



Australian Government

Department of Agriculture, Fisheries and Forestry

Submission to

Senate Standing Committee on

Rural Affairs and Transport—

Inquiry into the Management of the Murray–Darling Basin

December 2010

CONTENTS

- Executive summary** Error! Bookmark not defined.
- Introduction** **5**
- Role of the department** **5**
- An overview of Australian agriculture**..... **6**
 - Economic contribution..... 6
 - Productivity..... 6
 - Trade 7
 - Farm business performance 7
 - Irrigated agriculture 8
- The Murray–Darling Basin and irrigated agriculture** **10**
 - Basin economy 10
 - Irrigated agriculture in the basin 10
 - Irrigation water management in the basin..... 11
 - The recent drought 11
 - Financial performance of irrigation farms in the basin 11
- The Murray–Darling Basin Plan** **13**
- Impacts of the basin plan**..... **14**
 - Impacts on agricultural production 14
 - Impacts on food security 15
 - Impacts on domestic food prices..... 16
- Government support**..... **17**
 - Assistance for irrigators 17
 - Programs managed by the Department of Agriculture, Fisheries and Forestry 17
 - Trade and market access assistance 18
 - National Food Plan 18
- Rural research and development**..... **19**
 - The agricultural research and development landscape..... 19
 - Rural research and development corporations 19
 - ABARES 20
 - CSIRO..... 20
 - Cooperative research centres 21
- Other issues**..... **22**
 - Foreign investment..... 22
- References** **23**

EXECUTIVE SUMMARY

The Commonwealth *Water Act 2007* sets out the requirement for the Murray–Darling Basin Authority to develop a basin plan for the shared water resources of the basin, to be implemented through state water resource plans from 2014. The basin plan represents a significant reform that is designed to rebalance the allocation of water between the environment and productive and consumptive uses.

The Guide to the Proposed Murray–Darling Basin Plan proposes sustainable diversion limits that represent an average cut in surface water diversions of between 3000 and 4000 gigalitres and in groundwater diversions of 185 gigalitres per year.

This submission provides an overview of agriculture and its role in the basin and outlines the role of the Department of Agriculture, Fisheries and Forestry in driving productivity improvements, international competitiveness and the sustainability and profitability of agricultural industries. Through its policies and programs, the department promotes innovation, self-reliance and improved access to international markets for Australia’s primary industries, including for irrigated agriculture. The submission also canvasses the effects of the basin plan on agricultural production, food security and food prices.

The department’s research bureau, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), has assessed the likely impacts of the reduction in water diversion limits outlined in the guide as follows:

- The reduced diversion limits could result in a decline in the value of irrigated agricultural production in the basin of between 13 and 17 per cent from what it would otherwise be. This decline would be mitigated by the Australian Government’s investments in water purchases and infrastructure modernisation.
 - Impacts on agricultural production are likely to vary across the different agricultural industries, with cotton, rice, dairy, hay and cereals most affected and horticulture (fruit, nuts and vegetables) least affected.
 - While production would decline, productivity (a measure of the ratio of farm outputs to inputs) will increase as more efficient operators will remain in the industry and infrastructure investments will deliver efficiency benefits.
- The Government’s *Water for the Future* initiative (water purchases and infrastructure modernisation) and its commitment to ‘bridge the gap’ by purchasing additional water required for the environment from willing sellers, along with water trading, will significantly mitigate the impacts of reduced diversion limits.
- Prices of agricultural products would be likely to increase only slightly.
 - As cotton, rice, dairy and cereals are trade-exposed, the prices for these products are determined by international markets and are not likely to be significantly affected. For products that are less trade-exposed, such as fruit and vegetables, ABARES estimates production to be least affected by reductions in diversion limits. ABARES expects that the likely small decrease in fruit and vegetable production would lead to a relatively small increase in domestic prices for these products.

- Australia's food security is unlikely to be significantly affected.
 - Australia has a trade surplus in food products of around \$16.6 billion per year, based on the average surplus over the past five years. Exports account for more than half of national food production and imports are largely highly processed food and beverages. Declines in production resulting from reduced diversion limits are likely to have the greatest impact on exported commodities, rather than on food for domestic consumption.
- Impacts on global food security are expected to be small.
 - Australia accounts for 2.2 per cent of global trade in food in value terms. Australia is a significant exporter of bulk wheat, barley, beef, live sheep and cattle, and alcoholic beverages such as wine. However, Australian production represents less than 5 per cent of global production of these commodities.

A number of limitations and assumptions associated with the ABARES assessment are outlined in detail in a separate submission by the bureau that should be read in conjunction with this submission. Among these are uncertainties around the timing of the effects, as the purchase of water is expected to occur over a relatively long time frame; the extent to which infrastructure investments will deliver water savings; and the path taken by the states to implement new diversion limits, which could have implications for the variability of irrigation water supplies. Despite these limitations, the ABARES results provide a useful insight into the overall effects of changes to diversion limits and the mitigating influence of government policies and programs.

The department notes that the viability of individual irrigation farm businesses may be affected by a number of factors, including ones external to the basin plan, such as price fluctuations owing to global commodity market competition, changes in the value of the Australian dollar or the potential opening up of domestic markets to international products as may occur in some horticultural industries. These pressures may have more significant short and long-term effects on irrigated agricultural industries than the basin plan.

Irrigated agriculture will continue to be viable and robust in the basin. However, regional and local impacts are likely to vary and some areas will be more affected by the plan than others, in particular those regions and towns that are heavily reliant on irrigated industries.

The department will contribute to any further government consideration of the impacts of the basin plan as appropriate.

INTRODUCTION

The Department of Agriculture, Fisheries and Forestry welcomes the opportunity to provide a submission to the Senate Standing Committee on Rural Affairs and Transport on the management of the Murray–Darling Basin.

This submission outlines the department’s portfolio responsibilities, provides an overview of irrigated agriculture in the Murray–Darling Basin, and presents information on the effects of the basin plan on food production, food prices and food security. It outlines the measures put in place by the Australian Government which can support adjustment of irrigated industries and will also alleviate adverse social and economic impacts on communities.

The submission also includes information and comments from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), and four divisions of the department—Agricultural Productivity, Climate Change, Trade and Market Access, and Sustainable Resource Management.

ROLE OF THE DEPARTMENT

The department implements the Government’s policies and programs as they relate to Australia’s agricultural, fishing, forestry and food-related industries and aims to:

- promote more sustainable, productive, internationally competitive and profitable industries through policies and initiatives that promote better resource management practices, innovation, self-reliance and improved access to international markets
- safeguard Australia’s animal and plant health status to maintain overseas markets and protect the economy and environment from the impact of exotic pests and diseases through risk assessment, inspection and certification, and the implementation of emergency response arrangements.

The department provides specialist services to portfolio industries through agencies such as the Australian Quarantine and Inspection Service (AQIS) and ABARES. Biosecurity Australia is a prescribed agency within the department. The portfolio also includes regulatory and statutory marketing authorities, research and development corporations (RDCs) and advisory bodies.

The department maintains an interest in areas that are primarily the responsibility of other Government agencies but which affect the agriculture, fisheries and forestry sector—for example, water, regional development, rural infrastructure and climate change.

