Submission No. 59

Department of Agriculture, Fisheries and Forestry

Submission to the House of Representatives Standing Committee on Agriculture, Resources, Fisheries and Forestry inquiry into the Australian forestry industry

April 2011

Contents

Executive Summary

This submission addresses the terms of reference of the House of Representatives Standing Committee on Agriculture, Resources, Fisheries and Forestry Inquiry into the Australian Forestry Industry. The submission also provides background to the policy framework and history of forest management from successive governments.

Australia has a long history in forest management and use since European settlement dating back to the early 1800's in native forests and early 1900's in plantations and Australia's forest industry has developed to be a legitimate, useful and important industry. The use of public and private forest resource contributes economically and socially to Australia's communities, and is appropriately regulated in terms of environmental management and responsibilities.

Successive Australian, State and Territory Governments have sought to implement the vision of ecologically sustainable management for Australia's forests and plantations particularly since the National Forest Policy Statement was finalised in 1992. This includes establishment of a comprehensive reserve system and continued support of a range of innovative and competitive sustainable forest-based industries that use forests and their resources in an efficient, environmentally responsible manner and are responsive to community and market signals.

Australia has a comprehensive framework designed to achieve this vision including:

- National Forest Policy Statement – promotes the conservation and sustainable management of forests;
- Regional Forest Agreements (RFAs) – 20 year agreements underpinning regional approaches to balance conservation and production from native forests;
- Australia's Sustainable Forest Management (SFM) Framework of Criteria and Indicators 2008 – internationally recognised framework for sustainable forest management applied to Australia's forests;
- State and territory frameworks – jurisdictional legislation and codes of practice applied to ensure environmentally responsible forestry practices; and
- Forest certification – independent accredited third party forest certification applies to most of Australia's production forests.

In developing and implementing the National Forest Policy Statement, governments have been mindful of the important conservation values of Australia's forests, and of the contribution that forest-based activities make to the national economy and rural and regional communities. This is reflected in the RFAs which are a key mechanism developed to achieve several outcomes of the National Forest Policy Statement.

Further, new strategies have been developed and implemented that build upon and complement the National Forest Policy Statement, including Plantations for Australia: the 2020 Vision; the National Indigenous Forestry Strategy; and the Farm Forestry National Action Statement.

Australia's SFM credentials remain valid, and a process of continuous improvement to the management framework will assist in meeting the environmental, social and economic contributions of forestry to society.

Australia's forest estate

Australia has 149 million hectares of forest (Figure 1). Of this, 147 million hectares is native forest, dominated by eucalypt (79%) and acacia (7%) forest types and 2.02 million hectares is plantations (Table 1). The areas in each main tenure category for each state and territory are shown in Table 2.

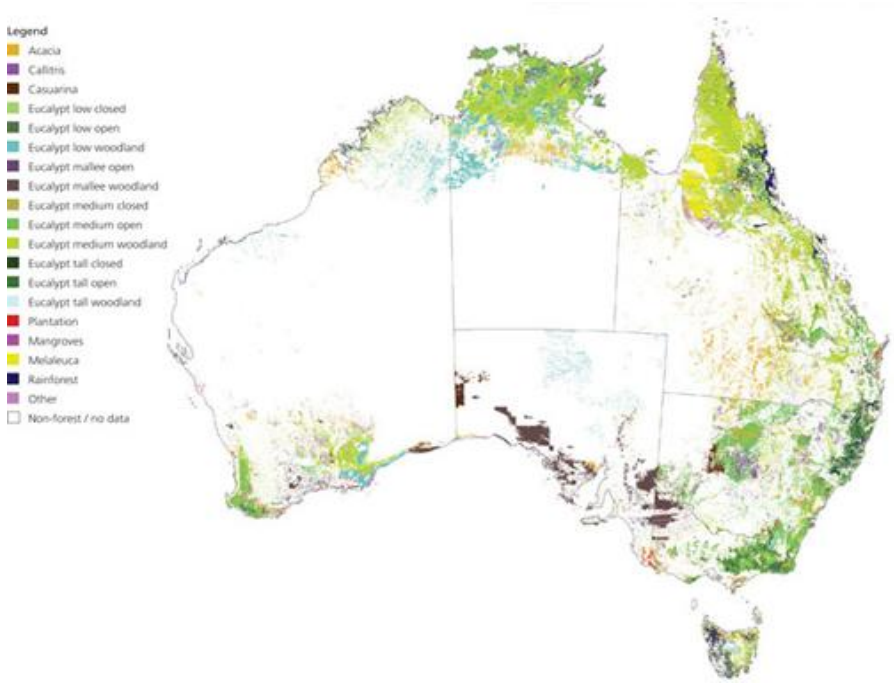

Figure 1: Australia's forest cover

Table 1: Forest as a percentage of land area, by jurisdiction

	Native forest area[a] ('000 ha)	Plantation area[b] ('000 ha)	Total land area ('000 ha)	Forest as % of jurisdiction	% of Australia's forest
Australian Capital Territory	123	8	243	54	<1
New South Wales	26,208	383	80,064	33	18
Northern Territory	31,010	32	134,913	23	21
Queensland	52,582	256	173,065	31	35
South Australia	8,855	183	98,348	9	6
Tasmania	3,116	309	6,840	50	2
Victoria	7,838	424	22,742	36	5
Western Australia	17,664	425	252,988	7	12
Australia (Total)	147,397	2,020	769,202	19	100

Sources: a) MIG (2008), b) Gavran and Parsons (2010).
Note: Totals might not tally due to rounding.

Table 2: Area of forest, by tenure and jurisdiction ('000 hectares)

	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Aust.	Tenure category as % of total native forest area
Leasehold forest	8	9,891	13,920	34,304	3,083	0	35	3,891	**65,132**	44
Multiple-use public forest	0	1,980	0	1,991	0	1,026	3,163	1,248	**9,410**	6
Nature conservation reserve	108	5,148	16	4,576	4,029	1,121	3,505	3,868	**22,371**	15
Other Crown land	7	943	674	1,598	277	85	109	7,169	**10,862**	7
Private land (including Indigenous)	0	8,076	16,317	8,908	1,399	885	1,025	1,489	**38,099**	26
Unresolved tenure	0	170	83	1,204	67	0	0	0	**1,524**	1
Total native forest	**123**	**26,208**	**31,010**	**52,581**	**8,855**	**3,116**	**7,837**	**17,665**	**147,397**	100

Note: Totals may not tally due to rounding.

The role of government

Constitutional responsibility for forest management rests with state and territory governments. The Australian Government coordinates a national approach to sustainable forest management. Successive Australian, state and territory governments have shared an objective of sustainable management of forests to integrate environmental, commercial and community values and uses. The sustainable management framework established under the National Forest Policy Statement provides for the maintenance and recognition of the monetary and non-monetary values of Australia's forests. The framework helps protect the environment and biodiversity values, enhance recreational and tourism opportunities, and form a sustainable resource that provides jobs, supports important Australian industries and underpins many rural communities.

Governments have implemented the National Forest Policy Statement through a range of policy coordination, regulatory, funding program and communication mechanisms. Regulation established to protect public interests in forests, includes the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* and the *Export Control Act 1982*. To provide certainty to industry the application of the requirements of these Acts are met through RFAs and codes of practice.

There has been considerable investment by the Australian Government since 1992 to support the National Forest Policy Statement and associated policies to assist in making the framework for sustainable forest management remain valid. This includes the comprehensive regional assessment process, forest industry structural adjustment programs (including the current process in Tasmania),

forest industries development funds (2007 election commitment), and significant investment into research and development for the industry through bodies such as the CSIRO, Cooperative Research Centres, and Forest and Wood Products Australia (and it predecessor, the Forest and Wood Products Research and Development Corporations).

The Department of Agriculture, Fisheries and Forestry objective in providing advice to government is to assist our forestry industry to grow, improve and capitalise on new opportunities while protecting the environment. While forests continue to provide sustainably produced wood products, they will also continue to provide other benefits such as carbon sequestration, salinity control and biodiversity conservation and any consideration of the management framework for forests needs to consider all of these values and benefits.

Australia's forest industry should be competitive, sustainable, self-reliant and responsive to market pressures. A stable operating environment that provides certainty but allows free market mechanisms to occur will help achieve this. Through current research and development arrangements the government supports knowledge generation and technical innovation to assist industry to be competitive and sustainable.

The government is assisting farmers to understand the opportunities and multiple benefits from farm forestry through the Sustainable Farm Practices area within Caring for our Country. The Carbon Farming Initiative and Climate Change Adaptation program may also provide future opportunities for farm forestry.

History of forest management in Australia

The role of government in the management of Australia's forests can be traced back to 1803 when it was realised that clearing forests on the banks of the Hawkesbury River in New South Wales (NSW) was causing erosion and flood damage (Dargavel 2005) . In the early 1870s it was realised that forested areas were being cleared at a rapid rate so the government set aside the first areas of Crown Land to serve as timber reserves. By 1884 the area reserved for timber production in the colony of NSW was just over 2 million hectares. A Royal Commission on forests and timber resources was held in Victoria in 1897 that concluded that successive governments had been warned about the need to reserve and protect the remaining forests and to introduce effective management (DSE 2010). There have been numerous other inquiries, reviews and research into forestry in Australia since the 1897 Royal Commission in Victoria, dealing with the various social, environmental and economic components of the industry. Appendix A provides a list of a number of the key inquiries and reviews into the forestry sector that have influenced the current status of this sector.

After federation in 1901, each state eventually passed a *Forest Act* (Dargavel 2005). Forest services were established in each state to be the custodians of publicly-owned forested land. The forest services became responsible for forest management activities on public lands, particularly in regard to the production of timber for use by people of the State.

The goal of early forest services in Australia was to bring forests under systematic and planned management according to the European principles of sustained yield (Dargavel 2005). Data collection and interpretation of reliable information about the extent of the forests, the quantity of timber and the growth rates of different species was another critical role that the state forestry departments realised would be required for successful planned management.

A further responsibility for state forest services was the 'opening up' of the 'bush' with roads for logging and trails for fire protection. This was a vital task that not only supported the growth of the timber industry and other industries such as bee-keeping, but also provided some protection from bushfire to towns and suburban areas that adjoined forests.

The National Forest Policy Statement

The National Forest Policy Statement was signed in December 1992 by the Prime Minister and all mainland Premiers and Chief Ministers, and in April 1995 by the Tasmanian Premier. The National Forest Policy Statement was agreed by the Australian, State and Territory governments to ensure the ecologically sustainable development of wood production for various wood-processing industries in conjunction with the identification and retention of nature conservation reserves and wilderness areas. It comprised eleven broad national goals and a range of policy measures aimed at increasing the competitiveness of forest industries and reducing conflict over the use of Australia's forests.

The National Forest Policy Statement represents a significant milestone in the management of Australia's forests. The National Forest Policy Statement embodied many developments in forests, both nationally and globally, including the Resource Assessment Commission's Forest and Timber Inquiry (1992), a comprehensive, independent study on forests in Australia. This was accompanied by strategic initiatives, including the National Strategy for Ecologically Sustainable Development (1992), the Inter-Governmental Agreement on the Environment (1992), the *Endangered Species Protection Act 1992*, the National Greenhouse Response Strategy (1992); and the United Nations Conference on Environment and Development, also known as the Earth Summit, which was held in Rio de Janeiro, Brazil, in June 1992.

The eleven goals of the National Forest Policy Statement are:

1. Conservation: to maintain an extensive and permanent native forest estate and to manage it in an ecologically sustainable manner for the full range of forest values.

2. Wood production and industry development: to develop internationally competitive forest based industries that maximise value-adding opportunities within Australia.

3. Integrated and co-ordinated decision-making and management: to streamline land-use decisions and improve State – Commonwealth interaction.

4. Private native forests: to encourage the retention and better management of private native forests, both for resource and conservation reasons.

5. Plantations: to expand commercial plantation development on cleared private land, both to provide additional timber resources and to help address land degradation problems on farmland.

