national level Australia produces more food than needed and is a strong food exporter, resulting in no immediate threat to national food supply. Maintaining this food security level requires addressing vulnerability to climate change, loss of prime agricultural land, soil degradation and decreasing productivity (Millar & Roots 2012 p. 3). Australia's reputation as a strong exporter is an important driver for policies that address food issues. However, this situation does not mean that all primary producers have a stable and sufficient income. Trends in rural areas indicate reductions in rural services and employment (Alston 2005 p. 162), decreases in production returns and increases in off-farm employment (Black 2005 pp. 32–34), and the loss of younger farmers (Hugo 2005 p. 70). Limited and poor access to fresh foods in remote parts of Australia indicates that some communities are food insecure (Burns et al. 2004 p. 5–6).

In equity terms there are many barriers to food access. Low income and/or unemployment are two determinants of food insecurity. Other barriers of a more systemic nature involve infrastructure, land use and the absence of appropriate policy responses. Burns (2008 pp. 90–96) explores the potential links between disadvantaged groups in the community and unhealthy eating habits. She concludes that tackling such potentially 'obesogenic environments' necessitates significant policy changes involving the 'full engagement of markets, all governments and consumers' (Burns 2008 p. 94). The implementation of 'obesity impact assessments' in new policy development is one option suggested by Sacks et al. (2008 p. 76) given the 'large number of policy areas, spanning multiple sectors and levels of governance' related to prevention, monitoring and evaluation of obesity problems.

From a triple-bottom-line (TBL) perspective, food policy is at the forefront of food security. Increasing conflicts over land uses have provoked public debate in recent times as have conflicts over water uses in the Murray–Darling Basin. Whatever the

‘sustainability’ issue involving the food system, policy solutions need to consider all impacts: economic, environmental and socio-cultural. With TBL sustainability in mind, this report provides an overview of food policy for food security in the context of human-induced climate change.

3. CLIMATE CHANGE CHALLENGES

Globally, climatic variability predictions are driving new scientific frontiers, with scenarios continually being developed and assessed to support adaption and mitigation strategies. In Australia, predictions of population increase to 35–40 million (PMSEIC 2010 p. 63) and challenges to food supply – such as climate change, water scarcity, land use competition, natural disasters, biosecurity outbreaks and the slowing of agricultural production (DAFF 2011a pp. vi–vii) – could mean food imports outstrip food exports. This is a significant threat to future food security (PMSEIC 2010 p. 1). This situation is explained by Gunasekara (2007 p. 663) as productivity and trade impacts of climate change, given that each country's economy will be affected differently in terms of agricultural productivity and import/export relationships between affected countries.

In production terms, Australian food producers can 'no longer rely on increased water, land and energy use' (PMSEIC 2010 p. 69). An important solution in tackling the impact of climate change on food security rests on the implementation of innovative technological development for which Australia is internationally recognised. This approach relies on 'an informed and engaged Australian community' with 'a regulatory environment and a food strategy that supports innovation in the food industry' (PMSEIC 2010 p. 63).

Human-induced climate change impinges directly or indirectly on a number of food security areas. Higher temperatures and rising sea levels combined with varying rainfall patterns impact food production of crops, livestock and fisheries (Godfray et al. 2011 p. 1013). Additionally, there will be increased volatility in food production and prices as a result of more frequent and severe extreme weather events (Godfray et al. 2011 p. 1013). This will increase volatility in production and prices. These predictions, together with increasing concern over the uncoordinated nature of food policy, have raised the food security debate in Australia recently (Millar & Roots 2012 p. 26).

Four policy themes are suggested by Gunasekera et al. (2007 p. 673) to address climate change variability within the agricultural sector. Firstly, reduce greenhouse gas emissions both in Australia and overseas. Nationally, that would mean agriculture would be part of an emissions trading scheme, with opportunity to mitigate emissions and gain from carbon sequestration. Other mitigation strategies could include reducing impacts from livestock waste, minimum tillage and improved fertiliser management (Gunasekera et al. 2007 p. 673). Secondly, adaptive measures could increase capacity through new technologies. Thirdly, productivity improvements could buffer climate change pressures. Finally, maintain export competitiveness through continuing research and development into mitigation and adaption technologies (Gunasekera et al. 2007 p. 673). All these possibilities require policy development and implementation.

4. THE CURRENT AUSTRALIAN FOOD POLICY CONTEXT: GLOBAL TO LOCAL SCALE

The authors of the PMSEIC report maintain that food production and processing is vital to both the economy of Australia and to the health and wellbeing of Australians (PMSEIC p. 2). Further, they observe that food is not treated in an integrated, consistent way that coordinates food policies, regulatory authorities and research institutions (PMSEIC 2010 p. 2). Consequently, policy decisions taken in one area or at one scale can result in significant ramifications for other food security areas (PMSEIC 2010 p. 45).

This section briefly explains contemporary food policy contexts across a scalar continuum from international to local. Selected examples are used to illustrate the complex array of food policy instruments currently in place that demand the attention of participants in the food system. The purpose of these examples is to emphasise the need for simplicity, coordination, flexibility and creativity in the development of future food policies generally, and specifically in relationship to human-induced climate change.

Two major issues provide an outline of Australia's role at an international level. Firstly, as a country that produces three times the food that it requires for its own needs, Australia is able to contribute significantly to global food security. However, with the potential increases in Australia's population coupled with the challenges arising from climate change diminishing food production, this contribution will decrease, impacting Australia's food security as discussed previously (DAFF 2011a p. vii). Secondly, Australia agreed to the Kyoto Protocol in 2007, with first round targets being the reduction of greenhouse gas emissions in the period 2008–2012 to no more than 8% above 1990 levels (Department of Climate Change and Energy Efficiency 2012). More ambitious targets in future years according to Godfray et al. (2011 p. 1013) 'cannot be achieved without involving the food system'.

In July 2012 the carbon tax system in Australia was introduced in a two-stage approach with a fixed price of $23 per tonne for the first three years. This stage does not directly impact agricultural production but will do so indirectly through transport, industrial processes and the energy sector. Policies and initiatives to help farms take advantage of storing carbon in soil and trees and then selling credits to other businesses will continue over the next four years. In July 2015 the carbon price will be determined by the market (Clean Energy Future 2012 p. 2). It remains to be seen how the carbon pricing will ultimately affect agricultural productivity (see Table 1 for more information about the policies and programs that affect agriculture).

Nationally, food policy is situated within wider macroeconomic and microeconomic policies, financial regulation and the health and welfare system. These broader policies 'support commercial activity generally, while addressing significant market failures and achieving other social objectives' (DAFF 2011a p. 5). The Australian Government's constitutional power includes 'fisheries, quarantine, patents … and broader provisions for trade, external affairs, taxation, railways, industrial relations and corporations' (DAFF 2011a p. 80). The government also addresses food policy through infrastructure provision and trade practices regulation. The Australian Government departments involved in broad food-related policies and programs include:

- Department of Agriculture, Fisheries and Forestry
- Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education
- Department of Education, Employment and Workplace Relations
- Department of Finance and Deregulation
- Department of Foreign Affairs and Trade
- Department of Families, Housing, Community Services and Indigenous Affairs
- Department of Health and Ageing
- Department of Infrastructure and Transport
- Department of the Prime Minister and Cabinet
- Department of Regional Australia, Local Government, Arts and Sport
- Department of Sustainability, Environment, Water, Population and Communities
- The Treasury

DAFF (2011a p. iv).

Additionally, a large number of regulatory bodies inside these government portfolios directly or indirectly impact the food industry set out below:

- Australian Competition and Consumer Commission
- Australian Customs and Border Protection Service
- Australian Fisheries Management Authority
- Australian Maritime Safety Authority
- Australian Pesticides and Veterinary Medicines Authority
- Australian Quarantine and Inspection Service
- Australian Transport Safety Bureau
- Civil Aviation Safety Authority
- Climate Commission
- Director of National Parks
- Export Finance and Insurance Commission
- Fair Work Australia (and other related bodies)
- Food Standards Australia New Zealand
- Great Barrier Reef Marine Park Authority
- IP Australia (and other related bodies)
- Murray–Darling Basin Authority
- National Industrial Chemicals Notification and Assessment Scheme
- National Measurement Institute
- National Transport Commission
- National Vocational Education and Training Regulator
- National Water Commission
- Office of Best Practice Regulation
- Office of the Gene Technology Regulator
- Safe Work Australia (and other related bodies).