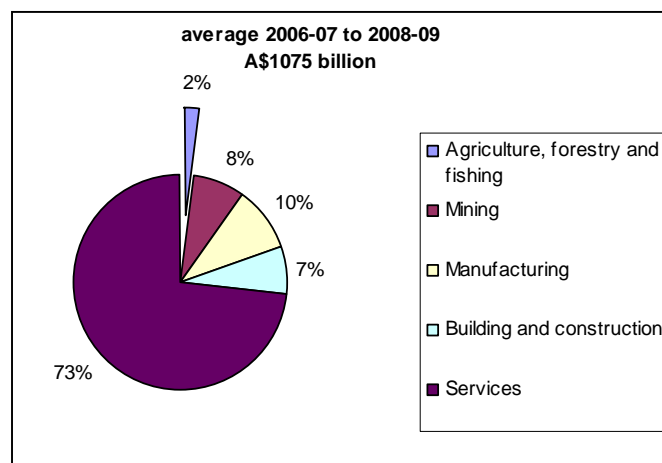
It advises the minister on portfolio interests in water reforms, including the Murray–Darling Basin Plan, and rural infrastructure, and also administers programs that support agriculture across Australia.

AN OVERVIEW OF AUSTRALIAN AGRICULTURE

Economic contribution

The gross value of agricultural production (GVAP) in Australia in 2008–09 was \$42 billion. Agriculture contributes about 2 per cent of Australia’s gross domestic product (GDP). This level of contribution in relation to other sectors of the economy is typical of a mature economy, with the services sector now accounting for about three-quarters of output.

Sector contribution to Australian gross domestic product



Source: Australian Bureau of Statistics

The gross value of production of most agricultural industries increased between 1987–88 and 2007–08. However, the value of rice production declined by about 96 per cent, sugar production by 24 per cent and pig meat by 10 per cent. This largely reflects the fall in production in 2007–08 (compared to historical highs) resulting from poor seasonal conditions (e.g. drought) and masks the increases in the value of production between 1987–88 and 2005–06.

The GVAP for fruit, nuts and vegetables has increased by 97 per cent since 1987–88, in part because of industry responses to growing consumer demand for more and different fresh fruit and vegetables. The GVAP for dairy rose by about 76 per cent, as milk production increased.

Labour use in agriculture has fallen on average by 1.7 per cent a year over the past 30 years. In 2008–09, the agriculture sector directly employed 317 000 people—about 3 per cent of Australia’s workforce. Improvements in labour productivity and the continuing trend toward fewer but larger and more capital-intensive farms mean that the decline in the number of people employed in the sector can be expected to continue.

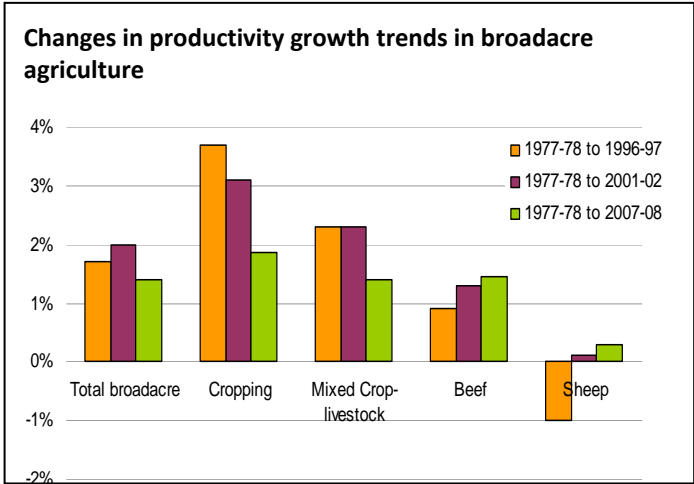
Australian agriculture contributes to regional employment beyond the farm gate. In 2008–09, 193 500 people were employed in food manufacturing and 28 500 in beverage manufacturing. Almost half of those employed in food and beverage processing were in regional Australia in 2006–07.

Productivity

Productivity is a measure of output per unit of input. Long-term growth in agricultural production largely depends on increases in productivity, because of limitations to the land, labour, water and other resources available to agriculture. Since the early 1980s, productivity growth in Australian agriculture has been strong relative to other sectors of the economy and

comparable to other Organisation for Economic Cooperation and Development (OECD) countries. Agriculture, fisheries and forestry productivity growth has averaged 3.1 per cent annually over the past 20 years, compared to 1 per cent economy wide. However, it has slowed over the past decade because of extended drought and a long-term decrease in public investment in agricultural research and development.

Broadacre and dairy industries account for 65 per cent of Australia’s GVAP. They achieved long-term productivity growth of 1.4 per cent and 0.8 per cent a year, respectively between 1977–78 and 2007–08. This growth has helped to maintain competitiveness in export markets and, over the long term, to offset a decline in farmers’ terms of trade and to sustain farm businesses and incomes.



Source: Department of Agriculture, Fisheries and Forestry, *At a glance 2010*

Trade

Australia’s agriculture sector is strongly export oriented, with about 60 per cent of production (in value terms) exported each year. In 2008–09, farm exports were valued at \$32 billion.

Australian farming’s dependence on exports varies across industries, ranging from almost 100 per cent for wool and cotton to about 50 per cent for dairy (mainly as manufactured products such as cheese, milk powders and butter) to just 2 per cent for poultry meat. In 2008–09 Australia’s major agricultural exports (in value terms) were wheat, beef and veal, wine and wool. For some products, such as grains, the value of exports can fluctuate significantly between years, depending on growing conditions in Australia and changes in world prices.

Farm business performance

According to the Australian Bureau of Statistics (ABS), in 2008–09 there were about 136 000 Australian farm businesses with an estimated value of agricultural operations of more than \$5000, most of which are family-owned and operated. There has been a gradual decline in farm numbers in Australia, mainly involving family farms buying other family farms and creating a larger farm business to increase the family’s income.

Between 1987–88 and 2007–08 the number of broadacre farms in Australia fell from about 80 000 farms to nearly 61 000 farms. Over the same period the total land area operated by these enterprises fell by about 5 per cent. Strong demand for rural land during this period has resulted in a sharp increase in land values, raising the total capital value of farms. The average

total capital value (in 2007–08 dollar terms) of broadacre farms has more than doubled over the 20 year time period to \$3.5 million in 2007–08.

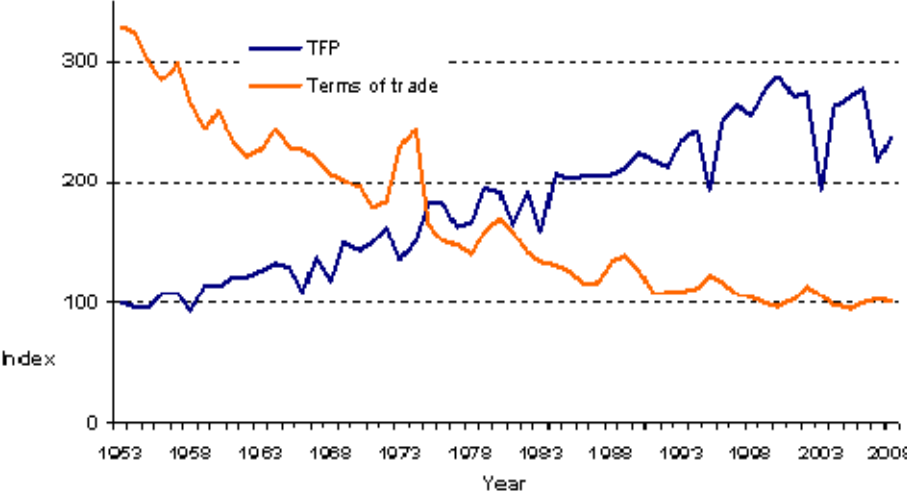
Two important features of Australian farming are income volatility and the long-term downward trend in farmers’ terms of trade (the ratio of average prices received to average prices paid). At the individual farm level, economic performance has been highly variable.