6. Water supply and catchment management: to ensure the protection of water catchment values.

7. Tourism and other economic and social opportunities: to give greater recognition to the value of forests for tourism and to ensure that this use does not lead to a decline in these values.

8. Employment, workforce education and training: to expand employment opportunities and the skill base of people working in forest management and forest-based industries.

9. Public awareness, education and involvement: to foster community understanding of sustainable forest management and their participation in decision-making.

10. Research and development: to increase Australia's forest research effort and to ensure that it is well-coordinated and directed to appropriate goals.

11. International responsibilities: to promote nature conservation and sustainable use of forests outside Australia and to ensure that Australia fulfils its obligations under international agreements.

Source: National Forest Policy Statement (1992)

During the drafting of the National Forest Policy Statement in the early 1990s, RFAs were conceptualised as a means to establish a framework for the balanced management and use of native forests in key regions of Australia.

Regional Forest Agreements

Successive governments have recognised and valued the ecological, social and economic aspects of our native forests and have supported a balanced and sustainable approach to their management. In major native forest areas in NSW, Victoria, Western Australia and Tasmania this is achieved through the RFAs between the Australian Government and these states.

The RFA policy was developed as the mechanism to achieve several key goals of the National Forest Policy Statement. The RFAs were negotiated from 1996 to 2001 following a Comprehensive Regional Assessment (CRA) process for each of the ten regions – the largest consultation and scientific assessment undertaken for Australian native forests. The RFAs have three key objectives:

1. to protect environmental values and a world class system of national parks and other reserves;
2. to manage all native forests in an ecologically sustainable way; and
3. to encourage job creation and growth in forest based industries, including wood products, tourism and minerals.

The RFA process was initiated with scoping agreements to identify key government obligations, regional objectives and interests, and broad forest uses. Criteria for a Comprehensive, Representative and Adequate (CAR) reserve system were nationally agreed. This was followed by ground breaking scientific CRAs of forest values and uses. Wide stakeholder consultation was undertaken throughout the process.

These stages culminated with the Australian Government progressively negotiating a world class framework for the conservation and sustainable use of Australia's native forests and signing ten 20-year RFAs with four State Governments between 1997 and 2001. NSW established three RFAs, Victoria established five, and one each was established for Western Australia and Tasmania. The locations of the ten RFAs are shown in Figure 2 below.

Figure 2. Map of Regional Forest Agreements

The RFAs were given legislative status through the *Regional Forest Agreement Act 2002*, which defines a RFA as an agreement that satisfies all the following conditions:

(a) the agreement was entered into having regard to assessments of the following matters that are relevant to the region or regions:
  (i) environmental values, including old growth, wilderness, endangered species, national estate values and world heritage values;
  (ii) indigenous heritage values;
  (iii) economic values of forested areas and forest industries;
  (iv) social values (including community needs);
  (v) principles of ecologically sustainable management;

(b) the agreement provides for a comprehensive, adequate and representative reserve system;

(c) the agreement provides for the ecologically sustainable management and use of forested areas in the region or regions;

(d) the agreement is expressed to be for the purpose of providing long-term stability of forests and forest industries; and

(e) the agreement is expressed to be a Regional Forest Agreement.

Through the legislation, forestry operations in an RFA region that are undertaken in accordance with an RFA are precluded from controls under the *Export Control Act 1982,* and through section 38 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)*,* they are also precluded from Part 3 of the EPBC Act, concerning environmental impact assessment.

All RFAs have five-yearly review processes as part of the agreements. In undertaking a RFA review, an independent reviewer assesses the Australian and State Governments' (the parties) implementation of the milestones, obligations and commitments as outlined in the RFAs and provides information against agreed state sustainability indicators.

In Tasmania the first and second five-year reviews have been completed with reviewers' reports tabled in Parliament. A whole-of-government response to the second five-year reviewer's recommendations was tabled in Parliament in January 2010. The next review in Tasmania is due in 2012.

In Victoria a combined first and second five-yearly review was completed in 2009 with the independent reviewers' report tabled in Parliament in September 2010. For the purposes of a combined review, all five RFAs were combined for reporting purposes. A whole-of-government response is currently under development. The third five-yearly review is due in 2014.

In NSW the first five-yearly review was undertaken in 2009. The independent reviewer's report was tabled in Parliament in March 2010. For the purposes of a combined review, the three RFAs were combined for reporting purposes. A whole-of-government response is currently under development. The second five-yearly review is due in 2011.

Western Australia is currently undertaking a combined first and second five yearly review which will be conducted during 2011.

All reports for the Tasmanian, NSW and Victorian five-yearly reviews are available on the department's website (http://www.daff.gov.au/rfa/publications/annual-reports) as well as on state government websites.

As RFAs approach their 15-year marks between 2012 and 2015, both the Australian and state governments will be considering the approach to extensions of the RFAs, and will take into account the independent reviewers' reports on the implementation of the RFAs in all states, the parties' response to the recommendations made in the Independent Reviewer's Reports, the outcomes from both the 2009 Senate Inquiry, the 2009 Hawke Review of the EPBC Act and any representations from state governments.

The 2009 Hawke Review of the EPBC Act identified that:

> *"RFAs have provided considerable certainty for forest industries through reduced Commonwealth regulation and the establishment of long-term frameworks for forest management. As well, they have increased reserves and conservation outcomes. RFAs have reduced community conflict over native forest harvesting but have been implemented in a way that has not realised the envisaged benefits in transparency and public accountability".*

The 2009 Senate Inquiry into the operation of the EPBC Act as well as the Hawke Review made a range of recommendations with regard to improving the RFAs. These included increased transparency, improved review processes, improved sustainability outcomes and reporting, and better handling of forest management complaints and reporting on forest compliance monitoring.

Wood and Paper Industry Strategy

The Wood and Paper Industry Strategy (WAPIS) was a four-year strategy from 1995 to 1999 to further develop the wood and paper industry while protecting forests for future generations (Cook and Beddell 1995). The WAPIS aimed to create a stable policy environment in which the industry could plan and invest with minimum risk and maximum confidence. It was developed following extensive public comment, and consultations with the industry, conservation groups, community organisations and unions. A series of research reports funded under WAPIS are available at http://fwpa.com.au/wapis.

Plantations

The Australian government has a long history of involvement in the plantation sector of the forest industry. Max Jacobs, Director-General of the Forestry and Timber Bureau, argued in 1964 that Australia should become self-sufficient in wood. The Australian Government supported the States in

strategies to establish more plantations to cover the expected shortages, and find pulpwood markets for the otherwise unsaleable trees so that native forests could be regenerated as future tree crops (Dargavel, 2005). This was facilitated through the *Softwood Forestry Agreements Act 1967* and subsequent acts (1972, 1976, and 1978), and self-sufficiency became implicitly, if not explicitly, a 'national' policy (Carron, 1990).

From the 1960s to the 1980s the rate of plantation establishment increased to an average of around 25,000 hectares per year. Figure 3 shows the historic pattern of establishment and investment in plantation forests in Australia. Over 90% of the plantations established in this period are exotic pines managed on long (30 – 35 years) production periods (rotations) primarily for sawlog production (Parsons, Schirmer, Gavran, & Burns, 2005).

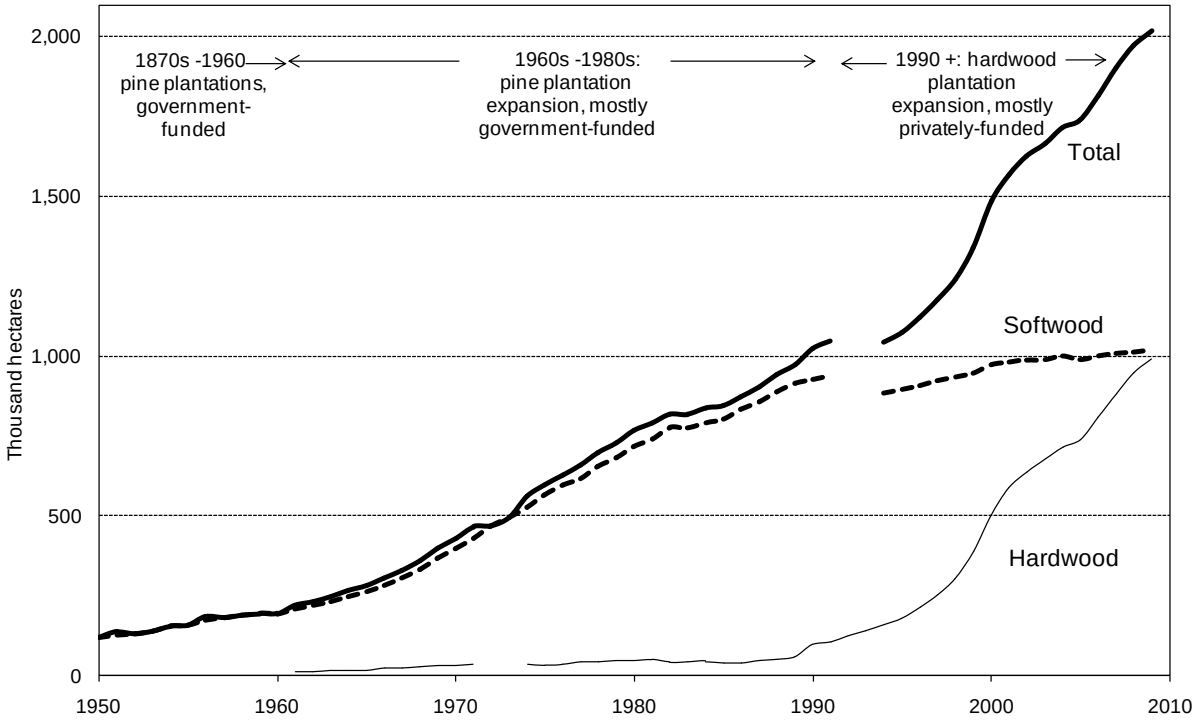

Figure 3. Phases of plantation development in Australia since 1950

From the 1990s the role of the Australian Government in plantation policy has largely been through encouraging private investment in the sector. This policy approach followed the National Forest Policy Statement, RFAs and Plantations for Australia: the 2020 Vision – all of which remain current Australian Government forest policy.

Opportunities for and constraints upon production

Australians consume around 22 million cubic metres (in log volume equivalent terms) of wood products on average each year. Most of the logs from which those products are made are grown in Australia. The volume of logs harvested has increased by about 35% in the past decade while consumption of wood products has increased by 21%.

It is important that a suitable area of public native forest is available for harvesting of wood products which range from sawlogs and veneer logs, that can not be sourced from our current plantation resource, to pulp logs for paper production. This activity supports employment in regional and rural communities, diversifies rural economies, increases regional wealth and provides wood products for a variety of uses including appearance grade products for flooring, decking, joinery, and furniture as well as products used in engineering and architectural applications.

There are economic, social and environmental constraints on production from both native forests and plantations. Economically, the strong Australian dollar has had a significant impact on exports and a flow on effect to industry, and the combination of the 2008 global financial crisis and the collapse of a number of forestry companies during 2009 has restricted private investment in forestry. More generally, the long timeframe involved in forest management compared to other land uses in terms of generating a return makes it a less attractive investment option for many companies and land owners.

Socially there is continued pressure from environmental non government organisations around native forest harvesting, and opposition to plantations from some environmental, community and farming groups.

Environmentally, the forest industry – both native and plantations – is heavily regulated and monitored, both mandatory and voluntarily, compared to other land uses. This contributes to operational costs and public scrutiny. The influence and impact of water policy and allocation mechanisms is also a potential significant constraint on production forestry, particularly plantations.

There are also a number of opportunities for the forest industry. Forests have been shown to play an important role in the mitigation of climate change through carbon sequestration. There are also a number of other environmental benefits from forests which are maintained through SFM, including biodiversity and habitat functions, water quality, soil stability and structure.

There is a large hardwood plantation resource that has resulted from the forestry managed investment scheme (MIS) sector. Opportunities for using this resource include domestic production of pulp and paper products, engineered wood products and sawn wood products. There are also export options for this resource to meet China and south-east Asia's increasing demand for woodchips.