DAFF (2011a pp. 5–6)

The primary focus of state and territory legislative powers concern ‘food safety, transport, education, health, the environment, and land management’ (DAFF 2011a p.

80). Together with the Australian Government, the state and territory governments have mandated power to address food regulations across the food chain as detailed in Table 1. So, food chain sectors are responsible to both federal and state regulation. Coordination for food policy occurs mainly though the Cabinet, the Council of Australian Governments (COAG) and other departmental arrangements (DAFF 2011a p. 8).

Table 1: Regulations affecting food supply and consumption

Activity	Key Australian Government regulation	Key state/territory government regulation
Land use and environment	• environmental protection • international treaties and conventions covering world, natural and cultural heritage and marine protected areas • National Pollutant Inventory • water access and regulation	• environmental protection/assessment and native vegetation legislation • land use, planning and building • weed and vermin control • water access and regulation • fire control
	• Aboriginal land rights/native title	• laws relating to Indigenous Australian's cultural heritage including native title
Primary production	• licensing and approval of chemicals, fertilisers and pesticides • fisheries	• use of chemicals, fertilisers and pesticides • livestock and animal welfare • fishing/aquaculture licensing and permits • boating regulations and licensing • fishing equipment and port requirements • fisheries landing and marketing requirements (size limits) and by-catch • fisheries restricted areas
Biosecurity	• quarantine and biosecurity • export certificates/controls • export approval for wildlife trade	• domestic quarantine and biosecurity • pest/disease/weed control
Food and packaging	• food and packaging standards (national and international)	• food safety regulation including primary production and processing food • certification and labelling packaging requirements
Transport	• national land transport regulatory frameworks • shipping and maritime safety laws and international maritime codes and conventions	• transport including vehicle and machinery licensing • government owned public/private transport infrastructure • transport access regimes

Activity	Key Australian Government regulation	Key state/territory government regulation
	• fuel tax	
General	• industrial relations • immigration • competition laws/access regimes • marketing legislation • WTO obligations • market access and trade and investment agreements	• industrial relations • occupational health and safety legislation and policy • insurance requirements • interstate certification arrangements (marketing)
	• foreign investment screening regime • taxation	• taxation

Productivity Commission 2007 in DAFF 2011a p. 7

Local food policies have traditionally rested with local government[2] in areas of environmental health and food safety. Other policies address community food services, such as Meals on Wheels and emergency food relief.

New areas of policy development emerging in some councils focus more broadly on food security, with potential links to environmental issues. Depending on the needs of individual municipalities, food security policies may emphasise a mixture of local issues, including preservation of high quality agricultural land, equitable food access, healthy eating and/or alternative food production avenues. A study undertaken by Slade (2013) of two health promotion projects with Victorian local government seeking to embed food security principles in policy found that 'there is an urgent need for higher tiers of government to recognize the food security agenda and provide coordinated support for local government initiatives, particularly through legislation and funding' (Slade 2013). This research indicated the potential for more effective intergovernmental cohesion in furthering sustainable food policy and program solutions.

[2] Local food policy formulation can involve or be influenced by other bodies, such as state governments, delegated authorities, numerous community health and service organisations, not-for-profit groups and the private sector.

4.1 Legislation, Acts, Regulation and Codes: The regulatory approach

The legislative process that results in the passing of Acts through parliament is the governance foundations of policy development. Out of these foundations come the various types of regulatory structures that, in this case, shape food security and climate change policies and programs. Overall, the federal, state and territory governments use a variety of regulatory processes to increase business productivity. These regulations can apply to 'land use, environmental protection, animal welfare, licensing, quarantine and export, food safety, packaging and transport' (DAFF 2011a p. 32). Other regulations impact economic markets, such as consumer and competition rules and food labelling. These regulations can be too complex, unnecessarily burdensome and/or inconsistent across portfolios (DAFF 2011a p. 32).

An example of this process is the Australian Food Safety Regulations System demonstrated in Figure 1. This flowchart shows the interaction between six governance levels centred on legislation and expressed through standards, institutional arrangements, agreements and policy and enforcement bodies.

***Legislation** is the process of making or enacting laws*

*An **Act** is primary legislation that has been passed by both houses of Parliament*

***Regulation** is the practical details and rules made under Acts*

***Codes** are a collection of rules on a given subject*

The 'Standards' level in this regulatory framework consists of the Australia New Zealand Food Standards Code. This Code extensively details the rules defining 70 food standards in four chapters, two of them relevant to Australia only:

- Chapter 1: labelling, food additives, contaminants and chemical residues, foods requiring pre-market clearance, microbiological and processing requirements
- Chapter 2: food product requirements applying to particular types of foods (for example, cereals, meat, eggs, fruit, vegetables, edible oils and alcoholic beverages)
- Chapter 3 (Australia only): food hygiene
- Chapter 4 (Australia only): primary production and processing: seafood and dairy.

Productivity Commission (2009)

Food Standards Australia New Zealand (FSANZ), the central food standard authority, is responsible for consumer food safety, providing information for consumers and preventing actions from food suppliers that may endanger consumers (DAFF 2011b). The details include processes that apply agreements to institutional arrangements, legislation, standards, policy bodies and enforcement bodies. FSANZ's website states that it does not provide stakeholders with Code compliance advice and suggests they 'may wish to engage a lawyer or consultant' for such advice (FSANZ 2012a online) but they do offer a Code Interpretation Service for implementation guidance on Chapters 1 and 2 on a fee-for-service basis (FSANZ 2012b online). This approach indicates the complexity of this regulatory system; unfortunately, it increases costs to food suppliers and other food chain stakeholders who are seeking to be compliant.