Farm income is affected by a number of factors external to farm businesses. These include climate conditions, demand for Australian agricultural products, exchange rates, changes in government policy, such as opening access for international products to Australian domestic markets, and access to new technologies.

Changes in world prices for agricultural produce and currency movements have an important impact on Australian producer returns. This is because domestic prices for these commodities will generally be relatively closely correlated with those in international markets. This is particularly relevant for commodities that are largely exported or which face competition from imports or domestically produced substitutes that are traded globally.

Declining terms of trade have been a long-standing characteristic of Australian agriculture and represent a significant challenge to the performance of the sector. Declining terms of trade reflect faster growth in the price of inputs used in farm enterprises than in the price of the outputs produced. This has been the case both domestically and globally in the agriculture sector.

While farm terms of trade have historically been declining, lately they appear to be levelling out. The following diagram shows how total farm production (TFP) has been increasing since the 1950s, while terms of trade have been declining, levelling out over the decade to 2008.



Average farm cash income for broadacre farms is projected to increase to \$86 000 and for Australian dairy farms to \$103 000 in 2010–11, representing an increase for both industries of 10 per cent above the 10-year average to 2009–10.

The financial performance of broadacre farms is expected to increase markedly in 2010–11. Well above average seasonal conditions across most of eastern and northern Australia, accompanied by higher prices for most broadacre commodities, are projected to result in farm cash incomes in 2010–11 being the highest recorded since 2004–05. Between 2004–05 and 2009–10, average farm cash incomes were reduced by widespread drought conditions. Farm cash incomes projected for the eastern states in 2010–11 would have been higher were it not

for the substantial reductions in grain quality as a result of the effect on winter crops of high and untimely rainfall at harvest.

Excellent pasture growth and increased availability of irrigation water is also expected to favourably affect dairy farm incomes in southern Australia in 2010–11.

Irrigated agriculture

Irrigated agricultural land comprises less than 0.5 per cent of all agricultural land in Australia. About 65 per cent of the water used in Australia is for agriculture. In 2007–08, 90 per cent of the water used for agriculture was for irrigating crops and pastures and 10 per cent for other agricultural purposes.

Agricultural water use decreased by 18 per cent in 2007–08 because of drought, following a 27 per cent drop in 2006–07. The biggest drop occurred in the Murray–Darling Basin, where water use decreased by 30 per cent, compared with a 1 per cent drop for the rest of Australia. Australia's irrigated agricultural water use rose slightly in 2008–09, by 3 per cent. Water use in the Murray–Darling Basin rose 11 per cent, but outside the basin irrigation it continued to fall, by about 4 per cent from the previous year. The area of land irrigated continued to fall both nationally and in the basin.

Australia's gross value of irrigated agricultural production (GVIAP) in 2008–09 was just under \$12 billion, accounting for approximately 29 per cent of the total GVAP. In general, there has been an increasing trend in GVIAP since 2000–01, although 2008–09 was the second successive year in which GVIAP decreased from the previous year's total.

Vegetables for human consumption and seed contributed the highest value to GVIAP in 2008–09 (\$2625 million), followed by fruit and nuts (\$2390 million) and dairy production (\$2274 million). These three commodity groups accounted for 61 per cent of total GVIAP.

THE MURRAY–DARLING BASIN AND IRRIGATED AGRICULTURE

The Murray–Darling Basin covers more than one million square kilometres of south-eastern Australia—14 per cent of the country. It includes 23 river valleys. It extends from north of Roma in Queensland to Goolwa in South Australia, near the mouth of the River Murray. About 94 per cent of its rainfall evaporates, 2 per cent drains into the ground, and 4 per cent runs off into streams, lakes and rivers.

Basin economy

Most land in the basin, 84 per cent, is used for agriculture. The basin generates about 39 per cent of the national income derived from agricultural production. Agriculture contributed approximately \$14.6 billion to the basin economy in 2008–09. The basin economy (gross regional product) was approximately \$59 billion in 2000–01, representing about 8 per cent of Australian GDP.

Employment in the basin was approximately 921 000 in 2006, or 10 per cent of total national employment, with about 96 000 people engaged in agriculture.

Irrigated agriculture in the basin

Irrigated agriculture is the primary water user in the basin, accounting for over 80 per cent of consumptive water use. Most irrigation water is diverted from surface water but there is also significant use of groundwater for irrigation.

Irrigated industries in the basin include broadacre crops such as rice and cotton, horticulture and vegetable crops, and irrigated pasture for dairy and hay. In 2008–09, cotton accounted for the highest proportion of irrigation water used (23 per cent), followed by cereal crops for grain or seed (20 per cent) and pasture for grazing (15 per cent).

The major cotton growing regions are in the northern basin in the Gwydir, Condamine and Namoi regions. Rice production occurs almost exclusively in the Murrumbidgee and Murray regions in southern New South Wales. Much of the irrigated pasture occurs in the northern Victorian regions of the Murray, Goulburn–Broken and Loddon.

Irrigated agriculture accounted for only 2 per cent of basin agricultural land use in the basin in 2005–06, equal to 1.65 million hectares of irrigated crops and pasture. This area reduced to about 958 000 hectares in 2007–08 due to low water availability.

Irrigated agriculture contributed less than 0.7 per cent to Australia's GDP in 2008–09, but a significantly larger proportion of the basin's GVAP. The basin's GVIAP was approximately \$4.3 billion, representing about 30 per cent of GVAP and about 10 per cent of total Australian GVAP. It also represented about 36 per cent of Australian GVIAP. In contrast, the value of irrigated production in the basin in 2000–01 represented 53 per cent of GVIAP for Australia at that time.

The commodities that contributed most to the basin's GVIAP in 2008–09 were fruit and nuts (\$1033 million or 24 per cent), dairy production (\$791 million or 18 per cent) and grapes (\$598 million or 14 per cent).

Of the approximately 61 000 farms in the basin in 2005–06, 18 600 carried out some irrigation. Most irrigation farms in the basin have some form of off-farm income. About one-third of irrigation farms obtained more than 50 per cent of total family income from off-farm sources in 2007–08.

Irrigation water management in the basin

Water management in Australia is largely the responsibility of state and territory governments. A national program of water reforms began in 1994 under the Council of Australian Governments, with the establishment of the National Water Initiative in 2004 being a significant step. Given the importance of agriculture in the Murray–Darling Basin and the pressures it puts on the basin’s water resources, basin jurisdictions signed the *Murray–Darling Basin Agreement 2008* to cement cross-jurisdictional arrangements for water management in the basin.