Opportunities for diversification, value adding and product innovation

The Australian Government has a long history of supporting the forestry industry to examine product innovation and value adding through business grants programs, information exchange and research and development. Since the Forest Industry Structural Adjustment Package (FISAP) in NSW in 1995, the Australian Government has committed over $430 million to forest assistance packages in Western Australia, Queensland, NSW, Tasmania and Victoria. Appendix B provides a summary of forest assistance packages since 1995.

In addition to the continuing support of research and development by the government, recent activities that provide insights into opportunities for diversification, value adding and product innovation include the Forest Industries Development Fund and the Pulp and Paper Industry Strategy Group (PPISG).

Research and Development

Extensive research and development has been undertaken by Forest and Wood Products Australia (FWPA) and its predecessor - the Forest and Wood Products Research and Development Corporation – and by Cooperative Research Centres (CRC), the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Joint Venture Agroforestry Program and ABARES into value adding and product innovation for the forestry sector. Significant research has focused on the utilisation of hardwood plantation resource for sawnwood products as a substitute for native forest resource. FWPA directs investment into research and development projects that are vital to the expansion and innovation of forest and wood product-based industries. This includes providing support for the development and promotion of sustainable practices. The Australian Government supports FWPA

through the collection of levies from industry and a matching co-contribution to FWPA's research and development program. A core premise of FWPA's research and development program is helping the forest industry to increase the market share and value of its products, while improving the sustainability and economic contribution of the sector to the overall Australian community.

CRC for Forestry links leading Australian forest research organisations, companies, government agencies and universities in a forest science and management research and education partnership.

CSIRO provides research activities from quantitative genetics, to precision plantation management, to smart paper and wood products of the future. The CSIRO previously had a dedicated Forestry Division, but restructures have resulted in forest related research being devolved to research flagships.

Research through Rural Industries Research and Development Corporation (RIRDC) and other agencies including states and CRCs has also examined the environmental, socio-economic and other aspects of farm forestry, including products and suitable regions, and opportunities for farm forestry.

A summary of key recently completed and current research and development projects supported by the Australian Government is provided at Appendix C.

Forest Industries Development Fund

The Forest Industries Development Fund, which concludes in June 2011, encourages increased investment in measures designed to add value to our forest resources. Through this initiative the Australian Government is working with the states, territories and industry, to ensure the long-term economic viability of Australia's forest industries. The Australian Government has committed $6.6 million through the Forest Industries Development Fund to boost the international competitiveness of Australia's forest products. Projects approved under the fund to date are principally focused on value adding initiatives in the following areas of activity:

- new timber products—shifting from low to high value products;
- improvements in cost efficiencies across the value chain;
- new uses for wood;
- new wood processing/production initiatives that will achieve value adding outcomes; and
- increased employment in the sector, or maintenance of workforce numbers.

These five areas of activity are critical in terms of opportunities for the industry moving forward.

Pulp and Paper Industry Strategy Group

On 19 June 2009, Senator the Hon. Kim Carr, Minister for Innovation, Industry, Science and Research, commissioned a PPISG to provide advice to the Government about the future needs of the pulp and paper industry in Australia. This followed a number of difficulties faced by parts of that industry sector. The PPISG was made up of key pulp and paper industry members.

On 31 March 2010, the PPISG submitted its final report to Minister Carr, making eighteen recommendations broadly grouped under the headings of innovation, investment, sustainability and productivity. The report covers a broad range of topics and includes information sourced from industry and government. The strategy group commissioned specific work to address knowledge gaps about economic benefits and socio-economic impacts of the report's recommendations. A whole-of-government response to the report is currently being developed.

Forecast wood supply from plantations

Plantations currently produce about two-thirds of the 27 million cubic metres logs of harvested in Australia on average each year. The balance of the logs comes from native forests. Softwood plantations provide most of the wood products used for building and construction. Building products consumption increases at roughly the same rate as population. The potential supply of softwood plantation sawlogs and pulpwood is not expected to change significantly from now to 2050 or beyond (Figure 4). Together, these factors are likely to lead to a steadily increasing dependence on imported timber products and/or substitution for more carbon-intensive materials.

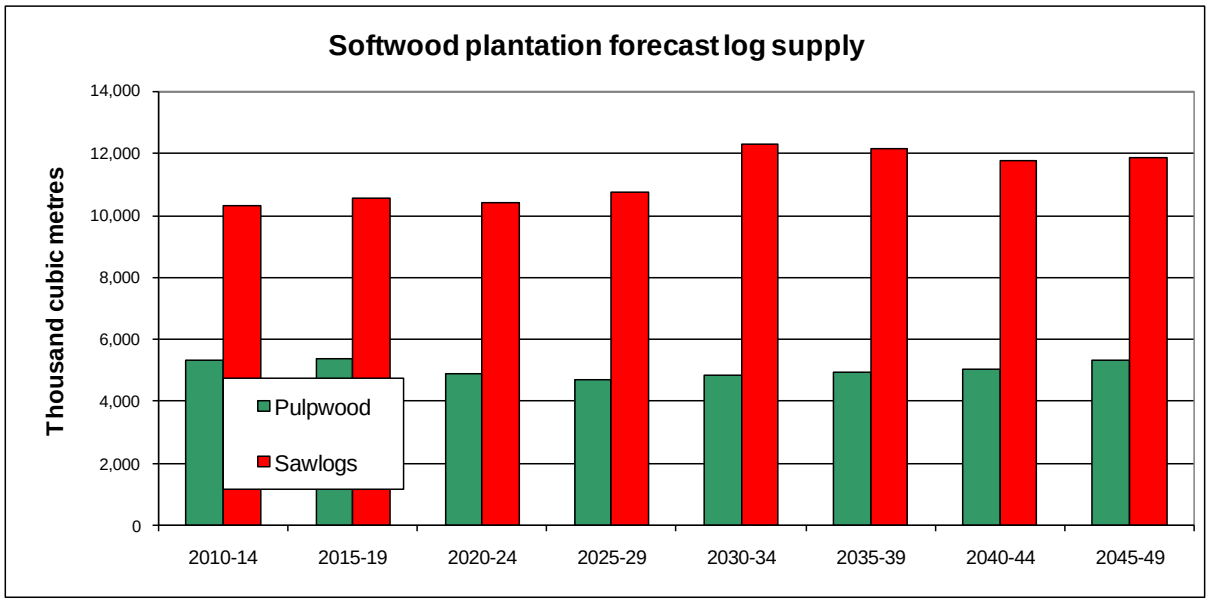

Figure 4: Forecast log supply from Australian softwood plantations

Source: Parsons, M., Frakes, I. and Gavran, M. (2007)

The potential log supply from hardwood plantations is rising because the large areas established from the mid-1990s are reaching harvest age (Figure 5). The vast majority of hardwood plantations is managed to produce pulpwood for papermaking. Unless new pulpmill/s or alternative uses for processing small hardwood logs are developed, most of the increased supply of wood will be exported as woodchips.

Most hardwood sawn timber is used for flooring, decking, joinery, furniture and similar uses where particular appearances or colours are required or for engineering and architectural applications that need particular strength, hardness and durability. Less than 10% of hardwood plantations, perhaps no more than 5%, are managed for sawlog production. The current supply of hardwood plantation sawlogs is small and will not increase much for a decade or more. If and when it does reach significant levels, most of the wood will be suitable mainly for structural grade wood, not for appearance grade products such as flooring, joinery and furniture.

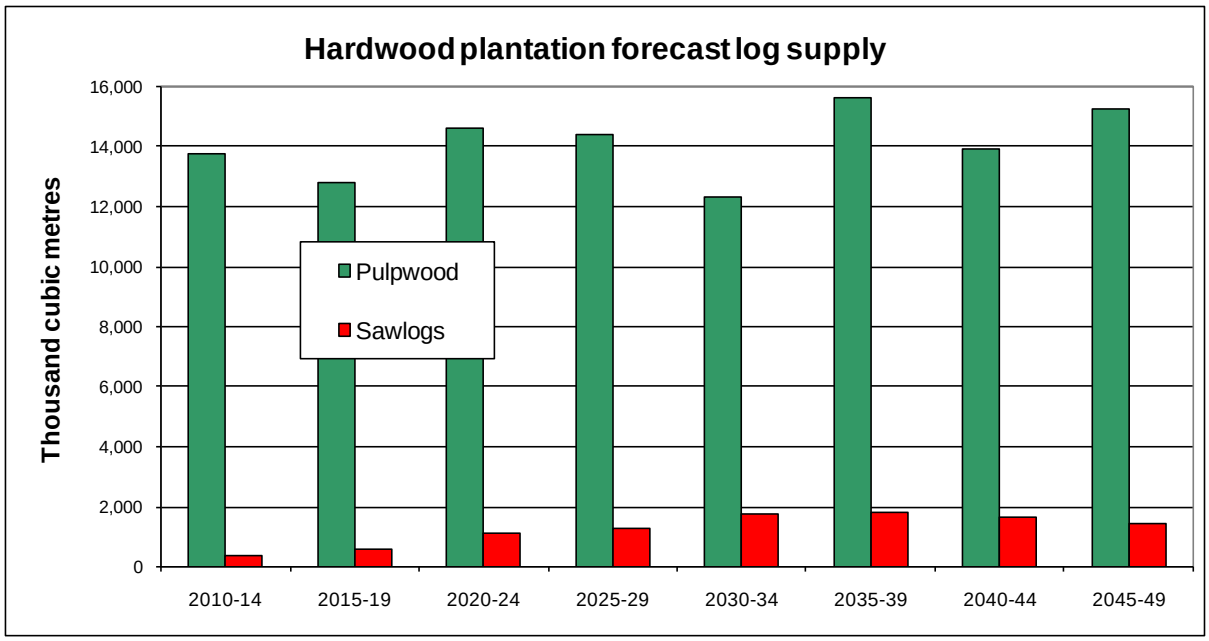

Figure 5: Forecast log supply from Australian hardwood plantations

Source: Parsons, M., Frakes, I. and Gavran, M. (2007)

Forests, wood products and carbon

Australia's total greenhouse gas emissions from power generation, transport, agriculture and other sources were estimated to be 599 million tonnes in 2008 (Figure 6). Plantations and native forests sequestered 23 million tonnes of carbon dioxide in that year, which reduced national emissions by 3.8 per cent.

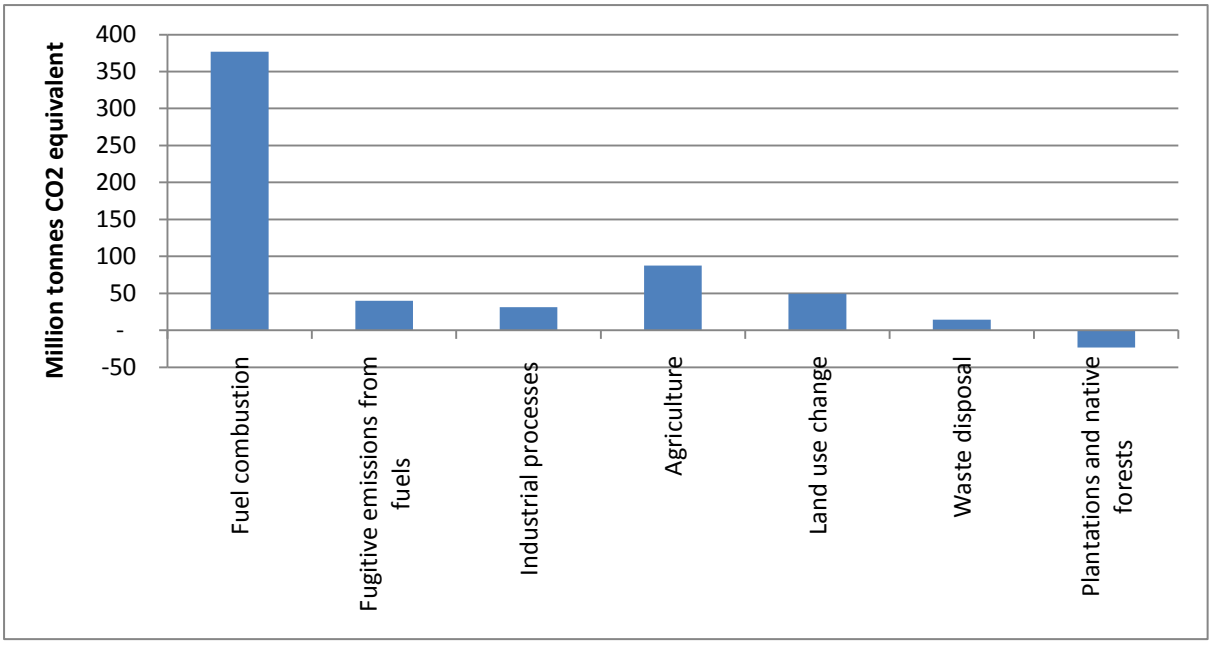

Figure 6: Australia's greenhouse gas emissions by sector, 2008

Source: National Greenhouse Gas Inventory, Department of Climate Change and Energy Efficiency 2010.