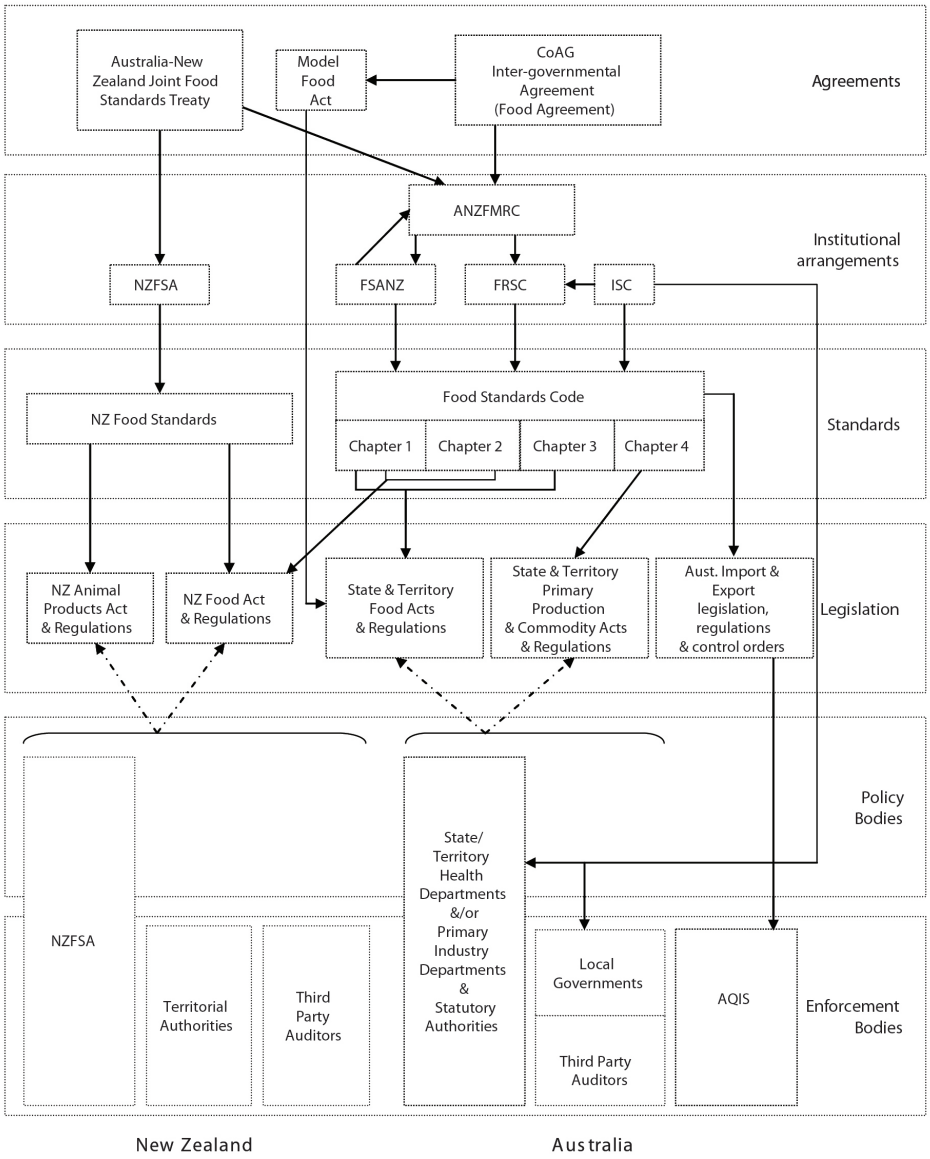


Figure 1: Australia-New Zealand Food Safety Regulation System

Productivity Commission (2009 p. 14)

The *Creating Our Future* report comments that past food safety regulation reforms have not been effective, with the regulatory system potentially stifling production innovation and competitiveness. The report points out inconsistencies in enforcement that require the voting power of ten governments (and involving several portfolios within each of these governments) to apply consistent food standards across Australia and New Zealand (Agriculture and Food Policy Reference Group 2006 p. 116). As a consequence of these arrangements it is possible, for example, for a combination of smaller states and territories to overturn 'the Australian and New Zealand governments and the larger state governments on matters of national food policy' (Agriculture & Food Policy Reference Group 2006 p. 117).

Other problems identified in the report include the length of time taken to set standards, the prescriptive nature of the Code itself, inconsistent implementation of regulation and misalignment of domestic and international standards, all of which create a burden on

government and businesses rather than allowing businesses to be innovative (Agriculture & Food Policy Reference Group 2006 pp. 117–118).

4.2 Policies, Plans, and Strategies: the strategic approach

Policy currently under development in Australia links the food system, food security and climate change. This process includes the development of complementary plans, strategies and programs. For example, the development of the *National Food Plan* was announced in 2010 by Tony Burke, Minister for Agriculture, Fisheries and Forestry at the time. The release of the *Issues paper to inform development of a national food plan* (DAFF 2011a) followed on 23 June 2011. Public consultation consisted of written submissions, a webcast and roundtable discussions across a broad stakeholder base (DAFF 2012a). On 27 October 2011, Joe Ludwig, the (current) Minister for Agriculture, Fisheries and Forestry, announced a green paper to 'outline the [Australian] government's vision and approach to food policy, canvassing potential changes to policy, programs and governance arrangements' in order to inform the public and obtain pertinent feedback from interested stakeholders (DAFF 2012b p. 5). This green paper was published for comment on 17 July 2012. Complementary food policies and initiatives currently being developed include:

- Review of food labelling law and policy (Blewett Review)
- Food Processing Industry Strategy Group
- Australia in the Asian Century white paper
- Prime Minister's Taskforce on Manufacturing.

DAFF (2012a)

Clean Energy Future (2012), the Australian Government's climate change strategy, is another example of the complexity of initiatives involved in a strategic approach to the food system. As stated earlier there is currently no direct carbon price on agricultural emissions, that is, from livestock or fertiliser use. One of the major initiatives of the strategy is the Land Sector Package, which includes the following components:

- Carbon Farming Initiative (CFI) for carbon offsets for land managers
- Biodiversity Fund to protect biodiverse carbon stores
- Carbon Farming Futures (CFF) to assist land managers in storing carbon and reducing emissions
- Carbon Farming Skills program
- Indigenous Carbon Farming Fund
- Carbon Farming Initiative (CFI) non-Kyoto Carbon Fund, in which the government will purchase such credits from soil carbon and revegetation
- Regional Natural Resources Management Planning for Climate Change Fund to revise NRM plans in light of climate change impacts and carbon farming
- The Land Sector Carbon and Biodiversity Board to advise the government on these initiatives.

DAFF (2012c)

Other national strategies relevant to food security and climate change include:

- Critical Infrastructure Resilience Strategy (June 2010) (Australian Government 2010)
- National Strategy for Disaster Resilience (February 2011) (COAG 2011).

4.3 Levies, Standards, Associations and Memberships: the private enterprise approach

A range of strategies are supported through the private sector in relation to food policy. These relate to research and development in specific industries, and to processes of certification for different approaches to food production and voluntary best practice.

DAFF collects, administers and distributes levies, on a cost recovery basis, on behalf of industries (DAFF 2012d). These industry levies are used to assist enterprises to work together and pool resources to tackle priority issues through research and development, marketing, testing and other initiatives (DAFF 2012d). For example, currently the dairy industry has one levy, the Dairy Produce Levy, which provides funding for marketing, research and development, and animal health programs (DAFF 2012e), while there are over twenty horticultural product categories with a levy and/or export charge used for marketing, research and development, plant health and residue testing programs (DAFF 2012f).

The domestic organic industry can use one of seven private certifiers to be able to claim organic status. The basis for these standards is the National Standard for Organic and Bio-Dynamic Produce, which sets the minimum requirements for all certified producers (DAFF 2009 p. 1). Under organic certification producers are required to keep records, refrain from the use of synthetic chemicals and genetically modified inputs, and promote natural farming (BFA 2010 p. 6).

The Australian Farmers' Markets Association (AFMA) is an example of a voluntary industry organisation formed as a networking entity in 2003. The AFMA is 'committed to supporting the development and growth of best-practice and sustainable farmers' markets across Australia' (AFMA 2012a). The association uses their website for promoting farmers' markets that are committed to AFMA Charter and standards. The Victorian Farmers' Markets Association (VFMA) has provided an accreditation program that allows authentic farmers' markets to be identified through the use of different 'tick' symbols displayed by individual markets and stallholders. Under this system a farmers' market can only be accredited if 90% of their stallholders are accredited (metropolitan areas) and 75% in regional areas (AFMA 2012b).

The Australian Food and Grocery Council (AFGC) represents Australia's packaged food, drink and grocery manufacturers. Their mandate is 'to ensure there is a cohesive and credible voice for the industry, advance policies and manage issues to help member companies to grow their businesses in a socially responsible manner' (AFGC 2012a). The Council provides its members with policy and industry updates, representation and advocacy as well as targeted programs and services. Current priorities include guidelines for sustainable practices and voluntary codes implemented as alternatives to regulation (AFGC 2012b).

5. LINK BETWEEN CLIMATE CHANGE, FOOD POLICIES AND FOOD SECURITY

Understanding of the relationship between these three areas is still emerging in light of continuing research into climate change impacts, mitigation and adaption. Similarly, contemporary understanding of the governance implications of criteria for food security is in its early stages. Food policies that are collaboratively devised and implemented by governments could effectively enable climate change and food security solutions that are benchmarked to the TBL. The recent report by Garnaut (2011 p. 44) envisages that the continuance of good broad-based sustainable development policy is an important contributor to positive adaptation responses. Other contributors are early adaptation and mitigation action, together with increased investment in agricultural productivity research and free trade globally.

Garnaut's report focuses on six main food security areas that may be significantly impacted by climate change in Australia:

- Agricultural production
- Biodiversity and ecosystems
- Land use
- Resilience to natural disasters
- Water scarcity
- Biosecurity.