The Australian Government has legislated its role under this agreement through the *Water Act 2007*, and provides funding to secure water supplies in the basin through its \$12.9 billion *Water for the Future* initiative. The initiative includes \$3.1 billion for water purchases in the basin for the environment, and approximately \$4.9 billion for modernising basin irrigation infrastructure to save water for the environment and to support irrigation communities.

States and territories license access to irrigation water from bores (groundwater) and river systems (surface water), and also own major storages on rivers. Distribution of irrigation water from state-owned facilities is managed by private or public utilities, depending on the state. These utilities levy fees for delivery.

Water entitlements (permanent water) and water allocations (temporary water) can be traded on the water market. Water markets are well established in the southern basin, where there is a high degree of river regulation (water storages and other water management infrastructure) but are not so well developed in the northern basin. Increased trading of water is contributing to a more economically efficient allocation of the resource between competing uses. Such trade was particularly useful in the recent drought in ensuring that scarce water was available to higher-value uses such as irrigation for perennial plantings of horticulture crops.

The recent drought

This year, 2010, marks the end of 14 years of drought in south-east Australia. The prolonged dry spell was characterised by a combination of recurrent drought (short-term dry spells), less autumn and winter rainfall in most years, and an absence of very wet periods. Recent widespread, above-average rainfall across much of Australia has alleviated short-term dry conditions. November 2010 was Australia’s wettest on record, with high rainfall across most of eastern Australia. Australia received its wettest spring (September to November) on record.

The combination of low river system inflows and low storage levels during the drought resulted in a severe water shortage for irrigators, particularly in the southern basin. From 2005–06 to 2008–09, the area irrigated and the volume of irrigation water applied in the basin have decreased by 44 per cent and 53 per cent respectively.

Irrigators adopted a number of strategies to cope. Water trading has played a critical role, enabling irrigators to adjust to the change in water availability. Despite the drought and other challenges facing irrigators in recent years, a large proportion of irrigation farms throughout the basin recorded net farm incomes in 2006–07 and 2007–08. Generally, farm incomes were higher in 2007–08 because of increased production and/or higher prices for some commodities.

Financial performance of irrigation farms in the basin

ABARES recently released its report on financial performance of irrigation farms in the Murray–Darling Basin in 2006–07 and 2007–08. The report indicates that average farm equity ratios for irrigators were about 80 per cent for both years. About 13 per cent of irrigation farms had low income and low farm business equity.

Most irrigation farms had some form of off-farm income. About one-third obtained more than 50 per cent of total family income from off-farm sources. On average, about one-third of the total off-farm income earned by irrigation farms in 2007–08 was from wages or salaries, while about half was from sources such as government assistance and non-farm investments.

Average farm business debt for irrigated broadacre and horticulture farms in the basin rose in 2007–08, while for dairy farms there was a small decline. The major components of farm debt were land-purchases debt and working capital debt.

The value of capital for irrigated broadacre farms averaged \$4.8 million a farm in 2007–08. For horticulture farms, it averaged \$1.7 million a farm, while for dairy farms it was \$2.6 million. Many irrigation farms added to farm capital in 2007–08, with purchases of land and permanent water entitlements being the largest components of additions. A relatively small number of irrigators disposed of capital in 2007–08.

THE MURRAY–DARLING BASIN PLAN

The Murray–Darling Basin Authority is required under the *Water Act 2007* to develop a basin plan to provide for the integrated management of the basin’s water resources in a way that establishes and enforces environmentally sustainable limits on the quantities of surface and ground water that may be taken from the basin. The plan must also include an environmental watering plan, a water quality and salinity plan and rules to improve the efficiency of the water market.

The plan will give effect to relevant international agreements, such as the RAMSAR Convention on wetlands, and certain migratory bird agreements. In giving effect to those agreements, the plan must also promote the use and management of basin water resources in a way that optimises economic, social and environmental outcomes.

The plan will take effect from 2014 to 2019 as state and territory water resource plans, compliant with the basin plan and accredited by the authority, are implemented.

The Guide to the Proposed Murray–Darling Basin Plan, released on 8 October 2010, proposes sustainable diversion limits that represent:

- an average annual cut in surface water diversions of between 3000 and 4000 gegalitres — this equates to a cut of between 22 and 29 per cent from the 13 680 gegalitres currently diverted annually on average from all sources or a cut of between 27 and 37 per cent from the 10 940 gegalitres currently diverted from watercourses
- an average cut in groundwater diversions of 10 per cent across the basin (185 gegalitres a year to be cut from the current 1786 gegalitres diverted on average).

IMPACTS OF THE BASIN PLAN

Basin communities have raised a number of concerns relating to the impacts of the basin plan on agriculture and food production. These concerns centre on potential reductions in agricultural production and impacts on domestic and global food security and domestic food prices. The basin community is also concerned about the impacts of the plan on regional communities, townships, secondary industries and small businesses. Other government departments and agencies have lead responsibilities for these issues.

Impacts on agricultural production

ABARES estimates that reduced diversion limits outlined in the guide to the proposed basin plan could result in a decline in the value of irrigated agricultural production in the basin of between 13 per cent and 17 per cent. This decline would be mitigated by the government's investments in water purchases and infrastructure modernisation.

One scenario modelled by ABARES was a reduction in diversion limits representing an average cut of 3500 gegalitres to surface water diversions. The modelling indicates that such a reduction, coupled with water trade and the Government's investments in water purchases and infrastructure upgrades, would result in a long-term reduction in the basin's projected GVIAP of about 10 per cent. This equates to a reduction of around 3.6 per cent for the basin's GVAP.

Without the mitigating effects of the Government investments, the reduction in GVIAP resulting from the reduced diversion limits was predicted to be 15 per cent, and in GVAP was predicted to be 5 per cent. The ABARES modelling showed that impacts on production would be about 1 to 2 per cent greater without water trade.

The largest absolute reductions in GVIAP in the modelling, after accounting for the mitigating effects of the Government's investments, are predicted to occur in irrigated cotton (down \$216 million) and rice (down \$119 million), with smaller reductions in dairy (down \$53 million), hay (down \$54 million) and cereals (down \$58 million).

The modelled reductions in water diversion limits will not have as significant an annual impact on production as the decade-long drought experienced by farmers until this season. However the reductions will be felt over a longer time frame. As they will be permanent, the reductions will affect long-term production averages.

Water trade across regions in the southern basin is expected to mitigate the plan's economic impacts by allowing water to trade to higher-value activities, such as horticulture (fruit, nuts and vegetables), and away from lower-value activities such as pasture irrigation and broadacre cropping. The movement of water to horticulture assumes economic conditions similar to 2005–06 and does not account for other external pressures on those industries.

While the effects of the new limits will be partially offset by an increase in dryland agricultural production as irrigated land returns to dryland agriculture, these offsets will not be substantial. The value of production from dry land is small compared to that from irrigated agriculture. The GVAP in the basin for dry land in 2005–06 was \$184 per hectare, and for irrigated land, \$3295. ABARES modelling predicts that dryland expansion under a reduction of 3500 gegalitre in diversion limits will reduce the impact on GVIAP from around 15 per cent to 14 per cent. This equate to a negligible effect on GVAP.