The embodied energy of a product is all the energy used to obtain raw materials and to manufacture, package and transport the product. Energy use is closely associated with the amount of carbon dioxide emissions to the atmosphere. Different materials have widely different embodied energy. The embodied energy of timber products is much lower than that of many other materials (Figure 7).

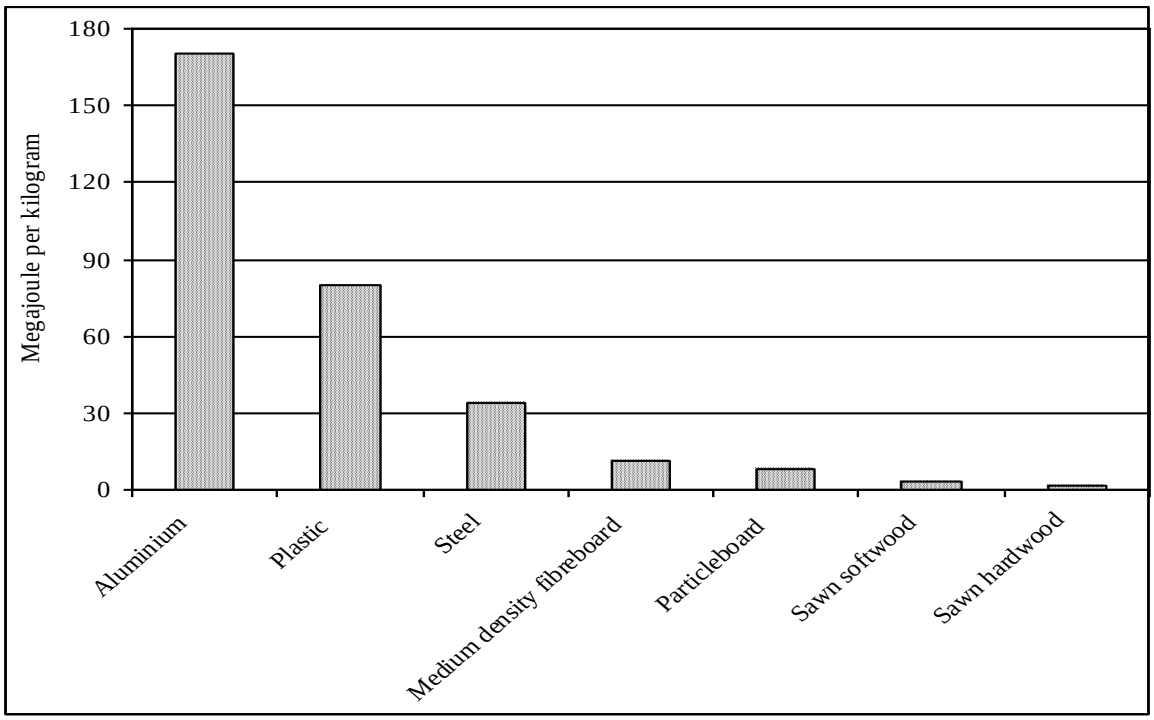

Figure 7: Embodied energy in new materials

Source: Taylor, J and Van Langenberg, K 2004. The value for plastic is for PVC (polyvinylchloride). The values for timber are for kiln dried timber.

Environmental impacts of forestry

Maintenance of a permanent forest estate, both for conservation and production, provides substantial environmental benefits such as water quality, biodiversity, salinity management, and soil management.

Within the production estate, governments aim to minimise environmental impacts through planning practices, legislation, regulation and monitoring. The forest industry, through voluntary codes of practice, forest management plans, certification and other planning processes seeks to achieve environmental care at a greater level than the mandatory requirements.

Multiple-use forests and timber harvesting

Timber production is allowed in State native forests classified as 'multiple-use' in NSW, Queensland, Tasmania, Victoria and Western Australia. Substantial areas within those classified as 'multiple-use' are reserved from timber harvesting to protect particular landscape, flora, fauna and other values. The balance is available for timber production, although a substantial portion is not suitable for commercial timber harvesting or is inaccessible. Timber may be harvested from a portion of the net available area each year. Timber is also harvested from some leasehold forested land in some states, particularly Queensland.

The net forest area available for timber harvesting and the areas where timber is actually harvested on average each year are shown in Table 3.

Table 3: Harvesting from multiple-use native forests–areas available and annual average areas harvested (hectares)[1]

State[2]	Area available[3]	Area clearfelled and regenerated	Area thinned or partially felled	Total harvest area	Proportion harvested
New South Wales	1 470 000	0	43 500	43 500	3.0%
Tasmania	890 000	4800	6700	11 500	1.3%
Victoria	922 000	4900	2900	7800	0.8%
Western Australia	848 000	430	8820	9250	1.1%

Notes

1. Annual averages generally for previous five years. Areas of forest cleared from mine sites are not included.
2. Information for Queensland is incompatible with the reporting format. Native forest timber harvesting in Queensland on State-controlled lands occurred on about 23 000 hectares in 2009–2010. There is no multiple-use forest in the Australian Capital Territory, Northern Territory and South Australia.
3. This is the State forest area available for timber harvesting after excluding areas reserved by management plans and regional forest agreements. Timber harvesting is excluded from additional parts of the available areas to meet regulatory requirements to protect flora, fauna, catchment and other values.

Source: Australia's forests at a glance 2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

Regional Forest Agreements

RFA forestry operations are required to adhere to the principles of SFM, including the application of management strategies and management prescriptions to protect rare and threatened flora and fauna. SFM entails the management of native forests to maintain their full range of environmental, social and economic values. The concept of SFM has a long and evolving history in Australia. As our understanding of forest ecology has increased and community attitudes have changed, management practices have also changed to meet sustainable timber yields and maintain and protect other forest values.

Codes of practice

The Regulations under the *Export Control Act 1982* require that exports of two tonnes or more of unprocessed wood be licensed. Plantation sourced wood is exempt from export controls where the Australian Government forestry minister has approved a 'code of practice' for a state or territory that describes the practices to be used for the management of all plantations in that state. Codes were approved between 1996 and 2004 and the Department has engaged the CSIRO to undertake an expert technical assessment of each state and territory's current code of practice for plantation management. This process commenced on 1 July 2010, with all codes of practice for the states and territories to be assessed by mid 2011. The CSIRO, in cooperation with each state and territory, will conduct a scientific assessment of each code of practice against the *Forest Practices Related to Wood Production in Plantations: National Principles*. The findings of each assessment will be provided for consideration for approval under the Regulations.

Impacts of plantations upon land and water availability for agriculture

The conversion of agricultural land to plantations is often raised as an issue by different sectors. Competition from urban expansion and mining developments, and its flow on effects to primary production is also increasingly becoming an issue for Australian communities living in rural areas. While the Australian Government provides research and analysis of land use change issues, particularly those that affect our primary industries, decision-making with regard to land use planning rests with state governments. A number of states have, or are developing policies for protection of prime agricultural land.

Land

Rural interest groups have argued that MIS subsidised through the tax system have forced up the price of land in the past decade or so. The effect of plantation expansion on land prices has been examined in the context of the employment and population studies (Schirmer 2009). The research shows that rapid plantation expansion in some regions and over some periods has contributed to land price increases. Land prices have also increased rapidly in other areas.

National Plantation Inventory data show that the rate of plantation expansion in the late 1990s and early 2000s was exceptionally high (Figure 8). The fluctuations in area established from year to year are at least partly related to changes in tax policy related to those years.

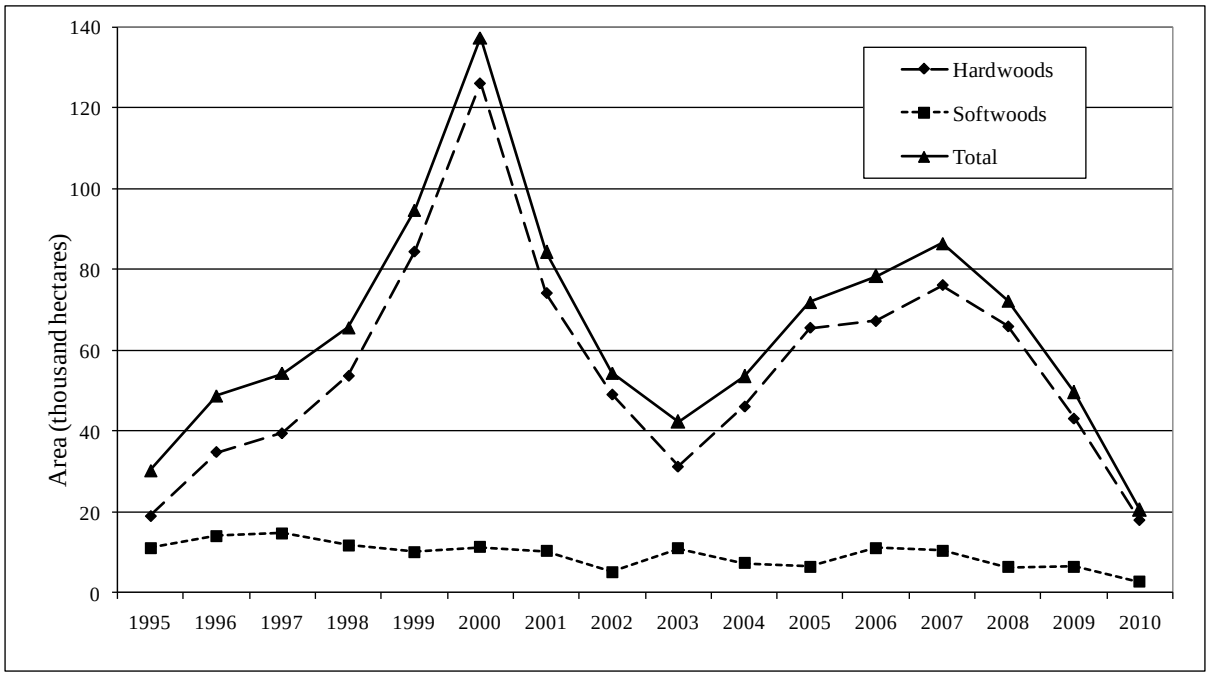

Figure 8: New plantation area reported, 1995-2010, Australia (National Plantation Inventory)

Note: Figures for 2010 are provisional.

Much of the expansion in the late 1990s and early 2000s occurred in a few recognised plantation regions, where annual rainfall is 500 mm or greater. Table 4 shows the land area available in areas of 500 mm rainfall or greater compared to the area of land in areas with less then this amount of annual rainfall. In general land in areas that receives less than 500 mm per annum is less productive and potentially unsuitable for commercial activities such as forestry, plantations, grazing, modified pasture, cropping, horticulture, intensive animal or plant production. This comprises 615 million hectares. Land receiving over 500mm of rainfall per annum amounts to 150 million hectares and of this the land used for plantations (2.02 million hectares) is approximately 1.3 per cent of the available land.