5.1 Agricultural production

World agricultural production will be negatively impacted by climate change potentially raising food prices, a situation that may advantage Australian exporters. On the other hand, Australian food production is predicted to experience increased climate variability, affecting the maintenance of a production level required to take advantage of price increases (Garnaut 2011 p. 47). Unlike in previous decades, Australian agricultural productivity is not increasing at a rate needed to cover its own food requirements (Lawrence et al. 2012 p. 2). Without global mitigation, Australia will be relying more heavily on imports in the global free trading system that provides export dollars, increasing potential dependence on global supply for food security (Garnaut 2011 p. 48).

Climate is one of the most important variables in Australian food production, affecting product quality and quantity, farming locations, soil types, application of management and technologies, input costs, food prices and natural resource management (PMSEIC 2010 p. 11). Impacts of climate change include:

Short-term

- Changes in planting and harvesting times
- Modification to crop, cultivar and animal types suitable for particular temperature zones and other farming practices, such as crop rotations as a result of higher temperatures and/or a reduction in average rainfall
- Reduced water run-off and consequently water availability for irrigation
- Increase in extreme weather events, for example, heatwaves and bushfires, tropical cyclones, and drought and excessive rainfall.

Long-term

- Changes in water storage
- Potential need for some farmers to relocate
- Business flexibility on-farm
- Regulatory reform for native vegetation management and genetic modification technology
- More efficient use of nitrogen fertilisers, improvements in productivity and reduction of emissions
- Changes in global trading patterns
- Changes to production costs due to government greenhouse gas emission policy
- Potential opportunities for carbon sequestration.

(Garnaut 2011 p. 5; Calford et al. 2010 p. 7; Hogan & Morris 2010 p. 13; DAFF 2006).

5.2 Biodiversity and ecosystems

Australia is known globally for its diverse ecosystems and extensive biodiversity but is also acknowledged as one of the most vulnerable countries to climate change, particularly due to water limitations and inability of flora and fauna to shift to higher climatic elevations and geographical locations (Garnaut 2011 p. 29; Lindenmayer et al. 2010 p. 1587). The intense nature and chemical-based methods of productivist farming have resulted in salinity and acidification Lawrence et al. (2012 p. 2). Human activity such as land clearing or deforestation 'releases large amounts of GHGs [greenhouse gases] and is one of the most serious, although indirect, ways that pressure from the food system contributes to global warming' (Godfray et al. 2011 p. 1031). As a result, dry land and irrigation salinity caused by rising water table levels and soil acidification through over-use of chemical inputs continue to be serious concerns (Millar & Roots 2012 p. 32).

The Australian Government has adopted a range of policies to help protect and enhance biodiversity in a changing climate. *Australia's Biodiversity Conservation Strategy 2010–2030* is a comprehensive policy to assist all stakeholders in managing and protecting Australia's biodiversity. The Strategy has three action areas:

1. Engaging all Australians
2. Building ecosystem resilience in a changing climate
3. Getting measurable results

Natural Resource Management Ministerial Council (2010 p. 4).

Case Study 1: Strategic Cropping Land (SCL) Legislation in Queensland

The Queensland Government has introduced the *Strategic Cropping Land Act 2011* with associated Strategic Cropping Land Regulation 2011 and the State Planning Policy 1/12: Protection of Queensland's strategic cropping land. The government articulates that SCL is 'an important, finite resource that is subject to competing land uses from agriculture, mining and urban development sectors' (Queensland Government 2012a).

The aim of the legislation is 'to strike a balance between these sectors to help maintain the long-term viability of our food and fibre industries, and support economic growth for regional communities' (Queensland Government 2012a). The Act allows for the identification of SCLs through eight criteria; the establishment and protection of management areas; the facilitation of development assessments; and the imposition of conditions to prevent permanent impacts or diminished productivity. If this last situation does arise developers will be held accountable (Queensland Government 2012b).

While the Act states that protection of SCLs takes precedence over development, the concept of temporary or permanent impact is introduced. Permanent impact is seen as impeding cropping of the land for at least 50 years, or the land cannot be restored to its pre-development status, or it involves open-cut mining or storing hazardous mine wastes (Queensland Government 2012c).

Questions arise about the implications for coal seam gas mining being considered as a temporary use allowable up to 50 years (or two generations) and whether it is possible to return soil and underground aquifers to original condition after such activities.

5.3 Land use

Over 50% of the total land mass of Australia is used for agricultural production, particularly in large pastoral grazing areas, while irrigated areas and urban/rural residential land occupy approximately 0.35% of the land mass (Millar & Roots 2012 p. 27). In a number of locations agricultural land use is being challenged by other land uses, such as housing, rural lifestyle farms and mining. These trends compete with productive agricultural land and put pressure on infrastructure and water resources (PMSEIC 2010 p. 41). As temperatures increase and sea levels rise with climate change, the importance of protecting prime agricultural lands for national food security becomes increasingly significant.

Property rights and sovereignty are increasingly viewed as issues in maintaining food security in the Australian context. A recent policy response in Queensland to perceived threats to prime agricultural land has resulted in legislation regulating 'Strategic Cropping Land' (Case Study 1).

Another concern for maintaining productivity in agricultural landscapes centres on competing land uses in peri-urban areas around major centres. Peri-urban agricultural has a small land footprint but is highly productive; it will experience limited impacts from climate change and provides food security in regional and local food systems. As more

people move to cities and regional centres, pressure on agricultural production landscapes on urban fringes increases. There has been a mixed policy reaction to these trends. For example, in 2002 the Victorian Government's strategic plan *Melbourne 2030 – Planning for Sustainable Growth* (Department of Planning and Community Development 2002) placed an urban growth boundary around the city in order to contain sprawl. But more recently, there have been extensions to this boundary with the result that prime agricultural land (that provides food to the city, state and beyond) to the south-east in the City of Casey is now allocated for housing. Despite existing protection in local government policies for agricultural land, the state government holds the final decision to change land uses.

In May 2012 the New South Wales government released the *Sydney over the next 20 years: A Discussion Paper* in preparation for the new 20-year plan, the *Metropolitan Strategy.* This discussion paper has incorporated a section 'Protecting productive rural and resource lands' reiterating the importance of fresh food production close to the city. These areas produce 40% of NSW's perishable vegetables and contribute $1.5 billion to the State's total value of agriculture (New South Wales Government 2012 p. 6). However, this section also stresses the importance of coal resources and coal seam gas wells in the Sydney area. Requests for comments centre on finding the balance between population growth, jobs, biodiversity, agriculture and resources (New South Wales Government 2012 p. 27). As yet the success of implementing this new Metropolitan Strategy is not clear, but the importance of peri-urban agriculture has been identified.

5.4 Resilience to natural disasters

Millar and Roots (2012 p. 34–35) outline the string of natural disasters that have occurred in the last decade: bushfires in 2003, 2006 and 2009 (Case Study 2); two major cyclones in Queensland, destroying banana and sugar cane crops, and widespread floods in 2010 and 2011 resulting in loss of life, extensive crop and infrastructure damage (Case Study 3), all resulting in considerable financial costs.

Case Study 2: Black Saturday Fires, Victoria, February 2009

Hennessy (2011 p. 47) uses this recent extreme weather event to help understand the importance of future climate change impacts. These bushfires killed 173 people and 1 million animals, destroyed over 2000 homes, and burnt out 430,000 hectares, resulting in a cost of $4.4 billion. Preceding weather conditions were extreme, with high temperatures and winds, low humidity and very dry vegetation from years of drought. The combination of these factors produced an extreme forest fire danger (FFDI). When the FFDI is over 50 the risk is considered 'Extreme' and a 'Total Fire Ban' is issued. Many locations in February 2009 had an FFDI of over 100; since then, the fire rating 'Catastrophic' has been added.

An analysis of the annual total FFDI ratings for the past 30 years shows an upward trend in southern Australia as a result of increasing temperatures and prolonged drought. These statistics can be used to simulate future numbers of days with 'Extreme' fire danger at different rates of global warming.