Increases in onfarm water-use efficiency as a result of new technologies and processes for managing irrigation water will also offset some of the impacts. However, the recent decade-long drought has already driven significant efficiencies, and the easy gains for farmers are likely to have been achieved already. The Government's investment in modernising irrigation

infrastructure on a large scale both on- and off-farm will help to offset the impacts on production.

The ABARES modelling does not take account of factors that are unrelated to the basin plan that might affect irrigated agriculture. These include price fluctuations due to global commodity market competition, changes in the value of the Australian dollar, or the potential opening of domestic markets to international products, as may occur in some horticultural industries. The effects of these pressures may alter the estimates provided by the model.

Impacts on food security

While Australia faces no immediate food security threat, the Government is taking a comprehensive and strategic approach to addressing food security, domestically and globally. From Australia's point of view, addressing food security includes:

- enabling consumer choice and access to affordable food through economic policy settings to foster a productive industry
- fostering a sustainable and resilient food supply
- responding to short-term humanitarian needs that arise during emergencies.

Food security will be supported by improving agricultural productivity, particularly through research and development and its adoption, protecting the productive base by maintaining plant and animal health status, sustaining the natural environment and maintaining efforts to liberalise trade.

– Domestic food security

Australia is in the fortunate position of being a food-secure nation, with significant capacity to meet our current food needs and to continue to be a significant and reliable supplier to the world food market. In recent years we have been able to export more than half of our food production, depending on crop size. In 2009–10 Australia exported \$24.3 billion worth of food products, compared with imports in the same year of \$10.1 billion. Over the past five years this surplus has averaged \$16.6 billion in 2009–10 dollar terms.

Australia's food exports are dominated by minimally and moderately processed food, including grains, meat, dairy, wine and sugar. Meat and grains have consistently been the two largest sectors, with meat exports accounting for 26 per cent of the value of food exports in 2009–10 and grains accounting for 19 per cent.

On the other hand, food products imported into Australia are dominated by highly processed foods, including fruits and vegetables, and beverages. This is consistent with our high cost of labour supply, the distance to markets and the high value of the Australian dollar, which makes it cheaper to import some products.

New Zealand is Australia's greatest single source of food imports. In 2009–10, Australia imported around \$1.8 billion of food from New Zealand. In 2009–10, fresh fruit and vegetable imports were valued at \$96 million and processed fruit and vegetable imports were valued at \$186 million. Australia's fresh fruit and vegetable exports to New Zealand were valued at \$43 million and processed fruit and vegetable exports at \$129 million.

– Australia's contribution to global food security

Even though a high proportion of its food production is exported, Australia is still only a modest player in world food markets, being ranked the 14th largest food exporter in 2009. This accounted for 2.2 per cent of global trade in value terms. Australia is a significant exporter for food products such as bulk wheat, barley, beef, live sheep and cattle, and

alcoholic beverages, but Australian production represents less than 5 per cent of global production of these commodities.

The government advocates reform of global agricultural and food markets as essential for economic development and improving global food security in the long term, and accords highest priority to achieving this reform at the multilateral level. It is committed to removing trade barriers to allow food to move more freely, and continues to advocate good economic, agricultural and trade policies, including conclusion of the Doha Round of trade negotiations. The department contributes extensively to a whole-of-government approach to secure access to international markets for agricultural commodities and foods.

Impacts on domestic food prices

Reductions in water diversion limits considered in the guide to the proposed basin plan are likely to result in only small increases in prices of agricultural products. The reason for this is that about 60 per cent of Australian agricultural output is exported to world markets and prices for these trade-exposed products are determined on international markets. This is particularly the case for cotton, cereals and livestock products. Similarly, rice and dairy products are both imported and exported, and so prices are also determined on international markets. As cotton, rice, dairy and cereals are all trade exposed, the domestic prices for these products are not likely to be affected by the plan.

For more domestically oriented agricultural products, such as many fruits and vegetables, production is expected to decline by a relatively small amount, and price impacts are therefore also expected to be small. Producers of these relatively high-value products are likely to purchase water to maintain production, with water traded from lower to higher returning activities.

ABARES estimates that the fall in production for fruit and vegetables will be between 2 and 5 per cent in the basin. The basin accounts for 20 to 50 per cent of fruit and vegetable production in Australia (around 50 per cent for grapes and 20 per cent for vegetables). Overall, Australian production of fruit and vegetables is expected to fall by less than 3 per cent. This would translate into a relatively small price increase for consumers.

While there is substantial international trade in dairy products, unprocessed milk is not suitable for international trade. However, unprocessed milk consumption represents a small proportion of total dairy production in the basin, so the liquid milk price is unlikely to be significantly affected.

GOVERNMENT SUPPORT

Almost all management practices undertaken on farm have off-site impacts with the potential for public benefits as well as decline in natural resource condition. The Government recognises the work by farmers to continually adapt their farm systems and land and water management practices to the changing environment in an effort to improve environmental outcomes, while maintaining a profitable business.

The Government's long-term objective for Australia's landscapes is to support and maintain ecosystem services, such as clean water, biodiversity and healthy soils, while continuing to improve food and fibre productivity and long-term food security.

The Government has a range of initiatives that support irrigators and farmers more generally to achieve this objective.

Assistance for irrigators

Irrigators will be compensated for water losses under the basin plan, with the Government committing to purchase water at market rates, and only from willing sellers. Farmers can choose either to retain their water entitlements or sell them into a water market that is likely to be stronger due to increased government demand for environmental water. Irrigators who choose to sell their water are better placed to retire debt, invest in infrastructure, diversify their operations or exit irrigation.

In addition, irrigators are benefitting from large-scale government programs to upgrade water infrastructure and promote water-use efficiency under its *Water for the Future* initiative. Infrastructure investments will assist those irrigators who choose not to sell their entitlements to produce more from their water. This will in turn reduce the impacts on the GVIAP and increase irrigators' profitability.

The Government's commitments under *Water for the Future* will provide more than \$7 billion to help irrigators in the basin to meet new diversion limits, and 'bridging the gap' will provide further funding to ensure that all additional water required for the environment under the basin plan can be purchased from willing sellers.

Programs managed by the Department of Agriculture, Fisheries and Forestry

The department has a number of programs to assist primary producers, including irrigators in the basin, to better manage risk, adopt more sustainable farming practices and prepare for the challenges of climate change. It also funds programs to promote Australian primary produce in the marketplace (see Attachment A).

The department considers there will be adequate financial support for irrigator adjustment through the Government's commitments under *Water for the Future* and 'bridging the gap'.

The department had two programs running from 2007 to 2009 specifically targeting irrigators in the Murray–Darling Basin, which have now closed. The Irrigation Management Grants Program assisted eligible irrigators to implement water management strategies to address reduced water allocations and to improve on-farm practices. The program provided a one-off grant of up to \$20 000 to irrigators in the basin affected by reduced water allocations because of decisions by water regulators. During the life of the program, \$204.75 million was paid to 11 414 grant recipients. The Murray–Darling Basin Irrigation Industries Workshop Program provided \$7.5 million to five peak industry bodies, which then held information sessions to provide irrigators with agronomic and business advice for farm business survival.