Table 4: Areas of agricultural land by rainfall and jurisdiction ('000 hectares)

State	Rainfall < 500 mm per annum	Rainfall > 500 mm per annum
Queensland	94,701	77,551
Northern Territory	111,224	22,986
New South Wales	60,266	19,738
Western Australia	233,142	18,750
Victoria	15,071	7,518
South Australia	95,982	2,113
Tasmania	4,933	1,564
Australian Capital Territory	199	36
Australia (total)	615,520	150,256

Sources: ABS 7121 Agricultural commodities, 2005–6; National Plantation Inventory 2010.

The rate of expansion is now declining and the total plantation area is projected to stabilise at 2.0 to 2.1 million hectares in the next few years. This is based on recent changes in ownership of large plantation estates, probably leading to changes to other land uses following harvesting of some of the current tree crop, and significant areas of land becoming available for reestablishment following the harvest of first rotation crops.

Foreign ownership of agricultural land is also an issue that has come under renewed focus, including following the sale of large areas of formerly managed investment scheme land to foreign entities. On 23 November 2010 the Australian Government announced it had developed an information gathering process to address some emerging community concerns around foreign ownership in agriculture. The Australian Bureau of Statistics is undertaking a survey of the extent of foreign ownership of agriculture land and water rights in Australia and RIRDC has commissioned ABARES to undertake a research project on the role of foreign investment in Australian agriculture (Shorten and Ludwig 2010).

Water

All multiple-use public native forests and plantations are subject to codes of practice designed, among other purposes, to reduce soil erosion, minimise damage to soil physical properties and to maintain water quantity and quality. For example, the areas in managed forests most susceptible to erosion, such as log extraction tracks, log landings and logging access roads, must be rehabilitated after harvesting to specified standards. Most private native forests and plantations are subject to similar codes of practice.

Water is often raised as an issue with MIS and in areas with established softwood plantations, such as in the green triangle region and in southern NSW. While commercial timber plantations expanded rapidly in some regions during the past decade, there is not likely to be further significant expansion for the foreseeable future. The regions with the slowest rate of plantation expansion in the past decade include those within the Murray-Darling Basin.

Plantations can have positive environmental effects by lowering saline watertables, but some communities have become concerned that they can also reduce water availability for other uses, such as irrigated agriculture. Plantation development is one of the land-use changes covered by the Intergovernmental Agreement on a National Water Initiative, which provides a national framework for considering the impacts of activities that may intercept water. Research is also being conducted into the effects of plantation management on water quality and quantity.

It is possible that large horticultural MIS developments affected a localised water market within the Murray–Darling Basin in the few years in the past decade when those schemes were being established, but forestry MIS were unlikely to have impacted on the broader water market. The amount of the water entitlements in the Murray–Darling Basin would mean that the likelihood of any sustained impact on water entitlement prices from MIS developments is minimal (Murphy 2007).

The development of win-win outcomes in balancing environmental costs with economic opportunities

Forestry has the potential to provide further environmental and economic benefits to individual land holders and the broader community through farm forestry, certification and carbon sequestration, including through the Carbon Farming Initiative.

Farm Forestry

The objective of farm forestry is to encourage the incorporation of commercial tree growing and management into farming systems for the purpose of wood and non-wood production, providing diversification of landholder income, increasing agricultural productivity, reducing soil erosion and salinity, stabilising water tables and improving water quality, increasing biodiversity and restoring wildlife habitat through sustainable resource management. The Farm Forestry National Action Statement (2005) outlines the objectives and actions agreed by the Australian, State and Territory governments and the forest and wood products industry to develop farm forestry. It was developed following the National Farm Forestry Roundtable that was established by the Australian government from 1998 – 2000.

The National Farm Forest Inventory (NFFI) was established in November 1998 to work with regional, state and other stakeholders to facilitate the collection and interpretation of farm forest data. The NFFI collated the first, and so far only, comprehensive national inventory of farm forests in Australia. That inventory was published in Plantations of Australia 2001 (Wood *et al*, 2001) and reported that by 2001 over 65,000 hectares had been planted in farm forestry activities. The NFFI project was not continued after 2001 but the National Plantation Inventory includes available data on farm forests. As far as can be ascertained from the limited data available, the rate of uptake of farm forestry by Australian farmers is low. With the exception of private native forests in a few states, farm forestry cannot be expected to contribute significantly to wood supply.

Certification

Forest certification schemes also play an important role in sustainable forest management and in providing public and purchaser confidence in demonstrating environmental outcomes of forestry operations. Forest certification and chain of custody schemes are also increasing in importance for market access, both domestically ands internationally.

Australia has two bodies, Australian Forestry Standard Limited (AFSL) and the Forest Stewardship Council (FSC) Australia, which manage forest management schemes where forests and forest products are certified by independent, accredited third-party certification bodies.

The Australian Government supports all credible, internationally recognised, forest certification schemes and equal recognition of these schemes in the market place. The use and implementation of the schemes is a market driven issue and a commercial business decision.

Australian Forestry Standard

The development of the Australian Forestry Standard (AFS) was initiated by Australian, state and territory governments in the late 1990s through the Ministerial Council on Forestry, Fisheries and Aquaculture (MCFFA). The AFS was recognised as an Interim Australian Standard by Standards Australia in 2003. Ownership and management of the AFS was transferred to AFS Ltd in 2003.

AFSL currently has 24 organisations certified under The Australian Forestry Standard with 10 267 513 hectares of public and private native forests and plantations certified. The two Australian Standards® - forest management (AS 4708—2007) and chain of custody (AS 4707—2006) - are currently under revision by Australian Forestry Standard Limited which commenced the process in late 2010. The

revision of standards every five years is undertaken to comply with standard development procedures for Australian Standards®.

Forest Stewardship Council

FSC Australia has been seeking to develop a national forest management standard since 2006 to replace the two interim forest management standards currently used to certify 608 787 hectares of mainly plantations in Australia. FSC Australia recently released a 21 page plan for the *Development of an Australian FSC Forest Management Standard* over the next two years from December 2010.

There are two interim standards used by accredited certification bodies under the FSC system to deliver FSC forest management certification in Australia with another certification body interested in providing forest management certification under its interim standard. These standards have certified mainly plantations but the recent native forest certification in Tasmania indicates that native forests can be certified under these interim standards.

At the same time, there is also an FSC controlled wood standard which is used by wood processors for non-FSC certified wood to ensure its legality status for use with FSC certified wood in the manufacture of certified products.

Carbon Farming Initiative

The Carbon Farming Initiative is a carbon offsets scheme being established by the Australian Government to provide new economic opportunities for farmers, forest growers and landholders and help the environment by reducing carbon pollution.

The Carbon Farming Initiative includes:

- Legislation to establish a carbon crediting mechanism;
- Fast-tracked development of methodologies for offset projects; and
- Information and tools to help farmers and landholders benefit from carbon markets.

Legislation to underpin the Carbon Farming Initiative was introduced to Parliament on 24 March 2011. The legislation and an explanatory memorandum, which explains each of the provisions in the legislation, are also available at http://parlinfo.aph.gov.au.

ABARES is undertaking analysis for the Treasury to estimate the potential for Carbon Farming Initiative compliant plantings under selected carbon price scenarios. No results are available at this time.

Creating a better business environment for forest industries

Investment models for sawlog production

The Australian Government provides a supportive environment for the development of investment models that give a level of certainty such as through the RFAs and macro economic settings including taxation, foreign investment policy and support for research and development.

The Australian Government facilitates private sector investment in the plantation industry by providing investors in forestry MIS with a statutory tax deduction for legitimate expenses incurred in establishing their investment, providing certain integrity conditions are met. The majority of investment in new plantations has been through these schemes; however the majority of investment has been into short-rotation projects (Figure 9).

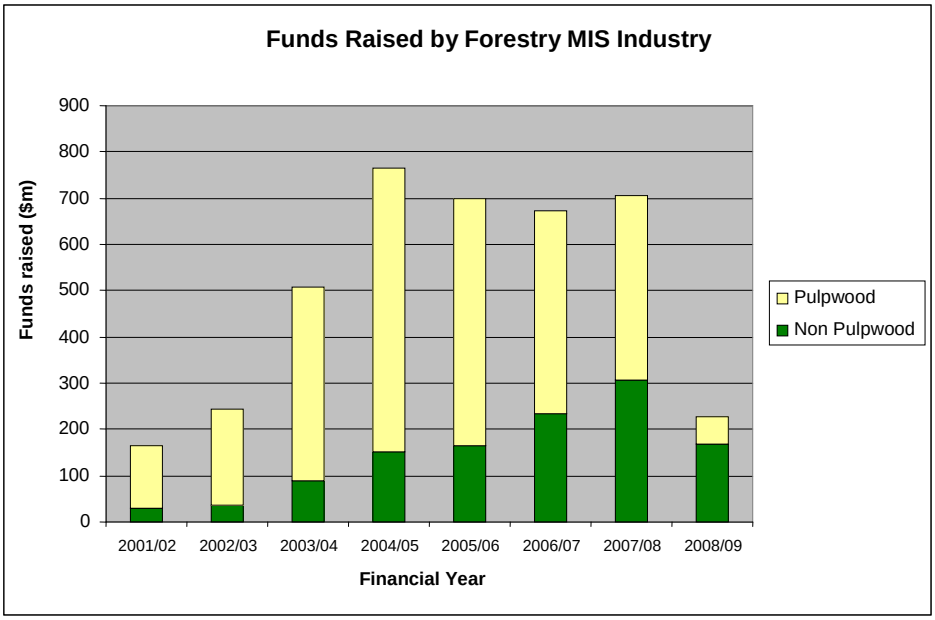

Figure 9. Retail forestry funds raised for short- and long-rotation projects

Source: Australian Agribusiness Group (2009)

To encourage increased investment in long-rotation projects, amendments to the taxation arrangements were made in 2007 to allow for the trading of investments after four years. Initial indications were that this had some impact on encouraging investors towards long-rotation products (as shown in Figure 9); however the impact of the global financial crisis and the collapse of a number of forestry companies has largely stopped investment in 2010.

New business and investment models for plantation production

A sharp decline in private-sector investment in new wood fibre plantations since 2007 has prompted industry calls for the government to consider additional policy support on plantation investment. Establishment rates have declined from over 53,800 hectares funded by forestry MIS companies in 2008 to an estimated 8,000 hectares in 2010. This is due to the collapse of a number of forestry companies causing a loss of investor confidence and uncertainty around the industry. The Australian Securities and Investment Commission has proposed the introduction of benchmarks during 2011 to improve consistency and quality of disclosure from responsible entities of agribusiness MIS to address this issue. The decline in establishment may lead to a long term decrease in the plantation

estate and create wood fibre supply pressures for the wood-processing industry. Some plantations established by forestry MIS companies will not be re-established after harvesting due to low site productivities, distance to markets and processing facilities, and high land lease rates and will revert to other agricultural pursuits.

While investment in establishing new plantations has fallen, there is strong interest in the purchase of Australia's existing plantation resources. Multi-national Timber Investment Management Organisations (TIMOs) have stated that growing high quality certified plantations in Australia on appropriate sites, in reasonable proximity to markets remains an attractive long-term investment opportunity, as displayed by the recent sale of Queensland's public plantation resource.

FWPA has commissioned a report (Project number PRA189-1011) titled *Review of Policies and Investment Models to support continued Plantation Investment in Australia* (de Fegely *et al*, 2011). The report was released in March 2011 and is available at http://fwpa.com.au. It investigates the issues constraining investment in the plantation sector and the potential investment models that could be used for attracting investment, including the maintenance of the managed investment scheme model. The FWPA report builds on work undertaken by ABARES (2010) on alternative investment models. Plantation investment and alternative models for investment have previously been discussed by the PPISG, Forestry and Forest Products Committee and the Forest and Wood Products Council, but continued discussion is needed. The Carbon Farming Initiative being established could provide new economic opportunities for farmers, forest growers and landholders in specified circumstances.