5.5 Water scarcity

Water availability has been a constant concern to Australian agricultural production as farmers contend with a highly variable climate ranging from prolonged drought to floods, storms and bushfires. Dam and irrigation infrastructure development in the 1920s enabled a vibrant agricultural system despite the variable climatic conditions;

however, years later prolonged droughts and over-allocation of water rights have not only devastated natural resources (Millar & Roots 2012 pp. 32–33) but brought home the realisation that vital natural resources are finite. Under further changes to climate, water will be increasingly scarce. River systems, such as the Murray–Darling Basin, have been degraded through providing water for irrigation resulting in the government buying back water to replenish the environment but leaving farmers with the challenge of greater efficiency with less water usage (Lawrence et al. 2012 p. 2). Other concerns involve the potential risk of degrading underground aquifers and removal of chemically polluted water during coal seam gas production (Hepburn 2012 online) and chemical run-off from agriculture into rivers and other waterways (see Masters et al. 2008 for testing on herbicide run-off from sugarcane farming in Queensland into waterways around the Great Barrier Reef).

But there are not just environmental and economic concerns; social impacts are seen in the Murray–Darling Basin (Case Study 4).

Case Study 3: Queensland Summer 2010–2011 Floods and Cyclones

This report asks the question whether the Australian food chain is resilient during and after a major disruptive event. In recent disasters food supply to affected areas was handled well by the industry; however, future resilience could be reduced as key factors are not well understood and could pose threats. The authors believe that government management of risks could be better coordinated and communicated to stakeholders, and regulation needs to make it easier for the food industry to respond (Sapere Research Group 2012: iv).

The project researched the resilience of the supply chain after the 2010–2011 Queensland floods by interviewing and surveying a cross-section of the food industry. Interviewees identified key vulnerabilities as simultaneous loss of distribution centre facilities and transport links around major cities, fuel shortages, ongoing workforce shortages, and extended disruption to foods or inputs only produced overseas (Sapere Research Group 2012: ix).

The research also investigated policy issues to be addressed to decrease food supply risks. These include:

a) Perceived confusion as to the roles played by different government levels, for example, road closures and lack of information about contacting government agencies
b) There were regulatory inhibitors, particularly in food distribution, such as trucking licences and retail trading hours. 'The Queensland experience suggests that there is no established protocol for cutting through regulatory barriers to food supply in the event of a disaster' (Sapere Research Group 2012: xii)
c) Some foods travelled more than two states before delivery in affected Queensland towns. Resilience therefore needs to be addressed at all levels of government rather than predominantly at a local level
d) There were some unrealistic expectations from various stakeholders in terms of disaster responses, including:
   - an over estimation of the Australian Defence Forces' capacity to move large quantities of food
   - assumption by some agencies that they could obtain food from local businesses without payment
   - a lack of appreciation by communities outside the disaster areas that their food supplies would be affected.

   (Sapere Research Group 2012: xiii)

Recommendations were made to improve communication between the food industry and government as well as a policy commitment for compensation for food taken without payment by agencies in an emergency (Sapere Research Group 2012: xiii).

Case Study 4: Murray–Darling Basin

The 'Food Bowl' of Australia and Environmental Reform

This region consists of small farms along the Murray River which are dependent on water licences to irrigate their food crops. The prolonged drought left them with little or no water allocation although payments for the water had been made. This situation results in financial hardship for these families who have an uncertain future in the face of climate change.

It also highlighted the over-allocation of water rights. A number of political decisions followed:

- In 2007 the National Water Plan aimed to improve infrastructure, increase efficiencies and purchase some of the water rights
- Later that year the new Australian Government made amendments to the existing water regulations and established the Ministry for Climate Change and Water, which assumed oversight for the National Water Initiative (a joint agreement between federal and state governments). Not only did this agreement buy back water rights but it sought to return water to the river system for environmental reasons.
- The Murray–Darling Basin is now centrally controlled by the Australian Government under the *Water Act (2007)* and is managed by the Murray–Darling Basin Authority (MDBA). (Monash University 2010, pp. 9-10)

According to Alston and Whittenbury (2011) the National Water Initiative was developed as a mitigation policy for climate variability; resulting water availability under the initiative has severe consequences for rural people, but they have not been allowed to participate in its development.

The two strategies to tackle climate change are mitigation and adaptation; however, some strategies to address change in rural areas are more 'coping' than 'adaptation'. Examples include off-farm work, often a long distance away from family; reduction in personal health care; stress-related use of alcohol and drugs; young people leaving the area; small business closure; or casualisation of work. Policies ensuring quality of life, inclusiveness, respect and flexibility to allow rural people and their communities to build resilience to rapid changes are required

5.6 Biosecurity

'Biosecurity is the protection of people, animals and the environment from infectious disease, pests and other biological threats' (Australian Biosecurity CRC 2009). Climate change will potentially increase the spread of diseases and pests through changing vector pathways, for example, migratory bird patterns or tidal movements, expanding habitats and weather events (DAFF 2012g p. 4). Additionally, population growth brings people nearer to agricultural production and protected environmental areas (DAFF 2012g p. 4). Stakeholders in biosecurity reform include exporters and importers, tourists and the transport sectors (DAFF 2012g p. 21).

A particularly important biosecurity concern for Australian is monitoring and managing the northern border activities through the Torres Strait because:

1. The area is vulnerable to migrating birds and natural events.
2. This coastline is sparsely populated, making it particularly vulnerable to foreign vessel and other human activities that bypass quarantine checks (DAFF 2011c).
3. The Northern Australia Quarantine Strategy (NAQS) was developed in 1989 to address these risks. The aims of the strategy include:

    - identification and evaluation of quarantine risks

- early detection measures
- contribution to national and international initiatives to target pests and disease monitoring
- management of border movements.

DAFF (2011c)

In 2008 an independent review of Australia's Quarantine and Biosecurity Arrangements was undertaken which resulted in the publication of the report *One Biosecurity: a working partnership*, which recommended 84 reforms to the Australian Government (DAFF 2012h). In December 2008 the government agreed in principle to all the recommendations made and directed the Department of Agriculture, Fisheries and Forestry to commence the reform process (DAFF 2012g p. 8).

Reforms to national biosecurity are underpinned by:

- implementing a risk-based approach to biosecurity management
- managing biosecurity risk across the continuum — offshore, at the border and onshore
- strengthening partnerships with stakeholders
- being intelligence-led and evidence-based
- support from modern legislation, technology, funding and business systems.

DAFF (2012g p. 2)

One of the reforms undertaken has been the development of new biosecurity legislation to replace the Quarantine Act 1908. The new legislation consists of two bills p. the Biosecurity Bill and the Inspector-General of Biosecurity Bill (DAFF 2012i p. 5). The new legislation aims to respond to and manage biosecurity risks within a cooperative context between government, industry, trading partners and the community (DAFF 2012j).

There are important food security implications in having a strong biosecurity policy context combined with research about potential new event types as shown in Table 2. A strong biosecurity system frees 'the agricultural sector from the most destructive pests and diseases [and] confers a higher degree of quality on Australia's agricultural exports' (DAFF 2012g p. 5). This protects internal food security by maintaining levels of production and providing a diverse range of foods, protection of natural resources and safety from health risks.

Table 2: Potential biosecurity event types and examples

Event type	Example
Pandemic	• Possible influenza pandemic
Electricity or gas supply outage	• 2009 Victorian Black Saturday bushfires • 2008 Western Australian gas crisis – Veranus Island • 1998 Victorian gas crisis – Longford explosion
Industrial action	• 2008 national road transport driver shutdown • 1998 waterfront strike • 1987 storemen and packers strike
Food or water contamination	• 1998 Sydney water contamination incident
Severe weather event (flood, cyclone, drought)	• 2011 tropical cyclone Yasi • 2010/11 Queensland floods • 2010 tropical cyclone Ului – Queensland (Airlie Beach) • 2010 central Queensland flooding • 2007 Sydney supercell storm • 2007 Hunter Valley floods • 2006 tropical cyclone Larry – Queensland
Other possible events	• Coordinated demonstrations • Land contamination (chemical) in production areas • Major animal or plant disease biosecurity emergency

Sapere Research Group (2012 p. 21)

The Department of Agriculture, Fisheries and Forestry has combined biosecurity research, policy and programs for the four following areas: animal, plant, food and quarantine operations. Table 3 gives an indication of the type and scope of activities undertaken in each area.