Trade and market access assistance

The efforts of Australian farmers and food producers to sell their products to the world are hampered by high tariffs, farm subsidies and non-tariff barriers. These protectionist tools distort international food trade and promote inefficient food production practices. Importantly, they make it harder for Australian products to compete on the international market, which weakens our ability to help address the global food security crisis.

The Government supports agriculture in Australia by seeking access to international markets for Australian agricultural products, working both bilaterally and on a global scale through the World Trade Organization (WTO). The Government supports conclusion of the current Doha Round of trade negotiations, which will reduce agricultural tariffs by an average of 54 per cent in developed countries and 37 per cent in developing countries. Export subsidies would also be eliminated, and trade-distorting agricultural support cut by 80 per cent in Europe and 70 per cent in the United States.

National Food Plan

On 3 August 2010 the government announced that it would develop a National Food Plan encompassing the whole food chain, from the paddock to the plate. It committed to developing a plan with a broad scope, including issues such as food security, productivity and efficiency. One important role for the National Food Plan will be to recognise the wide range of work already occurring on food issues and to bring this information together.

The government established a National Food Policy Working Group to engage with the food industry across the supply chain, to help understand the industry's priorities and outlook. The group includes individuals from production, processing, logistics and retail sectors, as well as union, consumer and public health perspectives.

The government committed \$1.5 million from 2010–11 to 2013–14 to help develop the plan.

RURAL RESEARCH AND DEVELOPMENT

The agricultural research and development landscape

Rural research and development (R&D) is a key factor in driving productivity growth in the agricultural sector. It is also critically important in addressing the major climatic and economic challenges facing the sector, such as mitigating and adapting to the effects of climate change and variable water availability. An estimated \$1.6 billion a year is spent on rural R&D in Australia.

While the effect of R&D expenditure can be difficult to measure because of the long lags between investment in research and productivity gain, ABARES has found that the decline in public investment in agricultural research is likely to have contributed to the slowdown in productivity growth that occurred from the mid 1990's. Continued investment in irrigation research, development and extension will be essential in helping irrigated agriculture to maintain and increase productivity as the basin plan is rolled out.

Rural research and development corporations

A central feature of the rural R&D system is the 15 rural research and development corporations. The corporations are a partnership between the Government and industry. They are funded under a longstanding co-investment model based on statutory industry levies collected from industry and matching Government funds up to 0.5 per cent of the gross value of production.

In 2008–09 corporations spent \$470 million on rural research and development. The corporations commission research from providers such as CSIRO, state government departments of primary industries and universities.

The Australian Government's National Research Priorities and Rural Research and Development Priorities inform the RDCs' planning, and their investment contributes to the achievement of these priorities. The National Research Priorities highlight areas of particular social, economic and environmental importance to Australia, and areas where a whole-of-government focus has the potential to improve research and broader policy outcomes. The Rural Research Priorities aim to foster innovation and guide the R&D effort to manage climate change, improve productivity and support efficient use of natural resources such as water in the rural sector.

The corporations have supported activities in 2009–10 to improve water-use efficiency, sustainability and resource management priorities (see Attachment B), and have also supported the National Irrigation Program for Sustainability (see below).

The department provides funds through the corporations for research and extension to improve the economic viability and environmental performance of rural industries. For example, recent research funded through the Rural Industries Research and Development Corporation aimed to increase yields and the water-use efficiency of rice by 5 per cent by improving adoption of better farm practices in the Murray Valley and the Coleambally and Murrumbidgee irrigation areas. Another rice project investigated increasing productivity and water-use efficiency in Australia's rice industry through nitrogen management.

– National Program for Sustainable Irrigation

The National Program for Sustainable Irrigation (NPSI) is helping Australia to find ways to save and limit the use of water in a sustainable and productive way. NPSI is currently focused on the four key themes of water scarcity, sustainable irrigation, practice and leadership.

NPSI is a collaboration of 13 government, irrigation authority and primary producer bodies, and is one of the longest-running national cross-commodity research and development collaborations. Partners include RDCs such as the Cotton Research and Development Corporation, the Grains Research and Development Corporation, the Sugar Research and Development Corporation, Horticulture Australia Limited, and other government and primary producer bodies, including the Department of Sustainability, Environment, Water, Population and Communities, the Goulburn–Murray Rural Water Corporation, Lower Murray Water and the WA Department of Water.

The partners share many common research interests, including investigation of soil factors, water scarcity, irrigation system modernisation, biosecurity in irrigated landscapes, economics and practical tools that are applicable to all irrigators. Working together enables the sharing of knowledge and practical exchange across all agriculture commodities and horticultural industries to improve the efficiency of irrigation systems.

NPSI has been responsible for improved irrigation scheduling and application techniques, as well as other measures that have resulted in significant water savings, while improving productivity. Many irrigators state that techniques from NPSI have enabled them to reduce their water use by up to 40 per cent without loss of production.

Since 2002 NPSI has attracted \$18 million in investment. With continued funding from many RDCs, it has been extended until 2011. Expenditure in 2009–10 was \$2 053 703.

ABARES

ABARES is a bureau within the department that provides independent research, analysis and advice to assist decision-makers with current and future policy challenges affecting Australia's primary industries.

The bureau has capabilities in multidisciplinary research and analysis in the fields of economics, science and social science covering the agriculture, fisheries, forestry, food, resources and energy sectors. ABARES was formed by the merger of the Australian Bureau of Agricultural and Resource Economics and the Bureau of Rural Sciences in 2010.

Current research through ABARES is investigating drivers for change in agricultural practices and native vegetation management, and socio-economic information needs to assist policy and program development in natural resource management, including sustainable agriculture. The research and other information will help design policies and programs for sustainable farm practices.

ABARES has carried out important work under contract to analyse the social and economic impacts of the basin plan on a regional, basin and national scale. The work is available on the Murray–Darling Basin Authority website.

CSIRO

CSIRO is Australia's national science agency. It carries out scientific research, including in the areas of energy, the environment, information technology, health, mining, manufacturing, agriculture and natural resources. CSIRO's revenue was nearly \$1.2 billion in 2009–10, with the Government contributing approximately 60 per cent of this funding.

CSIRO has established 10 National Research Flagships, covering a range of key research issues, including Water for a Healthy Country, Sustainable Agriculture, Climate Adaptation and Food Futures. CSIRO's 13 divisions include Plant Industry, Livestock Industries, Land and Water, and Ecosystem Sciences.

CSIRO has also undertaken important work assessing regional water resources under its sustainable yields projects. The work is contributing to government policies and projects at

state level and nationally. CSIRO has assessed water availability in the Murray–Darling Basin, northern Australia, Tasmania and south-west Western Australia. Aside from the Murray–Darling Basin report, which provided input to the Guide to the Murray–Darling Basin Plan, the CSIRO sustainable yields findings are broadly as follows:

– *Northern Australia Sustainable Yields Project*

This report found limited opportunity for additional water capture and storage in northern Australia. It identified potential for further agricultural development, by intensifying beef production through using groundwater to irrigate fodder. The work was one input into the Northern Australia Land and Water Taskforce report.