Superannuation investment in plantations

The first investment by superannuation funds in plantations in Australia was in the late 1990s. Superannuation funds now manage an estimated 27% of all Australian plantations. With one minor exception, that has been achieved by purchasing large plantation estates that had already reached harvest age. There is only one superannuation-funded investment in establishing new plantations, and that is on a small scale.

Superannuation fund investments are through multi-national TIMOs. The funds use TIMOs as an element of their 'alternative investment' category to balance other asset classes, and also as an inflation hedge. As the potential pool of investable property shrinks in developed markets, investors are seeking cheaper land, faster growth species and emerging markets.

Factors such as species, growth rates, land availability, infrastructure, managing country risk and global markets influence investor's decisions. Business and legal perspectives on structuring investments in forestry, covering such issues as restrictions on foreign ownership of land resources, tax considerations, and choice of legal entity are all issues that are influenced by government policy.

Social and economic benefits of forestry production

Forestry industries are Australia's second largest manufacturing industry with an annual turnover of $22 billion in 2008-09. The industry contributes around 0.7 per cent to Australia's Gross Domestic Product and 5.8 per cent of manufacturing output. There is a $2.2 billion dollar trade deficit for wood products, with $4.5 billion of total imports and $2.3 of total exports for 2009. Pulp and paperboard was the major import product, with woodchips the major export product for 2009.

Based on 2009 statistics for forestry, logging and wood manufacturing from the Australian Bureau of Statistics approximately 76,800 people are directly employed in Australia's forest and wood products industry, representing 0.7% of total employment. This includes 11,000 people in the forestry and logging sectors and 64,800 people in the wood and paper manufacturing sectors.

There are also significant social benefits from public forests. Governments spend hundreds of millions of dollars annually on the management of nature conservation reserves and multiple-use public forests (Montreal Process Implementation Group for Australia 2008). Most publicly owned multiple-use and nature conservation reserve forests are available to the general public for recreation and tourism.

Plantations

Several regional studies completed in the past few years provide considerable data to assess the effects of changing land use from agriculture to plantation forestry. These studies cover most of the regions where there has been significant plantation expansion in the past 10 to 15 years. Conclusions of these studies, which are summarised in a submission to the Senate Select Committee on Agricultural and Related Industries inquiry into food production in Australia – impact of managed investment schemes (Schirmer 2009) are that:

- Plantations, including those funded by a MIS, generate more jobs than broadacre sheep and beef grazing and cropping once timber harvesting has commenced (Table 5);
- Jobs in the plantation industry are typically located in regional towns and cities, whereas agricultural jobs are typically located in smaller towns and on rural land; and
- The population reduction from plantation expansion is no larger than that resulting from other trends, such as farm amalgamation; there are no observable effects on rural population at scales beyond the individual farm property.

Table 5: Employment generated by plantations and other land uses (jobs/100 hectares)

Land use	Before the 'farm gate'[1]	Beyond 'farm gate'[1]	Total
Eucalypt plantations – not producing[2]	0.15-0.20	0.05-0.25	0.20-0.5
Beef	0.22-0.33	0.01-0.07	0.23-0.40
Cropping	0.23 (0.1-0.5)	0.01-0.07	0.24-0.30
Sheep	0.33 (0.2-0.6)	0.01-0.07	0.34-0.40
Eucalypt plantation – producing[3]	0.20 (0.15-0.25)	0.30-0.45	0.5-0.65
Softwood plantations	0.4	1.0-1.4	1.4-1.8
Dairy	1.4 (0.9-1.7)	0.2-0.3	1.6-1.7
Grapes (large enterprises)	7.7 (5.0-10.0)	6.5-7.0	14.2-14.7

Notes

1. 'Before the farm gate' refers to jobs involved in producing products. 'Beyond the farm gate' refers to jobs involved in harvesting, haulage and processing the products.
2. When much of the plantation estate is too young to harvest timber.
3. When plantations are producing timber at a steady rate of production.
4. The ranges given in brackets show the variation in employment due to how an enterprise is managed and variation in land productivity.
5. The data are based on: a survey of primary producers and plantation companies; the South West Victoria Farm Monitor project; ABS and ABARE data as reported in Schirmer (2009 a, b); Schirmer et al. (2008); Schirmer *et al*. (2005 a, b). Data represent the average across the different regions examined in these studies.

Source: Schirmer, J. 2009 c. Submission to the Senate inquiry into effect of managed investment schemes on food production.

Farm Forestry

Farm forestry also provides a number of socio-economic benefits. This includes local employment in establishing planted areas and managing plantations and native forest resource, natural resource management benefits, farm diversification, potential for alternative income. If farm forestry is integrated with farming activities, there is an opportunity for the land owner to consider improved farm planning on the basis of land units and natural resource management issues.

Potential energy production from the forestry sector

Biofuels and bioenergy can play an important role in expanding the range of renewable energy sources available in Australia. Australian state and territory governments have adopted comprehensive frameworks to ensure that environmentally responsible forest management practices underpin the use of wood residues for bioenergy.

Second generation biofuels derive ethanol and biodiesel from low cost, non-food feedstocks such as bagasse, forest residues, trees and woody plants, grasses and agricultural residues. Australia's forestry and agricultural sectors are well positioned to provide significant quantities of these non-food feedstocks.

The Australian government introduced the Renewable Energy Target scheme in 2009, to ensure that 20 per cent of Australia's electricity supply will come from renewable sources by 2020. Under this scheme, wood waste and energy crops (including plantation biomass) are eligible renewable energy sources. Eligibility criteria for the use of wood waste from native forests include that:

- biomass must be harvested primarily for purposes other than energy production;
- the value of the primary wood products must be greater than the value of other products resulting from harvesting (known as the 'high-value' test); and
- forestry operations must be carried out in accordance with the principles of ecologically sustainable management.

The Forestry and Climate Change Action Plan was developed in collaboration with key stakeholders, to help the industry respond to climate change through mitigation and adaptation, underpinned by research and development and communication. In April 2010, the then Minster for Agriculture, Fisheries and Forestry, Tony Burke announced that the Australian Government would provide $4.7 million to fund 20 projects under the Forest Industries Climate Change Research Fund. The fund, administered by the department, aims to address major knowledge gaps about the impact of climate change on forestry and forest industries in Australia.

Other Australian Government funded research

The Department of Resources, Energy and Tourism has policy responsibility for a range of programs which provide assistance to Australia's ethanol and biodiesel industries. These include the Second Generation Biofuels Research and Development Program which has provided $12.6 million allocated to six projects over three years from 2009-10 to 2011-12 as part of the Australian Government's expanded $5.1 billion Clean Energy Initiative.

Land use competition between the forestry and agriculture sectors

Implications of competing land uses for the cost and availability of timber, food and fibre

Some analyses suggest that rapid plantation expansion in some regions over some periods may have contributed to land price increases (Schirmer, 2009a, b). However, plantation expansion is only one factor influencing land prices and therefore should not be considered in isolation. Land price increases benefit those farmers looking to sell their land (say to retire) and whose main asset is their farm but are a problem for farmers who want to expand their land holdings. Because plantation expansion is now declining, any resulting pressure on land prices may also decline.

There are a wide range of views on the impact of plantation forestry on land use, with farming bodies and some communities expressing concerns on the impact on rural populations, employment opportunities and traditional agricultural activities.

The issue of food security has brought into focus concerns about competing uses for agricultural land, particularly in relation to the mining sector and urban development. Along with the potential loss of agricultural land there are concerns that mining activities will pollute water resources that are relied on for agricultural production.

The Australian Government generally has no constitutional jurisdiction over land planning and zoning decisions or the granting of mining exploration licenses as these are the responsibility of state governments. Some states have, or are developing, policies for protection of agricultural land.

In terms of food specifically, Australia is fortunately sheltered from direct concerns about food shortages because we have a world class agricultural sector which produces more food than we consume. The Australian Government has introduced important initiatives such as Australia's Farming Future, and Caring for our Country to assist farmers achieve more sustainable production and continues to invest in research and development to help support agricultural and food production in addition to support for forestry.

Harmonising competing interests

As policy changes induce expansion or contraction in the sectors that compete with forestry for inputs, these policies also affect the forestry sector. Similarly, as policy changes induce expansion or contraction in the sectors that consume forest products, they too affect forestry (Food and Agricultural Organization of the United Nations, 2003). In some countries programs are observed that support the conversion of forest to cropland in some parts while other programs support cropland reversion to forest in other parts. There needs to be a holistic approach to planning and land management policies that take into account land capabilities, infrastructures, processing facilities, contribution to employment at a regional scale, and non-commercial contribution of any land use, and planning for retention of key areas of both agricultural and forestry production for long term industry viability.

Most land acquired for plantation forestry is former broadacre grazing land, largely in areas with greater than 500 mm rainfall annually. Socioeconomic research completed in some of the main plantation regions has shown that the change from grazing to plantation forestry has had negligible effect on grazing livestock production. The reduction in livestock numbers is estimated at 0.05 per cent nationwide (Schirmer 2009).

Opportunities for farm forestry

There are opportunities for farm forestry on cleared agricultural land through integration with agriculture and diversification of activities on farm. For example, well-placed shelterbelts or wide-spaced plantings which allow grazed pasture can be integrated to provide agricultural and wood production benefits. Farm forest woodlots can provide high quality wood production on better sites or be used to rehabilitate degraded or low productivity land or manage salinity, while giving environmental and production benefits. However conversion of high quality agricultural land is less likely to occur or compete, for example areas with irrigated, high value agriculture.

Farmers manage over 59 per cent (457 million hectares) of the Australian landscape. Livestock grazing is the dominant agricultural activity and accounts for 56 per cent (428 million hectares) of the Australian continent. High-value horticulture, irrigated pastures and irrigated cropping occupies approximately 2.79 million hectares or 0.36 per cent of the Australian continent. This high-value production is often in close proximity to urban development and less frequently, mining activity. The built environment in Australia occupies 2.63 million hectares or 0.3 per cent of the Australian continent. Comparatively compared to agriculture, forestry represents a small area of Australia - there are 9.4 million hectares of public native forest available for timber production and 2.02 million hectares of plantations. Native forests on private land remain an important contributor to Australia's supply of hardwood timber, and there are opportunities to improve the management of some of these forests for long term biodiversity and wood production, by increasing skills and awareness of their value by landholders.

Farm forestry is an important sector for the forest industry, and the Farm Forestry National Action Statement outlines the objectives and actions agreed by the Australian, State and Territory governments and the industry to develop farm forestry. While farm forestry may compete with some agricultural activities, those farmers who design and integrate farm forestry into their farming enterprise can balance agriculture and forestry production as well as achieve and maintain long term environmental benefits integrating forestry activities on-farm may improve natural resources and biodiversity provide production benefits by increasing soil carbon, improving water quality, reducing erosion, managing salinity and controlling weeds. There is also the potential to offset carbon emissions from agriculture through plantings of trees on-farm which sequester carbon above- and below-ground.

Through the Caring for our Country initiative, in the Sustainable Farm Practices national priority area the Australian Government has committed to improving landscape scale conservation through farmers adopting activities that contribute to the ongoing conservation and protection of biodiversity. Farm forestry, as a land use, is recognised as contributing to this outcome and support is available to groups, including regional natural resource management bodies to assist farmers implement farm forestry.