Table 3: Scope of biosecurity activities undertaken

Biosecurity Animal	• Animal risk analysis and market access • Animal health • Aquatic animal health • Animal pests and diseases • Bringing cats and dogs to Australia • Importing to Australia • Exporting from Australia
Biosecurity Plant	• Plant risk analysis and market access • Plant health

	• Plant pests, diseases • Weeds • Locusts • Importing to Australia • Exporting from Australia
Biosecurity Food	• Food exports • Residues and food safety • Export standards
Biosecurity Quarantine Operations	• Travel information • International mail to Australia • Northern Australia Quarantine Strategy • Aircraft, vessels and military

DAFF (2012k)

6. ADDRESSING GAPS THROUGH ENABLING FOOD POLICIES

Enabling food policy development is central to ensure future food security, particularly in terms of climate change and wider environmental concerns. Policies need to consider economic, environmental and social outcomes. Such policy balance allows for diversification.

Three important areas for future food policy development are:

1. Simplification of regulatory systems and an unbundling of bureaucratic layers before adding climate change adaptation and mitigation strategies

This process will give flexibility to respond to volatility and changing circumstances and therefore promote resilience. It will also reduce barriers for innovation uptake (Hogan & Morris 2010 p. 21). In the *National Food Plan green paper* published in July 2012, the Australian Government seeks to 'progress its existing policy and regulatory reform agenda across the food chain' (DAFF 2012b p. 13). Reform priorities include climate change policy initiatives, food labelling, and biosecurity, agricultural and veterinary chemical regulation, reforming drought policy and working with regional Australia (DAFF 2012b p. 14; see also Section 6.7 Business regulation pp. 161–170).

Furthermore, the government is considering public input on the following options to:

- increase efforts to improve national consistency of food standards and safety regulations, by working with other governments and industry to address gaps and inconsistencies
- consider additional options to expand its food regulatory reform agenda, including for imported food
- increase efforts to build a stronger evidence base to support ongoing regulatory reform and prioritise reform efforts
- evaluate the cost of regulating the fishing industry in Commonwealth waters to inform potential future reforms
- examine options to improve the regulation of minor use chemicals.

Source: DAFF (2012b p. 15)

2. A consistent and integrated food policy approach in existing and future multi-governance arrangements, both horizontally and vertically

The *National Food Plan green paper* acknowledges the need to 'reduce overlap, duplication and gaps' in food policies, programs and regulations which are 'clear about responsibilities' and are able to 'manage competing policy objectives as effectively as possible'. Table 4 illustrates suggestions made in the green paper (DAFF 2012b p. 9) to enhance food policy development. It is noted that there is only one option suggested for improving integration and coordination across levels of government. Perhaps others will be suggested by interested stakeholders in their submissions.

Table 4: Food policy suggestions from the *National Food Plan green paper*

Aims	Options for Feedback
To improve food policy outcomes and leadership on food-related policy issues within the government	• Establish Ministerial Food Forum • Establish a Stakeholder Committee on Food to provide advice to the government on food policy issues • Establish a Food Council with representatives across the sector to consider long-term challenges and opportunities
To improve food policy integration and coordination across all levels of government	• Increased engagement with states and territories through COAG on food-related policy matters
To maintain a transparent, up-to-date approach by the Australian Government to food policy	• Periodically publish a 'State of the Food System' report which could include key information about food policies, programs and regulation, including their purposes and alignment with government objectives • Review and revise NFP regularly (approx. 5 yrs).

Source: Adapted from DAFF (2012b pp. 10–11)

While there is progress towards a consistent and integrated governance approach to food policy development and implementation, there appears to be less activity at the state level. There is also food policy development activity within some local governments (Case Study 5).

Case Study 5: Victorian Local Government 'Stand Alone' Food Policies

Four councils in Victoria have adopted discrete food policies as part of capacity building initiatives with the Victorian Health Promotion Foundation (Maribyrnong City Council and City of Wodonga) and the Department of Health's North & West Metropolitan Region (Cities of Hobsons Bay and Darebin). The table below provides a summary of the main features of these policies. Four criteria were used to analyse the policies: social justice, food access, food security and food supply. All the policies were concerned with equitable food access and regular supply of nutritious food based on social justice principles.

Food policies					
Criteria	Maribyrnong 2002	Wodonga 2005	Hobsons Bay 2009	Darebin 2010	Maribyrnong 2011
Document length in pages	3.5	3	4	23	19
Social justice, equitable access (SJ)	Social inclusion	Basic human right	Human rights framework	'Sustainable food system that maximises community self-reliance and social justice' p. 3	Human rights Social equity lens
Food Access (FA)	Yes	Yes	Yes	Yes, now and for the future	Yes, now and for the future
Food Security (includes elements of affordability, culturally appropriate, nutritious) (FS)	Yes	'Food security is determined by the food supply in the community, and whether people have adequate resources and skills to acquire and use (access) that food' p. 2	Yes	'Improving the ongoing supply of nutritious and sustainable food available in Darebin and improving access to the available food supply, particularly for those who are most vulnerable to food insecurity' p. 3	'The understanding of food security is also moving towards inclusion of sustainable production methods as a response to the emerging longer-term sustainability issues' p. 2

Source: Slade 2011

Shifts by Councils in these food policies since 2009 include the articulation of the link between food security principles, the natural environment, local food production, climate change, drought, peak oil, land degradation and loss of productive agricultural land. These local government food policies provide balance between economic, environmental and social outcomes but have limited capacity to act because of limited nested policy, authority and a lack of resources devolved from higher levels of government.

3. **Food policies need to envision and incorporate a diverse food system approach that includes regional and local scales rather than an agrifood export/import binary approach that focuses heavily on economic benefits of exporting**

According to Hogan and Morris (2010 p. 15) economic efficiency is 'the main criteria used in assessing the benefits, costs and risks of policy options'. Factors involved in this decision-making process include 'the extent to which a policy may have a negative impact on farm investment and production decisions' as well as 'administrative simplicity, including administration and compliance costs. Governments also have an important role in assessing the equity implications of policy options'.

Emphasis on the economic efficiency of food production predominantly for export markets can be out of balance with the environmental and social elements of sustainability. Similarly, the idea that local food systems always have preferential outcomes can also be a 'trap' that needs to be avoided (Born & Purcell 2006 p. 196). Diversification of scale and activities in a climate change environment enables capacity building and resilience development, consolidating TBL outcomes.

Regional and local food production requires food policy guidelines that facilitate sustainable outcomes. Alternative food networks, such as community-supported agriculture, farmers' markets, community gardens, backyard growing and food swaps depend on enabling policies. These activities provide opportunities for producers to sell their produce in their local/regional communities enabling shorter food chains, strengthening local economies and contributing to healthy and socially sustained communities.

7. CONCLUSION

This report has explored the relationship between food policy, food security and human-induced climate change. Current food policy is complex and multi-levelled. Regulation, strategic planning and industry requirements are the three overlapping approaches to food policy. Food security is also conceptually diverse with implications across multiple scales and sectors in terms of food availability, accessibility, acceptability and adequacy. Six food areas have been briefly examined to further understand the implications of the relationship between food policy, security and climate change in Australia. In summary, *agricultural productivity* is not increasing at the required rate, with the consequence in the long term of relying more heavily on imports. Climate is the most important factor in agricultural production and therefore any variation brings short- and long-term impacts. *Biodiversity and ecosystems* are also vulnerable to climate change, particularly with water limitations and the inability of fauna and flora to shift to alternative locations. Further, *land uses* are contested and not necessarily protected by governance mechanisms. Prime agricultural land, in both peri-urban and rural contexts, is currently contested due to increasing urban growth, aggressive mining activities, natural disasters and complex policy environments. Property rights and sovereignty are increasingly important. Recent *natural disasters,* particularly in Queensland, have exposed regulatory inhibitors around food distribution, unrealistic expectations of services and the necessity of improved response coordination of government roles. Resilience to natural disasters is an important agenda item for government. *Water scarcity* provides the opportunity for policies to consider a TBL approach; however, history tells us that water has been over allocated and social impacts are not always included. Policies need to be proactive and inclusive as well as ensuring quality of life and resilience building. At a national scale a strong *biosecurity* policy context has important food security implications.