The Northern Australia Land and Water Taskforce used this research and other information to identify the potential to develop an additional 20 000 to 40 000 hectares of irrigated land, using groundwater. Existing developed irrigation land in the north, including the Ord Irrigation Area, is around 20 000 hectares. By comparison, there were 1.65 million hectares of irrigated crops and pasture in the Murray–Darling Basin in 2005–06.

The taskforce’s findings confirm the need to focus on improving the sustainability and efficiency of existing irrigation areas, rather than seeking to translocate production to the north.

– *Tasmanian Sustainable Yields Project*

This report found there are a number of opportunities for future irrigation development in Tasmania.

In 2007–08, there were 91 500 hectares of irrigated area in Tasmania. The Tasmanian Government estimates that, by 2015, the state will need another 250 000 megalitres of irrigation water a year to support projected agricultural growth. Tasmania has identified a \$400-million program to develop irrigation infrastructure, and hopes the program will be funded through contributions from the Australian and Tasmanian governments and user contributions. The program is expected to provide up to 240 000 megalitres of water a year, put an extra 100 000 hectares of land under irrigation and, potentially, deliver up to \$200 million in produce at the farm gate. The Australian Government has committed up to \$140 million to modernise irrigation schemes in Tasmania under the *Water for the Future* initiative.

– *The South-West Western Australia Sustainable Yields Project*

This report identified groundwater resources that could support some future agricultural development in south-west Western Australia.

Cooperative research centres

A cooperative research centre is an incorporated or unincorporated organisation, formed through collaborative partnerships between publicly funded researchers and end-users. The centres must comprise at least one Australian end-user, either from the private, public or community sector, and one Australian higher education institution.

The Government has committed more than \$3.3 billion to funding the centres, and their participants have committed another \$10.8 billion in cash and in-kind contributions. There are currently 42 centres, including 11 in the fields of agriculture, forestry and fishing, largely focussed around commodities.

OTHER ISSUES

Foreign investment

Investment in agriculture, whether foreign or domestic, helps to stimulate jobs on farms and in support services such as harvesting, transport, and processing. These jobs have flow-on effects for regional towns and communities through local purchases of inputs, machinery and the general necessities of life. New investment also helps Australian farms to be more efficient, competitive and profitable in world markets.

An ABARES survey of broadacre and dairy farms, which account for 70 per cent of Australian farms, indicates that 99 per cent of the farms are family operated. Only around 0.1 per cent of the remaining 1 per cent of farms that are not family operated are foreign-owned. Investment in the agriculture, fisheries and forestry sector is a small part of overall foreign investment in Australia, representing less than 2 per cent of investment proposals approved by the Foreign Investment Review Board in 2008–09.

Australia's foreign investment policy allows the government to review significant foreign investment proposals on a case-by-case basis. The government can block proposals that it finds contrary to the national interest or impose conditions on the investment to address concerns of national interest. All foreign governments, their agencies or state-owned enterprises must notify the Foreign Investment Review Board and receive an approval before making a direct investment in Australia, irrespective of the value of the investment.

However, the Government recognises there are concerns about the sale of rural land and agricultural businesses to foreign investors, and is taking action to strengthen the transparency of foreign ownership of rural land and agricultural food production.

Senator the Hon. Joe Ludwig MP, the Minister for Agriculture, Fisheries and Forestry, has asked the Rural Industries Research and Development Corporation in collaboration with ABARES to report on the extent of foreign ownership of Australian agricultural land and the factors driving foreign investment in Australia.

In addition, the Assistant Treasurer, the Hon. Bill Shorten MP, has asked the ABS to address questions about rural land and water ownership to provide a better statistical picture of the foreign investment landscape.

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Department of Agriculture, Fisheries and Forestry Programs

- **Caring for Our Country—Landcare** is delivered jointly with the Department of Sustainability, Environment, Water, Populations and Communities. It aims to achieve an environment that is healthy, better protected, well-managed and resilient, and provides essential ecosystem services in a changing climate. The program is delivering more than \$2 billion over five years to encourage the adoption of more sustainable practices in the cropping, grazing, dairy and horticulture industries in the Murray–Darling Basin and other important Australian agricultural regions.

Through Caring for our Country and ongoing research, the Australian Government is working closely with farmers, land managers, industry groups, community groups, other jurisdictions, regional bodies and non-government organisations throughout the basin to increase the uptake of best-management practices to achieve its environmental aims, including healthy rivers and soil, pollination and clean air in a changing climate.

- **Exceptional Circumstances assistance for declared areas:**

Exceptional Circumstances (EC) assistance is the Government’s main mechanism for assisting eligible farmers and small business operators who are experiencing a severe downturn in income due to a rare and severe climatic or other event such as drought.

Such events are rare and severe events that are outside those that a farmer could normally be expected to manage using responsible farm-management strategies. Specifically, they are events that occur, on average, once every 20 to 25 years and have a prolonged effect on income (greater than 12 months).

To be classified as an exceptional circumstance, an event:

- must be rare, i.e. not have occurred more than once, on average, in every 20 to 25 years
- must result in a rare and severe downturn in farm income over a prolonged period (e.g. more than 12 months)
- must be a discrete event that is not part of long-term structural adjustment processes or normal fluctuations in commodity prices.

The Government is providing income support, interest rate subsidies and free counselling to support drought-affected farmers, rural communities and agriculture-dependent small businesses. The measures recognise the impact of severe drought on rural and regional communities, the environment and the broader Australian economy.

Exceptional Circumstances assistance may include the following:

- **EC relief payment**, which provides income support for eligible farmers and small businesses who are having difficulty meeting basic living expenses because of an exceptional circumstances event
- **EC interest rate subsidy**, which provides subsidies on interest liabilities to farm enterprises that are viable in the long term but are in financial difficulty due to an EC event; subsidies can be up to \$100 000 per 12 month period and \$500,000 over five years.

- **EC exit grants**, which provide grants of up to \$150 000 to eligible farmers (in EC declared areas) who have considered their options and decided to leave farming
- **Professional Advice and Planning Grant**, which provides grants of up to \$5500 for farmers in EC declared areas to access professional advice to assist with drought management and recovery.
- **Rural Financial Counselling Service**, which provides grants to organisations to provide free rural financial counseling services to eligible primary producers.

The Government is conducting a pilot of drought reform measures in part of Western Australia in partnership with the Western Australian Government. In response to the national review of drought policy the pilot is testing measures designed to help farmers better manage risks and prepare for future challenges. It is also trialling services for farming families and rural communities that provide more effective social support.

The pilot will be in place from 1 July 2010 until 30 June 2011. Payments made under one measure—Building Farm Businesses— will continue until 30 June 2014. The pilot will be reviewed in 2011 to inform ongoing work on the national drought policy reform.