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Appendix A: List of key inquiries and reviews into forestry

Date	Inquiry Type	Inquiry Title	URL
2011	Senate Standing Committee on environment & Communications	Inquiry into the status, health and sustainability of Australia's koala population	http://www.aph.gov.au/Senate/committee/ec_ctte/koalas/info.htm
2011	Senate Standing Committee on Rural Affairs and Transport	Sale of timber assets by the South Australian Government	http://www.aph.gov.au/Senate/committee/rat_ctte/timber/index.htm
2010	House of Representatives Standing Committee on Regional Australia	Inquiry into 'The Impact of the Murray Darling Basin Plan in Regional Australia	http://www.aph.gov.au/house/committee/ra/murraydarling/index.htm
2010	Senate Finance and Public Administration Committee	Native Vegetation Laws, Greenhouse Gas Abatement and Climate Change Measures	http://www.aph.gov.au/senate/committee/fapa_ctte/climate_change/report/index.htm
2009	Independent review	Independent review of the Environment Protection and Biodiversity Conservation Act 1999	http://www.environment.gov.au/epbc/review/publications/final-report.html
2009	Senate Select Committee on Agricultural and Related Industries	Inquiry into Bushfires in Australia	http://www.aph.gov.au/Senate/committee/agric_ctte/bushfires/report/index.htm
2009	Senate Select Committee on Climate Policy	Inquiry into policies relating to climate change	http://www.aph.gov.au/Senate/committee/climate_ctte/report/index.htm
2009	Royal Commission	2009 Victorian Bushfires	http://www.royalcommission.vic.gov.au/Commission-Reports/Final-Report
2009	Parliamentary Joint Committee on Corporations and Financial Services	Inquiry into Financial Products and Services in Australia	http://www.aph.gov.au/Senate/committee/corporations_ctte/fps/report/index.htm
2009	Senate Select Committee on Agricultural and Related Industries	Inquiry into food production in Australia - Impact of Managed Investment Schemes	http://www.aph.gov.au/Senate/committee/agric_ctte/food_production/report/index.htm

Date	Inquiry Type	Inquiry Title	URL
2009	Senate Environment, Communications and the Arts Committees	Inquiry into forestry and mining operations on the Tiwi Islands	http://www.aph.gov.au/Senate/committee/eca_ctte/tiwi_islands/report/index.htm
2008	Senate Rural and Regional Affairs and Transport Committee	Inquiry into Natural Resource Management and Conservation Challenges	http://www.aph.gov.au/senate/committee/rrat_ctte/natural_resource/report/index.htm
2008	Senate Environment, Communications and the Arts Committees	Inquiry into the operation of the Environment Protection and Biodiversity Conservation Act 1999	http://www.aph.gov.au/Senate/committee/eca_ctte/epbc_act/final_report/index.htm
2008	Standing Committee on Primary Industries and Resources	More Than Honey: the future of the Australian honey bee and pollination industries	http://www.aph.gov.au/house/committee/pir/honeybee/report.htm
2005	Tasmanian Community Forest Agreement	A joint commitment of the Australian and Tasmanian Governments to enhance protection of Tasmania's forest environment and provide growth in the forest industry and forestry jobs	http://ffic.com.au/_literature_56479/Tasmanian_Community_Forest_Agreement_(TCFA)
2005	House of Representatives Select Committee on Agriculture	Inquiry into pests - Dealt with the use of chemicals and with browsing damage management	
2004	Senate Rural and Regional Affairs and Transport Committee	Australian forest plantations: A review of Plantations for Australia: The 2020 Vision	http://www.aph.gov.au/Senate/committee/rrat_ctte/completed_inquiries/2002-04/plantation_forests/report/index.htm
2004	Productivity Commission	Impacts of Native Vegetation and Biodiversity Regulations - Dealt with restrictions to establishment of plantations	http://www.pc.gov.au/__data/assets/pdf_file/0005/49235/nativevegetation.pdf

Date	Inquiry Type	Inquiry Title	URL
2003	Select Committee on Recent Australian Bushfires	A Nation Charred: Inquiry into the Recent Australian Bushfires	http://www.aph.gov.au/house/committee/bushfires/inquiry/report.htm
2003	House of Representatives Standing Committee on Environment and Heritage	Inquiry into employment in the environment sector	http://www.aph.gov.au/house/committee/environ/greenjobs/report/contents.htm
2003	Senate Rural and Regional Affairs and Transport Committee	Inquiry into the Plantation Forests Industry	
2001	Natural Resource Management Ministerial Council	National Framework for the Management and Monitoring of Australia's Native Vegetation	
2001	Department of Environment and Heritage	National Forest Inventory	
1999	ARMCANZ Agriculture and Resource Management Council of Australia and New Zealand	Managing Natural Resources in Rural Australia for a Sustainable Future	
1998	Industry Commission	Inquiry into Ecologically Sustainable Land Management. A Full Repairing Lease	http://www.pc.gov.au/ic/inquiry/60eslm/inquiry_documents/finalreport/60eslm.pdf
1997	The Commonwealth of Australia and the State of Tasmania	Regional Forest Agreement	http://www.dier.tas.gov.au/__data/assets/pdf_file/0013/40207/tas_rfa.pdf
1997	Australian National Audit Office	Commonwealth Natural Resources Management and Environment Programs: Australia's Land, Water and Vegetation Resources. Audit Report 36	http://www.anao.gov.au/download.cfm?item_id=1EAC3665BDBDB09B32C64750953A202D&binary_id=BEB76BAB1560A6E8AA43C299BD517993

Date	Inquiry Type	Inquiry Title	URL
1996	Senate Rural and Regional Affairs and Transport References Committee	Land-care Policies and Programs for Australia	
1995	Department of Prime Minister and Cabinet	Wood and Paper Industry Strategy	http://www.daff.gov.au/rfa/publications/deferred/woodchip/growth
1993	Industry Commission	Adding Further Value to Australia's Forest Products Report 32	http://www.pc.gov.au/ic/inquiry/32addfur
1992	Council of Australian Governments	Intergovernmental Agreement on the Environment	http://www.environment.gov.au/about/esd/publications/igae/index.html
1992	Commonwealth of Australia	National Forest Policy Statement: A New Focus for Australia's Forests	http://www.daff.gov.au/__data/assets/pdf_file/0019/37612/nat_nfps.pdf
1992	Council of Australian Governments	National Strategy for Ecologically Sustainable Development	http://www.environment.gov.au/about/esd/publications/strategy/index.html
1992	Resource Assessment Commission (RAC)	Forest and Timber Inquiry	
1991	Ecologically Sustainable Development (working group on forest use)	Final report	
1991	National Plantations Advisory Committee	Final Report	
1985	Australian Heritage Commission	Comment on Environmental Impact Statement on Tasmanian Woodchip Exports beyond 1988	

Date	Inquiry Type	Inquiry Title	URL
1985	Commonwealth Department of Arts, Heritage and Environment	Rainforest Conservation in Australia	
1984	Standing Committee on Environment and Conservation	Bushfires and the Australian environment	
1981	Standing Committee on Trade and Commerce	Australia's Forestry and Forest Products Industries	
1978	Standing Committee on Expenditure	Northern Territory Forestry Program	
1978	House of Representatives Standing Committee on Science and the Environment	Woodchips and the environment: supplementary report	
1977	The Callaghan Report	Inquiry into the Structure of Industry and the Employment Situation in Tasmania	
1977	Senate Standing Committee on Science and the Environment	Woodchips and the Environment	
1976	Senate Standing Committee on Science and the Environment	Interim Report on the Impact on the Australian Environment of the Current Woodchip Industry Programme	
1975		Operation of the Softwood Forestry Agreements Acts 1967 and 1972	http://cfs.nrcan.gc.ca/files/353
1975		Working Group on the Economic and Environmental Aspects of the Export Hardwood Woodchip Industry	

Date	Inquiry Type	Inquiry Title	URL
1971	Department of Trade and Industry, Office of Secondary Industry	Report of the economic study group on the Australian timber industry	
1946	Royal Commission	Tasmanian Royal Commission on Forestry Administration	
1939	Royal Commission	Victorian Bushfires Royal Commission of inquiry on forestry	http://www.dse.vic.gov.au/DSE/nrenfoe.nsf/LinkView/C4BCA40C95A4C061CA256D960014420D8AC9C23269FA53B4CA256DAB0027ECC4
1922	Royal Commission	Western Australian Royal Commission on Forestry	
1921	Joint Standing Committee of Public Accounts	Purchase of saw-mills and timber areas	
1920	Joint Standing Committee of Public Accounts	Purchase of saw-mills and timber areas in Queensland – Interim report	
1908	Royal Commission	New South Wales Inquiry on forestry	
1897	Victorian Royal Commission	Victorian Royal Commission on forests and timber resources	

Appendix B: Summary of past forest assistance packages

Funds	Program Name	Duration	Money Spent	Administration	Program Focus
The Commonwealth was to provide $20 million to implement a South-West Forests Industry Structural Adjustment Program	**Western Australia:** Forestry Assistance Program for Western Australia (FAPWA) and Grants for Forest Communities (GFC).	May 2004-June2006	FAPWA: $13.07 million granted ($11.12 million spent). GFC: $1.88 million granted ($1.27 million spent).	Commonwealth only.	• FAPWA - assist the continuing development of a sustainable, efficient, value-adding and internationally competitive timber industry in WA. • GFC - to provide funding opportunities for community based initiatives or small businesses that can demonstrate innovative projects that create employment and are related to the forest and wood products industries.
$5 million in Commonwealth Government funding was to be provided to businesses in the form of a grant or interest rate subsidy	**Queensland:** Forestry Industry Development Assistance Program for South-East QLD (FIDAQ).	Dec 2000-June 2006	$4.95 million allocated to 12 businesses. 100% take up of funds.	Commonwealth only	• FIDAQ - assist the development of a value-adding and job-creating native timber industry in south-east Queensland.

Funds	Program Name	Duration	Money Spent	Administration	Program Focus
The Commonwealth committed to provide $3.6 million of unspent money from the South-East Forest Agreement (SEFA)	**New South Wales:** Eden Regional Adjustment Package (ERAP)	Dec 2000 – June 2004	The total cost of ERAP was $3.4 million, including $3.2 million in grantee funding and $200,000 in administration and independent assessment expenses.	Commonwealth only.	• ERAP was implemented in response to a sustained reduction in employment in the major industries of forestry and fishing in the Eden region of NSW. The objective of the package was to supplement private sector investment by businesses in the Eden region to create long-term employment in the region.
The Commonwealth committed to provide $110 million under the Tasmanian Regional Forest Agreement	**Tasmania:** Regional Forest Agreement	1997-98 to 2000-01	Commonwealth provided $110 million.	Tasmania only.	• Program to protect conservation values on private land in support of the CAR Reserve System ($30M). • Implementation of new intensive forest management ($57M). • Implementation of employment and industry development ($13M). • Infrastructure development – roading, tourism and new reserve management ($10M).

Funds	Program Name	Duration	Money Spent	Administration	Program Focus
The Commonwealth committed to provide $18.8 million	Victoria: Victorian Forest Industry Structural Adjustment Program (FISAP).	June 1999 – June 2005	Commonwealth contributed $16.6 million and Victoria $19.2 million.	Victoria only.	• Industry development assistance, business exit assistance, rescheduling assistance and worker assistance.
The Commonwealth committed to provide $20 million	Australia's Forest Industry – Preparing for the Future	July 2008 – June 2011	$14.6 million	Commonwealth	• Forest Industries Development Fund - to encourage ongoing investment in value adding and promoting the development of internationally competitive and ecologically sustainable forest and forest products industries • Preparing the forestry industry for climate change - to address major knowledge gaps about the impact of climate change on forests and forest industries in Australia (including the Forest Industries Climate Change Research Fund) • Development of a Forestry Industry Database - establishment of a forestry industry database to provide key information for workforce planning • Restricting the import of illegally logged timber - to combat illegal logging and associated trade by working with regional governments and industry • Establishing an industry skills council

Funds	Program Name	Duration	Money Spent	Administration	Program Focus
The Commonwealth committed to provide $22.4 million	**Tasmania:** Tasmanian Forest Contractors Package	Nov 2010 – June 2011	Commonwealth provided $17 million for the Tasmanian Forest Contractors Exit Assistance Program and $5.616 for the Tasmanian Forest Contractors Financial Support Program.	Exit Assistance Program – Commonwealth; Financial Support Program – Tasmania.	• Exit assistance to native forest harvest and haulage contractors. • Financial support to non-exiting native forest harvest and haulage contractors.

Appendix C: Research relating to opportunities for diversification, value adding & product innovation

Forest and Wood Products Australia
http://fwpa.com.au/currentprojects.aspx?s=2

Commencement Date	Research type	Description	Research Location
01/09/10	Predicting wood quality to improve sawlog value in radiata pine	To deliver to Australian softwood growers a decision making tool to predict variability in the density and stiffness of logs, as a function of varying growing conditions and to enable improved management and commercial decisions.	CSIRO
28/06/10	Impact of internal checking on the log and timber value of fire salvage ash type sawlogs	To study the relationships between fire intensity, tree moisture profiles and timber slab moisture loss during various air drying treatments, with the timing, location and severity of internal checks, and their impact on timber product value, for logs from bushfire salvage coupes, compared with logs from unburnt coupes.	Vicforests
24/02/10	Near Infrared (NIR) assessment of resin quality for composite panel production	1)Determine the ability of a real-time, NIR instrument to detect differences in UF(m) resin quality parameters which affect performance of panels, to a sufficient degree of accuracy to allow detection of potential issues and enable corrective action; 2)Assess the capability of the technology developed above to be applied at-line in a mill situation to monitor mUF resin quality; 3)If above are successful, scope the development of a trial instrument/calibration combination able to be installed at an MDF mill as a pilot; 4)Determine the feasibility of applying NIR monitoring of mUF resin quality at both despatch and receipt at mill to benchmark resin manufacture.	CSIRO

Commencement Date	Research type	Description	Research Location
11/01/10	Variable Retention Silviculture: A comparison of biodiversity research and management practices between Tasmania, Australia and the Pacific Northwest	To improve biodiversity outcomes from aggregated retention silviculture by better understanding factors that influence different plant and animal groups.	World Forest Institute
01/09/09	Glulam design based on lamination grades and the use of mill shorts	1. To investigate the relationship between shook length and tension strength for a range of species at the upper end of the density range in each case. Adhesive type will not be considered to be a variable; 2. To determine if the coefficient of variation of the lamination strengths can be introduced into the shook length formula so that good finger operations are rewarded and poor are penalized; 3. To develop design methodology that allows glulam bending strengths determined using individual finger joint tension.	Monash University
11/06/09	Improving the durability of low durability plantation hardwoods for use as power poles	To be able to reduce the impact of the shortfall in supply of pole sized material for maintenance and expansion of electricity networks through the use of low durability hardwoods grown in plantation.	Queensland Department of Primary Industries
09/06/09	FWPA support for Plantation Hardwood Research project 'High value timber composite panels from hardwood plantation “thinning”	To significantly improve the economics of hardwood plantation in Queensland and thus to encourage the establishment of more plantation, managed for higher value production.	Dept of Primary Industries - Qld LD
01/06/09	Active Genetic Conservation and Utilization of Native Radiata Pine Germplasm for Increasing Genetic Gain of Growth, Form and Wood Quality, and Risk Traits	The commercial objective of the project is to increase total value (or profit) of radiata pine in 3 ways: 1) infuse alleles for increasing total wood mass per hectare; 2)infuse alleles for increasing wood quality; 3)conserve rare alleles for combating diseases and pests, in conjunction with enhanced risk management.	CSIRO

Commencement Date	Research type	Description	Research Location
01/06/09	Optimising resin consumption, pressing time and density of particleboard made of hardwood sawmill residues by exploring use of alternative resins and mixes of softwood and hardwood		RMIT
19/05/09	The potential to recover higher value veneer products from Fibre Managed Plantation Eucalyptus and broaden product and market opportunities for this resource	To define the likely plywood/LVL quality obtained from the *E.nitens* and *E.globulus* grown in Tasmania; identify the genetic parameters that affect quality of rotary-peeled veneer, plywood and LVL, and develop niche markets for the resultant products.	University of Tasmania
30/04/09	Investigation of NDE technologies for improved drying quality to optimise kiln drying schedules, reduce drying degrade and accelerate kiln throughput in the hardwood sawmilling industry	To identify whether the simple wood properties of density or extractives content affect the relative rates of drying of Shining gum and Jarrah (and optionally Blackbutt and Mountain ash) lumber and 2) trial two technologies (acoustics and NIR) to test their ability to segregate green lumber prior to drying in order to segregate individual boards into "fast" or "slow" drying batches.	CSIRO Materials Science & Engineering
01/04/09	The Aus/NZ Solid Wood Initiative: Better performing structural products manufactured with higher efficiency and using less energy and water	To support and carry out research to develop wood quality assessment and lumber segregation technology	WQI Ltd
12/11/08	Analysis of genetic and tree performance data across whole of industry using TREEPLAN to identify superior trees to lift productivity, quality and economic value of the forestry resource		Southern Tree Breeding Association

Commencement Date	Research type	Description	Research Location
02/07/08	Investigation of the causes of natural durability in Australian hardwoods: Applicable to quality control and tree breeding to support the development of plantations for high-value solid wood products		University of Queensland
02/07/08	Investigation of the causes of natural durability in Australian hardwoods: Applicable to quality control and tree breeding to support the development of plantations for high-value solid wood products		University of Queensland
10/06/08	Managing subtropical pines for improved wood production based on a better understanding of genetics, silviculture, environment and their interactions	To explore ways of increasing plantation profitability while maintaining or enhancing future volume production and wood quality.	Forestry Plantations Queensland Pty Ltd
14/04/08	Investigation of sawmilling by-products as feed stocks for the furafuel process	1) To identify the quantities of hardwood and softwood sawmilling by-products amenable for processing in pre-treatments to produce liquid feedstocks for fuels and chemicals including a Biofine Process; 2) To determine the cellulose, hemicellulose, lignin and inorganic content and composition of a selection of appropriate sawmilling wastes. 3) To explore process conditions, product yields and product quality resulting from the thermochemical treatment of selected sawmilling waste streams.	Monash University

Commencement Date	Research type	Description	Research Location
16/07/07	Schedule development, predictive modelling and economic viability assessment of vacuum drying Australian commercial hardwoods for potential industry investment	To establish the viability of vacuum drying four high commercial volume Australian hardwood species in terms of drying quality, time and cost. From the wood and drying properties measured from drying trials, an industry applicable predictive superheated steam vacuum drying model using fundamental principles combined with modelling software will be developed. The model will predict drying schedules and drying time dependent on the sensitivity of intrinsic wood properties and drying characteristics.	Queensland Department of Primary Industries
27/06/07	Postgraduate research into the environmental, economic and other costs incurred by increasing the thermal performance (star rating) of the domestic construction in Australia, particularly on light-weight timber construction	To investigate the comparative environmental impact of three houses being built for the Best 5 star houses project during their construction phase and the first two years of operation. Results will inform understanding of the environmental impacts of timber construction in this part of the life cycle and support development of design-based solutions to minimise those impacts.	University of Tasmania
18/08/06	Use of genotypic information for *Pinus radiata* improvement	To determine whether our choice of genetic assumptions can affect the accuracy with which polygenic effects are estimated and, to what extent we can further improve our accuracy by varying our statistical methodology.	University of New England
25/07/06	Determining optimised H3 LOSP treatment options for decay protection in softwood glulam	To compare the resistance to decay of LOSP (TBTN) treated glulam, treated before or after gluing, and at two different preservative retentions. To examine the value of flood brushing ends cut after treatment. To calibrate decay rates between the field (wet tropics) and a test facility called the Accelerated Field Simulator (AFS). To include a comparison with azole LOSP.	CSIRO Materials Science & Engineering

Commencement Date	Research type	Description	Research Location
21/06/05	The importance of environmental factors in microwave induced permeability of timber	Study the effects of different environmental factors in the microwave induced permeability of timber with a view of applying the know how to timber drying, timber quality improvement and timber processing. A quantitative investigation is undertaken concerning both the permeability and the strength of timber at the thin laminar level.	University of Melbourne (Forestry)

An overview of completed research projects and affiliated reports can be found at http://fwpa.com.au/growing.aspx?s=2#530

CRC for Forestry
http://www.crcforestry.com.au/

Commencement Date	Research type	Description	URL
2008	High Value wood resources	Goulds country *Eucalyptus nitens* thinning trial	http://www.crcforestry.com.au/publications/downloads/TR168-Washusen-et-al-FORPRINT.pdf
2008	High Value wood resources	Plantation grown eucalypts for high-value solid-wood products	http://www.crcforestry.com.au/publications/downloads/TR188-compiled-for-web.pdf
2010	High Value wood resources	Plantation-grown *Eucalyptus nitens*: Solid wood quality and processing performance	http://www.crcforestry.com.au/publications/downloads/TR200-Harwood.pdf
2010	High Value wood resources	Sawn timber from native forests and plantations in Tasmania	http://www.crcforestry.com.au/publications/downloads/Bulletin-13-Sawn-timber-properties.pdf
2010	High Value wood resources	Evaluation of thin-section quarter-sawn boards and rotary veneer from plantation-grown *E.nitens*	http://www.crcforestry.com.au/publications/downloads/CRC-TR-202-final.pdf

Commencement Date	Research type	Description	URL
Current	Monitoring and Measuring	The research aims to deliver new techniques and technologies for evaluating soil and site characteristics, for remotely sensing forest health and condition and for carrying out stand inventory. This will be done in three sub-project areas: 1.1.1 Site evaluation 1.1.2 Monitoring of forest condition with multi-spectral and hyper-spectral remote-sensing 1.1.3 Improved forest inventory using high resolution airborne remote sensing	http://www.crcforestry.com.au/research/programme-one/monitoring/index.html
Current	Managing and Sustaining	This research focuses on building an understanding of the climate, site and biotic factors that affect plantation productivity and developing hazard and risk assessment techniques and robust management systems to reduce the probability of loss of production and ensure sustainable production through multiple rotations. This will be done- in two subproject areas: 1.2.1 Sustaining site resources 1.2.2 Measuring and managing forest health	http://www.crcforestry.com.au/research/programme-one/managing/index.html
Current	Modelling and information integration	This project will develop decision support tools for: The prediction of genotype, site and management effects on stand production end-use suitability of plantation-grown products stand-scale fluxes of carbon and water and risks inherent in plantation development. These tools will help managers to tailor silviculture for site attributes and allow precise targeting of fertiliser and pesticide application. Project 1.3 takes the science produced under Project 1.2 and integrates it with information from Project 1.1 to provide tools for forest managers.	http://www.crcforestry.com.au/research/programme-one/modelling/index.html

Commencement Date	Research type	Description	URL
Current	Modelling and risk assessment for new environments	Refer to URL link	http://www.crcforestry.com.au/research/programme-one/subtropical-modelling/index.html
Current	Harvesting and Operations	Harvesting and haulage are priorities for the forest industry. These activities account for some of the highest costs in the forest supply chain, and provide many opportunities for improvements in efficiency. Through projects in harvesting systems, product value -optimisation and forest transport systems, the CRC for Forestry 'Harvesting and operations' program collaborates with industry to conduct applied research to develop and implement solutions to reduce costs, reduce energy use and increase value recovered.	http://www.crcforestry.com.au/research/programme-three/index.html
Current	Trees in the landscape	This research program focuses upon developing forestry practices that meet agreed environmental certification requirements and foster constructive community engagement. Such practices will provide security for the forest industry's long-term 'licence-to-operate' in the Australian landscape, and build international recognition of sustainable forest practices for product marketing. Research Program Four comprises these research areas: Project 4.1 Water quantity and quality Project 4.2 Biodiversity Project 4.3 Communities Project 4.4 Industry Pest Management Group Project 4.5 Land use change	http://www.crcforestry.com.au/research/programme-four/index.html

CSIRO forestry
http://www.csiro.au/science/Forestry.html

Commencement Date	Research type	Description	URL
Current	Forest tree breeding and improvement	CSIRO has significant capability in hardwood and softwood improvement programs, based on its knowledge of species genetic architecture and the latest genetic marker techniques.	http://www.csiro.au/science/Tree-Genetics.html
Current	Native Plants and Forestry	CSIRO uses traditional and molecular methods to better understand the variety and needs of Australia's native plants. We are also breeding and conserving Australian tree species for restoration of degraded environments and to help ensure global wood security.	http://www.csiro.au/science/Native-plants-and-forestry.html

An overview of previous research publications/forest publications can be located at http://searchext.csiro.au/search/search.cgi?query=forests&area=site&collection=CSIROau_All&form=csiro