Future development of food policy to provide food security within a human-induced climate change context needs to be nested within all governance levels and integrated horizontally across relevant portfolios. There is progress towards a National Food Plan and some policy development by individual councils, but unfortunately state and territory government involvement appears limited. Some municipalities have engaged with policy development, food security and broader environmental issues. There is a need for food policy to adopt a diverse food-system approach that integrates the export/import binary and addresses relationships between global, national, regional and local scales. Food policies need to consider the impacts of climate change with TBL values as a central focus and allow flexible application of emerging knowledge.

REFERENCES

Agriculture and Food Policy Reference Group. 2006. Creating Our Future Agriculture and Food Policy for the Next Generation, Report to the Minister for Agriculture, Fisheries and Forestry. Canberra: viewed 12 May 2012, http://www.daff.gov.au/__data/assets/pdf_file/0003/248385/creating_our_future_full_report.pdf.

Alston, M. 2005. Social exclusion in rural Australia. In: Cocklin, C. & Dibden, J. (eds.) *Sustainability and Change in Rural Australia*. Sydney: UNSW Press. pp.157–170.

Alston, M & Whittenbury, K 2011, Climate change and water policy in Australia's irrigation areas: a lost opportunity for a partnership model of governance, *Environmental Politics,* 20(6), 899–917. viewed 12 June 2012, Taylor & Francis database.

Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease (ABCRC). 2009. *About Biosecurity,* viewed 3 August 2012, http://www.abcrc.org.au/pages/About.aspx.

Australian Farmers' Markets Association. 2012a. *What is AFMA? v*iewed 6 August 2012, http://www.farmersmarkets.org.au/about.

Australian Farmers' Markets Association. 2012b. *Victorian Farmers' Markets: What do these symbols mean?* viewed 6 August 2012, http://www.farmersmarkets.org.au/sites/default/files/VFMA-Accreditation-Program_details.pdf.

Australian Food and Grocery Council. 2012a. *Who We Are,* viewed 6 August 2012, http://www.afgc.org.au/whoweare.html.

Australian Food and Grocery Council. 2012b. *What We Do,* viewed 6 August 2012, http://www.afgc.org.au/whatwedo.html.

Australian Government. 2010. *Critical Infrastructure Resilience Strategy*. Canberra: Australian Government. http://www.tisn.gov.au/Documents/Australian+Government+s+Critical+Infrastructure+Resilience+Strategy.pdf.

Barling, D., Lang, T., & Caraher, M. 2002. 'Joined-up Food Policy? The Trials of Governance, Public Policy and the Food System'. *Social Policy & Administration,* 36(6), 556–574. viewed 14th July 2011, Wiley Online Library.

Biological Farmers of Australia. 2010. *Australian Certified Organic Standards 2010 Version 1.0,* viewed 6 August 2012, http://www.bfa.com.au/Portals/0/ACO_2010_150311_1&2.pdf.

Black, A. 2005. Rural communities and sustainability", In: Cocklin, C. & Dibden, J. (eds.) *Sustainability and Change in Rural Australia*. Sydney: UNSW Press. pp. 20–39.

Born, B., & Purcell, M. 2006. Avoiding the Local Trap: Scale and Food Systems in Planning Research. *Journal of Planning Education and Research,* 26(2), pp. 195–207, viewed 26 August 2009, Sage Publications.

Burns, C. 2008. The Vulnerable and the Disadvantaged. *The Australian Economic Review,* 41(1), pp. 90–96, viewed 13 July 2011, Wiley Online database.

Burns, C., Gibbon, P., Boak, R., Baudinette., S., & Dunbar, J. 2004. Food cost and availability in a rural setting in Australia. *Rural and Remote Health,* 4(311),

pp. 1–9, viewed 10 November 2012, http://dro.deakin.edu.au/eserv/DU:30002496/dunbar-foodcost-2004.pdf.

Calford, E., Gurney, A., Heyhoe, E., & Ahammad, H. 2010. *Issues Insights The effects of an emissions offsets scheme on Australian agriculture*. viewed 18 July 2012, http://www.daff.gov.au/__data/assets/pdf_file/0011/1893917/a2.pdf.

Clean Energy Future. 2012. *An overview of the Clean Energy Legislative Package,* viewed 5 August 2012, http://www.cleanenergyfuture.gov.au/wp-content/uploads/2012/05/CEF-overview_Apr2012.pdf.

COAG (Council of Australian Governments). 2011. National Strategy for Disaster Resilience. Canberra: Attorney General's Department, Australian Government. http://www.em.gov.au/Documents/1National%20Strategy%20for%20Disaster%20Resilience%20-%20pdf.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry). 2006. *Creating Our Future,* viewed 18 July 2012, http://www.daff.gov.au/__data/assets/pdf_file/0003/248385/creating_our_future_full_report.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry). 2009. *National Standard for Organic and Bio-Dynamic Produce Edition 3.4,* viewed 6 August 2012, http://www.daff.gov.au/__data/assets/pdf_file/0018/126261/national-standard.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry). 2011a. *Issues paper to inform development of a national food plan,* viewed 27 June 2012, http://www.daff.gov.au/__data/assets/pdf_file/0009/1926315/nfp_-_final.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry). 2011b. *Domestic Food Regulatory System,* viewed 28 July 2012, http://www.daff.gov.au/agriculture-food/food/regulation-safety/regulatory-system.

DAFF (Department of Agriculture, Fisheries and Forestry). 2011c. *Northern Australia Quarantine Strategy (NAQS),* viewed 3 August 2012, http://www.daff.gov.au/aqis/quarantine/naqs.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012a. *Process to develop the National Food Plan,* viewed 6 August 2012, http://www.daff.gov.au/nationalfoodplan/process-to-develop.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012b. *National Food Plan green paper 2012,* viewed 17 July 2012, http://www.daff.gov.au/nationalfoodplan.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012c. *How we are responding to climate change,* viewed 6 August 2012, http://www.daff.gov.au/climatechange/climate.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012d. *Levies,* viewed 6 August 2012, http://www.daff.gov.au/agriculture-food/levies/.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012e. *Dairy,* viewed 21 July 2012, http://www.daff.gov.au/agriculture-food/levies/dairy.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012f. *Horticulture,* viewed 21 July 2012, http://www.daff.gov.au/agriculture-food/levies/horticulture.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012g. *Reform of Australia's biosecurity system.* An update since the publication of *One Biosecurity: a working partnership*, viewed 1 June 2012, http://www.daff.gov.au/data/assets/pdf_file/0004/2134795/bio-reform-final.pdf.

DAFF (Department of Agriculture, Fisheries and Forestry). Forestry 2012h. *Review of Australia's Quarantine and Biosecurity Arrangements – Report and Australian Government Preliminary Response,* viewed 3 August 2012, http://www.daff.gov.au/about/publications/quarantine-biosecurity-report-and-preliminary-response.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012i. *Reform of Australia's biosecurity system New biosecurity legislation,* viewed 3 August 2012, http://www.daff.gov.au/bsg/biosecurity-reform/new-biosecurity-legislation/report.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012j. *Biosecurity reform,* viewed 3 August 2012, http://www.daff.gov.au/bsg/biosecurity-reform.

DAFF (Department of Agriculture, Fisheries and Forestry). 2012k. *About our Biosecurity system,* viewed 3 August 2012, http://www.daff.gov.au/bsg/system.