- **Australia's Farming Future** is the Government's major climate change initiative for primary industries. It is providing over \$130 million over four years, from 2008, to help primary producers adapt and respond to climate change. The program includes the following elements:
 - **Climate Change Research Program**, worth \$46.2 million, funds research, development and demonstration. Its aim is to support productive solutions to managing greenhouse gas emissions, better soil management, adaptation of agriculture to a changing climate and research on farm and by food processors by demonstrating practical options and driving the take-up rate of new technologies and systems. Research under this program will help government and industry to develop policies on land-use, and will contribute to establishing Kyoto-compliant and voluntary carbon markets, and to Australia's role in the Global Research Alliance on Agricultural Greenhouse Gases.
 - **FarmReady**, with announced funding of \$26.5 million, provides training and opportunities for industry, farming groups and natural resource management groups to develop skills and strategies to help them deal with the impacts of climate change
 - **Community Networks and Capacity Building** supports activities that will increase the leadership and representative capacity of target groups including women, youth, Indigenous Australians and people from culturally and linguistically diverse backgrounds, and build rural, regional and remote community resilience to a changing climate.
 - **Climate Change Adjustment Program** provides individually tailored professional advice and adjustment training grants of up to \$5500 to help farm businesses adjust to climate change and develop action plans to improve their financial circumstances. It also provides re-establishment grants of up to \$150 000 to eligible farmers who have considered their options and decided to leave farming, additional funding for rural financial counsellors, and Transitional Income Support to assist farm families in financial difficulty to manage the impacts of climate change.
 - **Irrigation Management Grants Program** (now closed) assisted eligible irrigators to implement water management strategies to address reduced water allocations and improve on-farm practices. It provided a one-off grant of up to \$20 000 to irrigators in the Murray—Darling Basin whose water allocations were reduced as a result of

decisions by water regulators. The program paid \$204.75 million to 11 414 grant recipients.

- **The Murray–Darling Basin Irrigation Industries Workshop Program** (now closed) provided \$7.5 million to five peak industry bodies to run information sessions to provide irrigators with agronomic and business advice for farm-business survival.
- **Regional Food Producers Innovation and Productivity Program** funds projects that encourage innovative production, processing and value-adding in regional food and seafood industries.
- **Promoting Australian Produce** (now closed) aimed to assist Australian agricultural and seafood industries develop their capacity to promote and market their produce more effectively to both domestic and export markets. Grants of between \$50 000 and \$750 000 were available to eligible agricultural industry organisation.
- **Promoting Australian Produce (Major Events)** assists with staging national events to encourage information exchange and promote Australian agricultural products and services.

Rural research and development corporations relevant to the Basin
Investments in water use efficiency, sustainability and resource management priorities

Rural Industries Research and Development Corporation

The corporation's strategic plan for 2007–2012 focuses on addressing national rural issues and on investments to increase profitability, resilience and sustainability of established rural industries of interest to the corporation. A key research priority is an environmentally sustainable Australia.

The corporation's investments in 2009–10 supported research and development that addresses natural resource management and sustainability issues of national importance, including investments in environmental farm management, water resource issues, and the impact of climate change and variability. Water usage and access continues to be a key research issue for the corporation.

The corporation has continued to support projects in this area such as the New Plant Products Program, which had a number of projects to find alternative, low water-use crops. The corporation supported by a number of projects such as development of cold-tolerant, water-efficient, high-yielding rice varieties.

Grains Research and Development Corporation

The corporation's focus is to achieve a profitable and environmentally sustainable grains industry through innovation. Key environmental issues for the grain industry are adapting to climate change, managing greenhouse gas emissions, and managing soil erosion, soil acidification, nutrient loss, salinity and water-use efficiency.

The corporation has invested approximately \$3.9 million in a number of projects to increase farm water use efficiency in various regions. Projects planned for 2010–2011 include:

- breeding to develop wheat varieties that have substantially higher yields and are better adapted to Australia's harsh environments than existing commercial varieties. Two new projects at the Australian National University will focus on modifying the sequence and expression of target genes to improve the photosynthetic and water use capacities of wheat
- development of pulses that adapt better to water-limited environments
- crop-breeding for improved water-use efficiency that involves identifying genes that enable crops to tolerate heat, frost and drought, and to increase the rate of adaptation of crops to climate change.

Cotton Research and Development Corporation

The corporation's primary objective is to help the Australian cotton industry to achieve a more sustainable, profitable and competitive cotton industry in response to new challenges such as climate change, water availability and competitiveness with other crops. R&D investments within farming systems have successfully targeted ongoing improvements in efficiency and responsibility in using water-based, cutting edge dryland techniques to manage scarce water resources.

As a result of innovation in farming systems, the Australian cotton industry is now regarded as the most environmentally friendly cotton production system, with the lowest water use, carbon footprint and chemical use of any cotton-producing region, and a leader in energy and water-saving technology. Dryland cotton production is now an important part of the cotton industry, with prospects of greater dryland production in the 2010–11 season.

Grape and Wine Research and Development Corporation

The corporation's five-year R&D plan for 2007–12, *Sustainability of industry environments and communities*, includes a program that focuses on the industry's response to the challenges of climate change and the management practices needed to adapt to changed environments. Projects either in development, underway or completed in 2009–10 include:

- developing varieties, clones and rootstocks with the potential to adapt well to future climates
- an improved understanding of the effects of heat and water stress on vines
- the modelling of climate change across the nation, as well as preparing for regional changes
- improving how recycled water is handled in wineries and used in vineyards
- managing soil and water to target quality and reduce environmental impact
- the Soil and Water Initiative Management Project, which is now used in information modules for grape growers.

Dairy Australia Limited

The direction of Dairy Australia's 2010–14 strategic plan is to innovate and adopt new dairy manufacturing technologies. The industry has invested in research to improve resource management through the following projects:

- 'Dairying for tomorrow' program—Dairy Australia has initiated partnerships with 29 regional natural resource management bodies. Thirty per cent of Australia's dairy farmers have been involved in these programs, which aim to achieve efficient use of natural resources, protect the environment and help achieve recognition for the dairy industry's environmental care.
- investigating the feasibility of subsurface drip irrigation under pasture, which was found to have the potential to increase water-use efficiency by 25 per cent
- reducing the use of water and energy in dairy processing plants by using the pinch analysis model. The aim is to apply this methodology in Australian industry for a possible annual reduction of about \$10 million in electricity and gas costs, together with a reduction in carbon emissions (through Dairy Innovation Australia Limited).

Forest and Wood Products Australia Limited

The company's 2009–13 strategic plan aims to improve the forest industry's competitiveness, assist in its climate change response, enhance investment, increase the use of forests, wood products and services, and ensure their sustainability.

Its priorities include the development of systems and technologies to optimise water productivity and efficiency and access to resources. The industry has invested in:

- developing methods to accurately assess the water allocation impacts of plantations
- predicting *Eucalyptus nitens* plantation water use, using growth parameters

- Solid Wood Innovation—a joint initiative between the company, the New Zealand Foundation for New Zealand growers and a major North American forestry company, which aims to generate further profitability for the industry by developing sawmill processes that result in better-performing structural products manufactured with higher efficiency and using less energy and water

Horticulture Australia Limited

The company invests R&D funds collected from 38 different members of the horticulture sector. The majority of its research is specific to the industry from which the levies are collected, with a small amount done on sector-wide issues. The Across Industry and multi-industry investment programs are an important part of the company's role and help horticultural industries to work together for mutual benefit. The Across Industry program focused on market access, pesticide regulation, a horticultural water initiative, scoping studies in food security and climate change research.