Department of Climate Change and Energy Efficiency. 2012. *More about the Kyoto Protocol,* viewed 5 August 2012, http://www.climatechange.gov.au/en/government/initiatives/kyoto/kyoto-protocol-detail.aspx.

Department of Planning and Community Development 2002. *Melbourne 2030 – Planning for Sustainable Growth*. State of Victoria. Melbourne.

Food and Agriculture Organization. 1996. Rome Declaration on World Food Security and World Food Summit Plan of Action. World Food Summit 13–17 November 1996. Rome. http://www.fao.org/docrep/003/w3613e/w3613e00.htm

Food Standards Australia New Zealand. 2012a. *Australia New Zealand Food Standards Code,* viewed 21 July 2012, http://www.foodstandards.gov.au/foodstandards/foodstandardscode.cfm.

Food Standards Australia New Zealand. 2012b. *Code Interpretation Service,* viewed 21 July 2012, http://www.foodstandards.gov.au/foodstandards/codeinterpretationse1517.cfm.

Garnaut, R. 2011. *Transforming rural land use,* Climate Change Review Update Paper 4, viewed 28 July 2012, http://www.garnautreview.org.au/update-2011/update-papers/up4-transforming-rural-land-use.pdf.

Godfray, H., Pretty, J., Thomas, S., Warham, E., & Beddington, J. 2011. Linking Policy on Climate and Food. *Science,* 331, 1013–1014.

Gunasekera, D., Kim, Y., Tulloh, C., & Ford, M. 2007. Climate change: Impacts on Australian Agriculture. *Australian Commodities,* 14(4), pp. 657–676.

Hennessy, K. 2011. Climate change impacts. In Cleugh, H., Stafford-Smith, M., Battaglia, M., & Graham, P. (eds.) *Climate Change: Science and Solutions for Australia,* CSIRO Publishing Melbourne.

Hepburn, S. 2012. The Coal Seam Gas Industry in Australia. *Deakin University Research Communications,* viewed 10 November 2012, http://www.deakin.edu.au/research/stories/2012/05/08/the-coal-seam-gas-industry-in-australia.

Hogan, L., & Morris, P. 2010. *Agricultural and Food Policy Choices in Australia. Abare-BRS Conference Paper 10.15,* viewed 21 July 2012, http://adl.brs.gov.au/data/warehouse/pe_abarebrs99001749/CP10.15_Agric_food_policy_CONFERENCE_PAPER.pdf.

Hugo, G. 2005. The state of rural populations. In: Cocklin, C. & Dibden, J. (eds.) *Sustainability and Change in Rural Australia*. Sydney: UNSW Press. pp. 56–79.

Koc, M., MacRae, R., Mougeot, L., & Welsh, J. (eds.). 1999. *For Hunger-proof Cities*, International Development Research Centre, Ottawa, Canada.

Lang, T. 2010. Crisis? What Crisis? The Normality of the Current Food Crisis. *Journal of Agrarian Change,* 10(1), pp. 87–97, viewed 14 July 2011, Wiley database.

Lang, T., Barling, D., & Caraher, M. 2009. *Food Policy: Integrating Health, Environment and Society*. Oxford: Oxford University Press.

Lawrence, G., Richards, C., & Lyons, K. 2013. Food security in Australia in an era of neoliberalism, productivism and climate change. *Journal of Rural Studies,* 29(1), pp.30-30, viewed 23 May 2013, ScienceDirect.

Lindenmayer, D., Steffen, W., Burbidge, A., Hughes, L., Kitching, R., Musgrave, W., Stafford Smith, M., & Werner, P. 2010. Conservation strategies in response to rapid climate change: Australia as a case study. *Biological Conservation,* 143, pp. 1587–1593, viewed 17 June 2012, ScienceDirect.

Masters, B., Rohde, K., Gurner, N., Higham, W., & Drewry, J. 2008. Sediment, nutrient and herbicide runoff from canefarming practices in the Mackay Whitsunday region: a field-based rainfall simulation study of management practices. Queensland Department of Natural Resources and Water for the Mackay Whitsunday Natural Resource Management Group, Australia

Millar, J., & Roots, J. 2012. Changes in Australian agriculture and land use: implications for future food security. *International Journal of Agricultural Sustainability,* 10(1), pp. 25–39, viewed 12 June 2012, Taylor & Francis database.

Nath, T., & Islam, N. 2011. *World-Class Food Systems and Western Australian Agriculture: An Overview*. Perth: Department of Agriculture and Food, Western Australia.

New South Wales Government. 2012. *Sydney over the next 20 years: a discussion paper,* viewed 6 August 2012, http://www.planning.nsw.gov.au/LinkClick.aspx?fileticket=4ZTqniHYDIg%3d&tabid=487&language=en-AU.

Natural Resource Management Ministerial Council. 2010. *Australia's Biodiversity Conservation Strategy 2010–2030*. Canberra: Australian Government, Department of Sustainability, Environment, Water, Population and Communities. http://www.environment.gov.au/biodiversity/publications/strategy-2010-30/index.html.

PMSEIC. 2010. *Australia and Food Security in a Changing World*. Canberra: The Prime Minister's Science, Engineering and Innovation Council.

Productivity Commission. 2009. *Performance Benchmarking of Australian and New Zealand Business Regulation: Food Safety,* Research Report, Canberra, viewed 12 May 2012, http://www.pc.gov.au/__data/assets/pdf_file/0020/93503/food-safety-report.pdf.

Queensland Government. 2012a. *Strategic cropping land,* viewed 3 August 2012, http://www.derm.qld.gov.au/land/planning/strategic-cropping/index.html.

Queensland Government. 2012b. *Legislation and planning,* viewed 3 August 2012, http://www.derm.qld.gov.au/land/planning/strategic-cropping/legislation-planning.html.

Queensland Government. 2012c. *Strategic Cropping Land Act 2011,* viewed 4 August 2012, http://www.legislation.qld.gov.au/LEGISLTN/ACTS/2011/11AC047.pdf.

Sacks, G., Swinburn, B., & Lawrence, M. 2008. Obesity Policy Action framework and analysis grids for a comprehensive policy approach to reducing obesity. *Obesity Reviews,* 10, pp. 76–96, viewed 13 July 2011, Informit database.

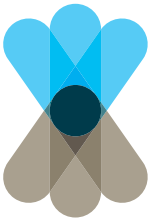
Sapere Research Group. 2012. *Resilience in the Australian food supply chain,* a report for the Australian Government Department of Agriculture, Fisheries and Forestry, viewed 3 August 2012, https://senate.aph.gov.au/.

Slade C. 2011.Linking Food Supply and Equitable Access: Local Government Food Security Policies. *Australasian Agrifood Research Network's Conference*, 7th December 2011, Australian National University, Canberra.

Slade, C. 2013. Institutional Capacity of Local Government to Embed Food Security into Policy. In Farmar-Bowers, Q., Millar, J., & Higgins, V. (eds.). *Food Security in Australia: Challenges and Prospects for the Future*. New York: Springer-Verlag New York Inc.

The Government Office for Science. 2011. *The Future of Food and Farming: Challenges and choices for global sustainability.* London: The Government Office for Science.

UK Cabinet Office. 2008. *Food Matters: Towards a Strategy for the 21st Century*. London: UK Cabinet Office, viewed 28 September 2008, <www.cabinetoffice.gov.uk/strategy/.



NCCARF
National
Climate Change Adaptation
Research Facility

Griffith University Gold Coast Campus
Parklands Drive, Southport
QLD 4222, Australia
Telephone 07 5552 9333
Facsimile 07 5552 7333
www.nccarf.edu.au

Australian Government
Department of Climate Change
and Energy Efficiency

Queensland
Government

Griffith
UNIVERSITY

Murdoch
UNIVERSITY

JAMES COOK
UNIVERSITY
AUSTRALIA

UNIVERSITY
OF SOUTHERN
QUEENSLAND

QUT

University of the
Sunshine Coast

MACQUARIE
UNIVERSITY

THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA