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INDUSTRY SKILLS COUNCIL
FOREST, WOOD, PAPER & TIMBER PRODUCTS INDUSTRY

Learning Resource for PROMOTE PLANTATIONS AS A SUSTAINABLE FORM OF LAND USE








ICONS

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Activity


Assessment

This Learning Resource has been developed to support ***FPI60111 Advanced Diploma of Forest Industry Sustainability***. It was based on the Unit of Competency ***FPIFGM5217A Promote plantations as a sustainable form of land use***.

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June 2014

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INTRODUCTION

ABOUT YOURSELF

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USING WEBSITE LINKS

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HOW ARE THESE MATERIALS USED?

This learning resource has been developed as a workbook with a strong focus on the self-directed application of knowledge. It is best used in the context of the Unit of Competency it has been written against as found on page 2. Completing this workbook and all activities and formative assessments will prepare you for your final assessment.

Where a table has been provided in activities and assessments you can use Adobe forms to make notes. Click on a cell to enter text, tab to move to the next cell. The table cells do not expand as you enter text.

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SELF-ASSESSMENT

At the end of this document there is a self-assessment checklist of the types of skills and knowledge you would be expected to have to be deemed competent in the associated Unit of Competency. At any stage you can self-assess yourself against this list and seek more information in areas you are unsure about.

On successful completion of the final assessment as agreed with your Registered Training Organisation (RTO), you can achieve competency in the related Unit of Competency.

WHAT IS THIS LEARNING RESOURCE ABOUT?

This learning resource addresses one unit of competency that can be undertaken to support achievement of an Advanced Diploma of Forest Industry Sustainability. The learning resource is designed to enable people working in the tree growing and forest management part of a forestry or forest products organisation or business to promote the environmental and sustainability benefits of plantations compared to other forms of land use to stakeholders and the general community within which they work.

EMPLOYABILITY SKILLS

The learning resources for the Advanced Diploma of Forest Industry Sustainability are designed to help you draw from your work and life experiences to develop and apply skills that will enhance your employability in the forestry and wood products industries. Each learning resource addresses skills in particular functions that you might be required to undertake during a career in these industries. These functions range from the basic financial and workplace management skills common to a range of industries to sustainability and technical skills specific to the forestry and wood products industries.

When completing your daily work tasks and when working through each learning resource and the activities prescribed in them, you will be continually building on and demonstrating competency in generic skills, such as:

- analytical skills
- oral and written communication skills
- management skills
- teamwork skills
- technological skills
- numerical and mathematical skills.

HOW THE SKILLS LEARNED APPLY TO YOUR WORKPLACE

Social, economic and environmental issues frequently arise in the day-to-day running of a plantation forestry business. By addressing these issues, a promotions program can help manage, improve and sustain relationships among plantation managers and stakeholders and the general community. It is important for people working in the plantation businesses to understand how these issues arise, because promotional activities can be developed based on that understanding. That strategy requires some knowledge of why plantations have and are being developed, by whom and on what kind of land. It also helps to know something about the outcomes of the considerable body of research that has gone into assessing sustainability issues associated with plantations, because those outcomes can be used in a program to promote plantations.

As well as being aimed at relationships with stakeholders and the general community, a plantations program could assist with attracting new or continued investment in plantation development or re-establishment.

This unit therefore describes the process of developing, implementing, monitoring and reviewing a program to promote the environmental, social, economic and sustainability advantages and disadvantages of plantation forests to stakeholders and the general community. The basic strategy that underlies the program is to explore how issues that affect relationships with stakeholders and the general community arise, to demonstrate how those issues can be analysed and addressed, and to compare the effects of plantation forestry with other uses of agricultural land and with other sources of timber.

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1. IDENTIFY TARGET MARKETS

This section of the learning resource addresses identifying target markets for a plantations promotion program by first discussing what plantations are and considering the people, sectors and organisations who have interests in or concerns about them and what those concerns might be. We also need to assess the plantation manager's potential obligations under work health and safety, environmental, legislative and organisational requirements and obligations of Australia's forest certification schemes.

IDENTIFY LEGISLATIVE AND ORGANISATIONAL REQUIREMENTS

Some issues that plantation owners and managers will need to consider in a promotions program are covered or addressed in some way by work health and safety, environmental, legislative and organisational requirements or by obligations of certification schemes. For example, there are regulations on the use of pesticides and on control of declared noxious weeds and certification schemes require that forest managers be able to demonstrate stakeholder engagement.

In Australia there are hundreds of regulations governing forestry and wood products industries. Regulatory requirements for public participation that apply to your workplace may be in national, state, local government or industry-based voluntary or mandatory regulatory systems. For example, state legislation may require that plantation managers consult with key groups when undertaking particular work activities. Plantation management companies may be certified by voluntary certification schemes that specify requirements for community consultation.

Legislation, regulation and policy necessary to consider include:

- Work health and safety regulations
- Current awards and enterprise agreements
- Industrial relations
- Environmental Protection Acts and regulations
- Noise and pollution control regulations
- Transport regulations
- Industry-based Codes of Practice
- Good Neighbour Charters
- Forest certification obligations
- Organisational policies and procedures
- Local government planning requirements.

This list may not include all relevant areas for particular workplaces but provides a guide to what regulations may apply.

IDENTIFY APPEAL TO STAKEHOLDERS

The potential of the plantations promotion program to appeal to stakeholders can be assessed by identifying the benefits and costs to the plantation organisation in the context a process of community engagement, that is, the process of building relationships with the community in which the organisation operates.

Community engagement is an important component of what is sometimes referred to as 'corporate social responsibility', that is '*the way that a business takes into account the financial, environmental and social impacts of decisions and actions it is involved in*'1. Corporate social responsibilities used by businesses typically require that issues such as human rights, environmental and social sustainability and community engagement be considered. A plantations promotion program can be considered to be a component of developing community relationships.

Identifying the benefits and limitations of community engagement for your workplace helps you decide where to best direct your limited community engagement resources, to ensure you maximise the benefits of your activities and minimise the limitations.

The common benefits of community engagement include the building of trust and hence better ongoing relationships and communication, greater inclusion of interests and concerns which results in better acceptance of decisions by stakeholders and a higher level of compliance with regulatory requirements. Costs of community engagement include staff labour and time and expenditure on consultants, external experts and operating expenses. Changes made to operating procedures as a consequence of engagement could also result in a cost to the plantation organisation. The potential costs of not engaging with stakeholders through a plantations promotion program also should be considered; those costs could include staff time required to respond to complaints and delays in operations due to protests or court cases.

EVALUATE POTENTIAL AUDIENCES

The target market or audience for a program to promote plantations is the wide range of people who potentially can be affected by or have an interest in plantations. To identify who those people might be, we first have to consider what we mean by 'plantation'. The key features of plantations we refer to in this learning resource are:

- Plantations are crops, similar to agricultural crops, but grown on a production cycle (called a 'rotation'2) of several years (for example, 4 years for production of mallee eucalypt for bioenergy production; 10 to 15 years for hardwood pulpwood production) to many years (for example, 25 to 30 years for radiata pine sawlog production; up to 50 years for hoop pine for sawlog and veneer log production).
- Silvicultural practices, mainly fertilisation, thinning and pruning, are used to optimise production of the required product or products.
- The crop is comprised of trees, that is, long-lived woody plants rather than the annual plants used in agricultural crop production, more akin to horticultural tree crops but where the trees themselves are the ultimate harvest product, not their fruit.
- The major purpose of the plantation is commercial – to grow timber to make wood products for commercial use. The products include pulpwood for paper, particleboard and other panel production, sawlogs for sawn timber production and veneer logs for plywood and laminated veneer lumber production. The tree species used are therefore selected for their timber-producing properties, including growth rate, tree form and wood properties such as density, fibre length and colour.
- Plantations can range from large-scale (10s of thousands of hectares) pine and eucalypt plantations owned and operated as a single estate by corporations or government-owned business entities to small blocks and strips planted by private landowners on farms. The latter end of the scale includes farm forestry or agroforestry, which often has multiple aims including land protection or rehabilitation, shelter for livestock and improved wildlife habitat, as well as producing a crop of wood for on-farm use or sale.

1 http://toolkit.smallbiz.nsw.gov.au/part/17/84/362

2 Not to be confused with the term 'rotation' used in agricultural crop management, where it refers to a cycle of growing a sequence of different seasonal crops, usually interspersed with one or more fallow periods, over several seasons and years.

The people who potentially can be affected by or have an interest in plantations, that is, the target market or audience for the program, therefore include:

- people who live near the plantations, or near wood processing facilities, who could be affected by noise, traffic, smoke, odour or other effects of business activities
- other private land owners, including farmers
- recreational users of plantations and plantation roads, including sporting and hobby groups (e.g. mountain biking, bushwalking, hunting groups, orienteers and rogainers)
- local community groups such as chambers of commerce, volunteer fire fighting groups, or community groups supported by your business
- forest industry groups, such as representative bodies, who may work with plantation owners and managers to address issues of public interest
- local governments
- local and national environmental and farming organisations
- managers of National Parks, State Forests and other public land adjoining or near plantations
- regional, state and national media organisations
- state government policy and regulatory agencies
- timber industry workers and businesses
- the general community.

Activity 1.1

List the main groups of plantation owners and managers in your region and describe their scale and ownership structure. Hypothetical examples are shown in the table below.

Owner or manager	Scale	Ownership structure
1. Farm foresters	Small, dispersed, regional aggregate estimated at X hectares	Individual private properties
2. XYZ plantation acquisition corporation	Medium, concentrated, aggregate estimated at X000 hectares	Part of international timberland investment management organisation estate set up for pension fund investment
3. State government business management organisation	Large, concentrated, aggregate estimated at X0,000 hectares	Public ownership via State Government
4. Next owner		
5. Next manager		

IDENTIFY STAKEHOLDER CONCERNS

Stakeholder people and groups, such as those listed above stand to benefit from a plantation promotion program by being better informed about the issues of concern to them and how the plantation manager is addressing them. The plantation manager stands to benefit through improved relationships with people and groups in the community.

The list of things that people have been (and maybe some people somewhere still are) concerned about regarding plantations, whether or not they are substantiated, includes:

- plantation development resulting in people leaving rural communities, leading to loss of services, and communities generally becoming less viable

- plantation development affecting rural land values (usually by forcing the prices of properties up so that farmers can't afford to buy them; the converse – that the farmers get a better price when they sell – has seldom been raised as an issue!)
- plantations established in water supply catchments using water, and therefore reducing water available for people to use for drinking and agriculture downstream
- plantations adversely affecting soil quality, leading to loss of productivity
- plantations requiring excessive use of fertilisers and chemical pesticides and weedicides
- drift or movement of fertilisers and chemical pesticides and weedicides from the plantations
- plantations increasing the risk of wildfire for neighbouring landowners
- plantation management operations causing dust, noise, smoke or other nuisances that affect people living in, working in or visiting the neighbourhood
- plantations harbouring weeds and pest animals that affect neighbouring landowners
- plantations being 'monocultures' and 'biological deserts', devoid of other plant species and animals
- plantation development causing loss of native forests, biodiversity and habitat for native birds and animals.

How and why these issues arose and related information will be described and assessed later in the learning resource so that users can work out how to address the issues in a plantations promotion program. Indicator 6.4d The importance of forests to people (pages 317–324) in Australia's State of the Forests Report 2013 (Montreal Process Implementation Group for Australia and National Forest Inventory Steering Committee 2013) provides useful background, especially the section "Public acceptability of plantation forestry" beginning on page 320.

The plantation manager needs to assess the effect of issues such as the above on the plantation organisation's reputation and business and compare those effects with the costs, in terms of expenditure and staff time, of developing and implementing the program; this will be considered later in the learning resource.

Activity 1.2

List the stakeholder organisations and interest groups in your region that potentially have interests and concerns in plantation establishment and management and plantation timber harvesting and processing, and what each of them is interested in or concerned about. When did these concerns arise? Hypothetical examples are shown in the table below.

Name	Interest or concern	When?
1. Neighbours	Noise, dust and smoke	When logging started on Back Road in 2005
2. Local government	Effects of trucks on local roads	When planning permit was lodged this year
3. Friends of the yellow-tailed black cockatoo	Loss of habitat for yellow-tailed black cockatoo	When blue gum plantations began to be established in the neighbourhood
4. Next stakeholder		
5. Next organisation		

Assessment 1

Locate 2 or 3 media reports on issues concerning plantations, preferably relating to your region, and assess:

1. what was the nature of the issue reported and was the concern factually based?
2. who was concerned and why?
3. how the matter was reported? Consider, for example, whose information and opinions were sought or obtained and whether the issue was reported objectively.

Summarise this in a short report on each media report using the 3 points above as a structure; a few hundred words should suffice.

2. PLAN A PROMOTIONS PROGRAM

This section of the learning resource addresses identifying the issues a plantation promotions program will address, defining purposes, objectives and outcomes, assessing the resources, time and costs required, selecting suitable promotional modes and methods, researching the resources available to address the issues and bringing this together into a plan that can be submitted for necessary approvals.

DEFINE PURPOSE AND OBJECTIVES

To plan a promotions program, we must understand why the issues that the program must address have arisen. This will ensure that the appropriate purpose and objectives are defined and that the program is aimed at key stakeholders. In the context of promoting plantations, we should therefore consider:

- why plantations were established
- plantation types, regions and purposes
- the key factors arising from plantation establishment that led to the issues that a promotions program should aim to address
- the environmental, social and economic effects of plantations compared with other land uses, so that the program can provide context and messages to address the issues.

This information, which is summarised in this section of the learning resource, helps identify how the issues arose that a plantations program will address, and therefore helps work out how to address them. Codes of practice and certification should also be considered because these can be used to show people that plantations are managed in accordance with sound environmental protection principles.

The sources of information used in this section, together with other references, are listed at the end in ***Sources, references and further reading***.

Why were plantations established?

Tree plantations of species selected for their timber production potential have been established in Australia since the 1870s (Carron 1990). That was about 100 years after European settlement started and clearing of forests and woodlands for farmland began. Two factors prompted people to start those first plantations. First, in some regions there was too little natural forest to provide the timber that the settlers and farmers needed for house construction, firewood and other purposes. Much of South Australia and the basalt plains of western Victoria, for examples, had few natural forests. Softwood tree species, whose timber was easier to work for building, was especially lacking. The second factor was that the gold mining industry that began in the 1850s had a voracious demand for timber and left large areas denuded, notably in several regions of Victoria. For this reason, the first Victorian government forestry agency grew from a branch (pun intended) of the Mines Department!

Pinus insignis (now known as *Pinus radiata*) brought from California and other species, softwoods and hardwoods, were planted at a number of places in South Australia from 1876. A few of those early plantings remain today (for example, Figure 1). *Pinus radiata* was also planted in Victoria, at Mount Macedon, by 1880, and soon after that near Ballarat, Creswick and other places severely affected by gold mining. Also by the late 19th century, many miles of *Eucalyptus cladocalyx* (sugar gum, introduced from South Australia) shelterbelts were

established criss-crossing western Victoria. These were established by sowing seeds in furrows. Sugar gum was chosen due to its suitability for fence posts and firewood; there was very little natural forest to provide those essential products in that region.

By 1900 it was apparent that *Pinus radiata* was the best species for plantation forestry in southern regions of southern Australia. Pines from the Caribbean region of the United States of America, were found to be suitable for the sub-tropics and tropics from northern New South Wales to north Queensland. Native species were also found to be suitable for plantations. Hoop pine (*Araucaria cunninghamii*) is the only native softwood used but there are many native hardwoods; these will be discussed below.

Figure 1: Radiata pine planted in 1900 at Kuitpo, South Australia; a registered heritage site (source: Parsons *et al.* 2006)**.**

Pines for self-sufficiency

The rate of development of softwood plantations peaked briefly in the 1930s, because planting trees was used to create employment during the Great Depression, before declining to negligible levels until the 1960s. From 1967 through the 1970s, the Australian Government provided finance to the State Governments to develop plantations. This arrangement, which was formalised by the *'Softwood Forestry Agreements Act 1967'* and subsequent Acts, was based on a policy to aim to make Australia self-sufficient in forest products. The loans have now been repaid and the plantations established with that money now support major regional industries that produce most of the wood used by Australians for home construction and other purposes.

When those agreements began in the 1960s, the more accessible land in areas where rainfall was sufficient for plantation forestry had been cleared for farming by the 1960s. When State Governments went looking for land for plantation forestry, they therefore had to look at native State forests. By this time too, an increasingly urbanised and affluent Australian community was learning about the biodiversity values of native forests. Removing native forests to plant pines is what led to the first community backlash against plantation forestry. Environmental organisations took up the cause, and a generation of people were told that plantations were something to worry about. The term 'environmental desert' came to be used at that time as part of the anti-plantation public relations campaign, and is still used today by people who oppose development of plantations.

By the 1980s, clearing of native forests for plantations waned, along with pine plantation development generally. Responding to the opposition to clearing public native forest, the Victorian government turned to buying cleared farmland in the north-east and south-west of the state. This led to a further backlash, this time from farmers who didn't like farmland in their neighbourhood planted with trees, and local governments, who were worried about the effects on local roads.

Expansion of pine plantations generally declined from the 1980s, although small areas continue to be planted. A notable exception is farm forestry and agroforestry planting of Maritime pine (*Pinus pinaster*, a native of the

Mediterranean region) to help rehabilitate farmland damaged by dryland salinity in the wheat belt of Western Australia.

Eucalypt plantations

Eucalypts were tried in the first era of planting, and there are some small trial areas dating from the late 19th and early 20th centuries remaining. However, with a few exceptions, eucalypts were not favoured for plantations until relatively recently. Among the exceptions were the sugar gum shelterbelts mentioned above and *Eucalyptus astringens* (brown mallet) plantations that were established in Western Australia from 1927 to 1960, primarily for **tannin production**. Others were in the Coffs Harbour area of coastal New South Wales where, from the late 1950s and through the 1960s, Australian Paper Manufacturers planted *E. grandis* (flooded, or rose, gum) to grow **pulpwood** for a planned pulp mill that was never built and in the Strzelecki Ranges of southern Victoria, where the Forests Commission Victoria planted *E. regnans* (mountain ash) and other species on abandoned farmland.

In the 1980s, the potential to grow *E. globulus* (Tasmanian blue gum) plantations to produce pulpwood for the Japanese paper industry was realised. Western Australia's Department of Conservation and Land Management led the way with this because **reforestation** was needed to help control salinity in the south-west of the state. CALM developed joint venture arrangements with Japanese pulp and paper industry and commodities trading organisations. Other State governments and private companies followed suit. At last count there were 19 Japanese-funded plantation projects around Australia with a combined planted area of 119 000 hectares.

Private investors also saw the potential to produce pulpwood for the Japanese paper industry, and to earn fees by bringing in mainly city-based high-income earners to provide the capital. **Managed investment schemes** were not new and the vast majority dealt in real estate, shares and share derivatives. **Private investment schemes** in plantation forestry were also not new, having been around in Australia since the 1920s, albeit on a relatively small scale and growing radiata pine. This changed in the 1990s.

The combination in the 1990s of a potential market for hardwood pulpwood (in the form of **woodchips**), high marginal personal tax rates (which provide an incentive for investments that provided an initial tax-deductible outlay) and the availability of managed investment schemes led to a massive increase in the rate of plantation development. The short-term attraction for the investors was an immediate tax deduction for the expenses associated with plantation establishment (excluding land costs) that enabled individual investors to offset their tax liability from other income. The long-term attraction was the profit from sale of the wood eventually harvested. From a wider perspective, the managed investment scheme structure enabled pooling of many individual investors to create the scale necessary to establish sufficient plantations to make wood production businesses viable.

The blue gum boom

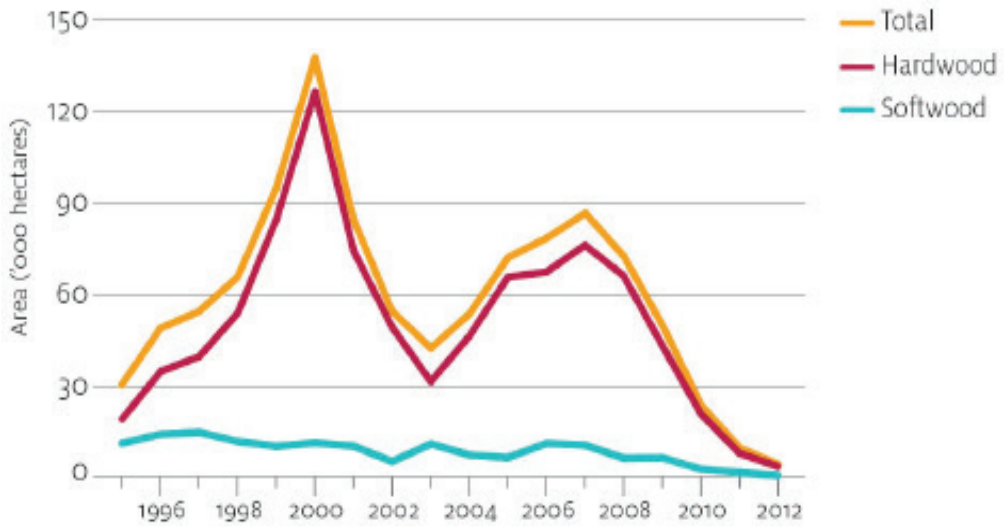
All this investment meant that for 10 years or so from the mid 1990s, the rate of new plantation development soared to levels never seen before (Figure 2). This started in Western Australia and soon moved to the Green Triangle region of south-west Victoria and south-east South Australia and other regions selected on the basis that there was considered to be adequate site productivity and potential for a sufficient plantation area to be developed close enough to a processing facility or port.

A joint government and industry policy called *'Plantations for Australia – The 2020 Vision'* helped set the policy scene to encourage this investment. The demand for land to grow these plantations caused another backlash against plantation forestry, as people in regional communities feared the effects of land use change.

Tasmanian blue gum was the first native species used on a substantial scale for short rotation plantation forestry in Australia. It has been found to grow well in temperate regions provided there is adequate rainfall and soil depth. Its key attribute is an ability to grow rapidly to produce an adequate pulpwood yield, preferably within 10 to 15 years. Shining gum (*E. nitens*) is more suitable for this purpose on cooler sites, such as much of Tasmania. Several other eucalypts, notably flooded gum (*E. grandis*) and Dunn's white gum (*E. dunnii*) are more suitable in the warmer climates of northern New South Wales and southern Queensland. Mangium (*Acacia*

mangium), a native Queensland species that is planted extensively in Indonesia and Vietnam, was also used in the Tiwi Islands of the Northern Territory.

Figure 2: New plantations established, 1995 to 2012



Source: Gavran (2013)

After a busy decade, new plantation development by managed investment schemes stalled when banks foreclosed on the major managed investment scheme companies in the aftermath of the 'global financial crisis'. That left a few small schemes, a few other private investors and a few state governments still going. The total plantation area is now expected to decline over the next several years because some of the land bought in the busy decade has proved to be not suitable for plantation forestry, and because the source of capital for replanting has dried up. It is therefore likely that commercially unviable plantations will be cleared or not replanted after harvesting, and the land probably will be converted back to agriculture.

A significant minority of hardwood plantations established from the 1990s has been aimed at **sawlog production**, rather than pulpwood. A small army of farm foresters planting trees on their own land is responsible for some of these plantations. Many farm foresters were supported, at least initially, by government-funded projects. Government support for **farm forestry** or agroforestry, as it is also called, was justified by the potential for increasing tree cover to help rehabilitate land. A few managed investment schemes also used hardwoods, including eucalypts, teak (*Tectona grandis*) and African mahogany (*Khaya senegalensis*) and one institutional investor is continuing to expand African mahogany plantations in northern Australia.

The result today is that we have a wide range of plantation types across Australia, reflecting the history of plantation development and the suitability of particular tree species to grow the required wood products in local environments. The main types of plantations and the purposes for which they are grown are summarised below.

Table 1: Types of plantations for a range of climates and products

Region	Main species	Main product
Tropical – high rainfall	Mangium	Paper products
Sub-tropical – medium rainfall	Flooded gum, Dunn's white gum	Paper products
Temperate – medium to high rainfall	Tasmanian blue gum, shining gum	Paper products
Tropical – high rainfall	African mahogany, teak, some native species	Sawn timber for furniture, flooring and other high-value uses
All regions	Various eucalypts	Sawn timber for building and furniture

Temperate – medium rainfall	Caribbean pine, slash pine and hybrids	Sawn timber for building, joinery, furniture, plywood, other high value uses, posts and poles; residues are used for paper, particleboard and medium density fibreboard
Temperate – low to medium rainfall	Maritime pine	
Tropical, sub-tropical – high rainfall	Hoop pine	

Altogether, there are about 2.0 million hectares of plantations in Australia. While that might sound a large area, it is a small proportion of land used for crops and agriculture, as shown in the table below.

Table 2: Plantations compared with areas of other major crops and land uses, Australia

Land use	Area (million hectares)
Wheat	13.9
Barley	3.7
Canola	2.5
Timber plantations	2.0
All agricultural crops	32.0
Land used for agriculture	405.5

Sources: ABS 7121 Agricultural commodities, 2011–2; Australia's State of the Forests Report 2013.

CONSULTATION WITH KEY STAKEHOLDERS

Section 7.1 outlined why plantations were established from era to era, the types of plantation established and the land on which they were established, highlighting the key issues that arose and likely that a plantations promotion program will have to address. The specific issues relevant to a particular plantations promotion program in a particular region will depend on how these circumstances applied in that region. The following activity aims to identify those specific issues. As part of that activity, key stakeholders must be consulted to seek their views and information they possess on plantation development in your region. Key stakeholders might include other people in the plantation management organisation and people and organisations who were identified through Activity 1.2.

Activity 2.1

Research plantation development in your region (or a region you are interested in), the general economic and government policy factors that led to that development, and the issues this has led to in the local community that a plantations program could address. While doing that, consult with key stakeholders in your organisation and externally to obtain their views on issues of concern. Drawing from what you have found, list 5 of those issues that a plantations promotion program could address for your region and the outcome a promotions program could aim to achieve. Summarise the issues and outcomes sought using a structure such as the table below, or other convenient way. Some examples are provided.

Issue to be addressed	Outcome sought from promotions program
Concern over effects on wildlife habitat	Community's understanding of effects and safeguards applied to conserve and protect habitat is improved
Concern over job losses	S have information on jobs provided by plantation forestry and wood products manufacturing
Concern over potential reduction of flow in Murray River	Community's understanding of actual scale of plantation development and effects is improved

RESOURCES, TIMELINE AND BUDGET

When developing the plantations promotion plan it will be necessary to estimate the resources, including the people, required and to develop a budget using that information and cost estimates. Consultation will then be required with the organisation's coordinating or operational personnel and management to ***determine*** whether this suits the resources available or whether the plan must be reconsidered.

The project plan timeline can be developed by setting out stages, tasks and key deliverables for each task, such as suggested below.

Table 3: Key stages, tasks, deliverables and dates

Stage	Task	Key deliverable for each task	Due date
1	1.1	Define issues to be addressed and objectives	Week
	1.2	Develop program outcomes in consultation with stakeholders	Week
	1.3	Research and develop resources to identify responses to issues defined	Week
	1.4	Select and document proposed promotional modes and methods	Week
	1.5	Develop implementation schedule by estimating times required for activities	Week
	1.6	Estimate resources required, including staff time, and costs (noting that time and cost estimates will be reviewed later, such as when promotional methods have been selected)	Week
	1.7	Identify process to monitor the quality of the program (This could be a method to record the use, uptake, participation in and responses to the promotional modes and methods used.)	Week
	1.7	Undertake risk assessment in accordance with organisational procedures, including consideration of work health and safety requirements and compliance with legislative, certification and other requirements	Week
	1.8	Develop plan and obtain necessary approvals and authorisations to proceed	Week
	1.9	Communicate implementation schedule of approved plan to coordinating personnel	Week
2	2.1	Initiate promotional activities	Week
	2.2	Complete X number of promotional activities	Week
	2.3	Complete Y number of promotional activities	Week
	2.4	Complete balance of promotional activities	Week

Stage	Task	Key deliverable for each task	Due date
3	3.1	Consult stakeholders to assess responses to promotional activities	Week
	3.2	Consult stakeholders to assess further promotional activities required	Week
	3.3	Prepare draft report on responses to promotional activities	Week
4	4.1	Circulate draft report to management organisation stakeholders	Week
	4.2	Undertake consultation over achievements and further activities required	Week
	4.3	Finalise report	Week

PROMOTIONAL MODES AND METHODS

Having identified the subjects and issues your program will address and the target audience, you now need to consider the how to design a strategy to communicate with different stakeholders. This involves deciding what promotional modes and methods suit the circumstances.

Many different communication methods can be used. These are described in guides to consultation and participation methods in the forest sector, for example:

- The Handbook for operational community engagement within Australian plantation forestry (http://www.crcforestry.com.au/publications/downloads/CRCForestry-CE-FINAL.pdf). This handbook was designed for Australian forest managers, and many of the methods included can be applied in other work situations as well, including in operation of wood and paper processing facilities (142 pages).
- The Online Consultation Guide Book, http://bangthetable.com/freebies/onlineconsultationguide/, is produced by 'Bang the Table', an on-line consultation web site, and focuses specifically on methods for using on-line approaches to consultation (69 pages).
- Public Participation in Sustainable Forest Management, http://www.northeasternforests.org/FRPC/files/1237487548SR_200506beckleypub_en.pdf provides a guide designed for use in the forest industry (60 pages).

Some advantages and disadvantages of the main communication methods are outlined below. The suitability of each communication method for particular issues and stakeholders can be assessed on the basis of factors including:

- practicality and accessibility to each identified stakeholder or stakeholder group
- costs in terms of personnel, expenditure and time required
- the time required, and how urgent is the need to initiate the program to address controversial issues
- particular specialist expertise required, and whether the plantation manager has this expertise or would have to engage external consultants or experts for the work
- whether there are practical ways to monitor the quality of the program, in terms of effectiveness in engaging target stakeholder groups.

Websites

Many people now use web sites as the first point of contact with organisations when they are seeking information. Web sites should be considered a high priority option in any promotions program. While the cost of developing a web site is clearly an issue, a key advantage of using web sites in a promotions program is that web site content can be updated frequently at negligible additional cost compared with material published in paper form. Another advantage is that web sites can be used to enable responses from visitors, so that the plantation manager might get some feed-back about whether stakeholders' consider that their concerns are being addressed. However, web sites are only accessible to people with adequate computer access and skills.

As for all written components of a promotions program, when preparing web site content you must consider the literacy levels of the target audience, especially when presenting information of a scientific and technical nature.

The numbers of visitors to the site can provide a way to monitor effectiveness of web sites as a promotional activity to some extent, especially if a facility for visitors to respond is provided.

Newsletters and information sheets

Newsletters, information sheets, brochures, and other published materials may be used to communicate information about how the organisation you work for operates, including its practices, activities and principles. These can be published as paper documents, on-line or both. Newsletters and information sheets are appropriate in most situations within the Australian context.

As for the content of web sites, published information is only accessible to people who have adequate literacy levels to read and comprehend the material, and the means to access the written materials. Adequate literacy needs can be high, depending on how technical the communication material is: a lack of literacy in specific scientific or technical language, for example, is very common. This must be considered when written information is developed. If literacy levels are low in some or all of the stakeholders you are working with, you will need to consider using methods other than written materials to communicate. In all cases, you need to ensure that any written information uses language that is easily understandable by the intended audience.

Published materials usually can be designed to fit different levels of available resources and there are usually no work health and safety considerations in producing this type of material. You will need to carefully budget the likely costs, which will vary depending on the printing and postage involved, and extent to which you plan to have materials professionally designed or edited.

Letters and e-mails

Letters, e-mails and other forms of one-to-one written communication may be used to communicate with individual stakeholders. These can differ from newsletters and information sheets and potentially provide a further benefit because, as well as providing generalised information about your operations, they can be used to discuss specific issues of relevance to the stakeholder that is being written to. Letters may be used to notify stakeholders of planned operations and invite comments or discussion of any concerns, to report on how you responded to their views, or for many other forms of communication.

Letters and e-mails are appropriate in most situations within the Australian context. As for other written material, letters and e-mails are only accessible to people who have adequate literacy levels to read and comprehend the material and the means to access the written materials. You cannot assume that everyone you need to communicate with has access to e-mail. Also as for other written material, when preparing letters and e-mails it is important to ensure that scientific or technical matters are explained appropriately for the intended audience.

Letters and e-mails usually don't require many resources and there are usually no work health and safety considerations in producing this type of material.

Existing community networks

Existing community networks include formal groups such as community organisations, volunteer groups, farming groups, citizen's associations, or informal social networks such as networks of family and friends within communities. These existing networks can provide good opportunities for building relationships either by joining and participating in activities regularly. Organisations also provide opportunities for non-members to address meetings and to attend other activities; these opportunities could be useful components of a promotions program. Sometimes you will join these networks not to promote specific issues related to your organisation, but to contribute to their objectives and activities, in other words, to be a good corporate citizen. At other times, you may seek to join these networks to promote specific objectives of your organisation or to work together with others to achieve a shared objective, for example working on joint programs to manage feral animals in forest management situations.

Existing community networks can provide a means of effectively interacting with multiple stakeholders. However, care is needed in identifying who you will be reaching – membership of some networks is restricted, and if you choose to use existing networks to engage with local communities, you need to identify whether any people in these communities you plan to engage with are excluded from the networks.

It is not always appropriate to attempt to use existing community networks to engage in dialogue about your organisation's activities. These networks provide a range of important benefits and services to their members. If your participation in the network might disrupt any of these benefits, you should consider alternative means of engaging with stakeholders. The stakeholders involved will typically decide who has access to networks, and their views should be respected on whether you should attempt to become a part of the network.

The resource needed for this type of engagement is staff time. You need to ensure staff have adequate time to engage in the social network's activities appropriately to enable a meaningful relationship to be developed. For example, if joining a local bushfire volunteer brigade, staff need to be able to attend necessary volunteer activities.

Depending on the type of network involved, there may be work health and safety considerations to consider when encouraging staff of your organisation to take part in the network. These need to be assessed for each case.

Good Neighbour Charters

Good Neighbour Charters are statements developed by industry organisations that explain to their neighbours, that is, people who live in, work in, or visit their local community, how they address issues of concern to them. Developing and publicising a Good Neighbour Charter could be an effective way to address some issues to be covered in a program to promote plantations. Examples of Good Neighbour Charters in the Australian forest sector can be found at:

- Tasmanian Good Neighbour Charter (6 pages) http://cdn.forestrytasmania.com.au/assets/0000/0552/FOT5958.pdf.
- Forest Products Commission (WA) Good Neighbour Charter (4 pages) http://www.fpc.wa.gov.au/content_migration/_assets/documents/about_us/publications/FPC-community-engagement-and-good-neighbour-charter.pdf.
- Australian Blue Gum Plantations Good Neighbour Charter (1 page) http://www.austgum.com.au/australian-plantations-woodchips/documents/Good%20Neighbour.pdf.

Developing a Good Neighbour Charter could take significant staff resources and time but there are usually no work health and safety considerations in producing this type of material. Public meetings and workshops would commonly play a useful role in developing a Good Neighbour Charter.

Public meetings and workshops

Meetings and workshops that are open to all people in the community can be arranged to present information on a specific issue and provide an opportunity for stakeholders to present and discuss their concerns. Such meetings are often used to communicate information about a planned activity or development or to address issues of current concern.

Your organisation could be the sole organiser or it might be more appropriate for the meeting to be organised by or in partnership with a local organisation or government agency that has an interest or responsibility in the issues to be presented. Having such an organisation take the lead could be especially useful in situations where there is a risk that vexatious stakeholders might use a public meeting to promote their own views to the exclusion of your objectives.

Arranging for independent experts to address meetings and workshops can be a useful way of providing stakeholders with information from sources not related to the plantation manager or forestry and wood products industries, and which stakeholders might therefore consider to be more objective.

Demonstration activities

People working in the forestry and wood products industries may be familiar with these industries being the target of demonstration activities! However, that is not the type of demonstration activities intended

here. Rather, what is intended is the 'field day' type of activity commonly used in extension programs in rural production systems such as agriculture and farm forestry. These are not new to plantation forestry, being commonly included in tours provided as part of conferences. The aim of this type of demonstration activity is to show people what is happening and explain why. In the context of a promotions program, this might then lead to an improved understanding of management practices, which might help to dispel misapprehensions and lessen concerns. Learning from agricultural extension practices, demonstration activities could play a useful role in promoting plantations.

Significant costs and work health and safety considerations could arise when conducting demonstration activities, since access to operational sites within the plantations will usually be required. Transport requirements, road conditions, hazards on site and other such factors must therefore be considered.

Mass media

Newspapers, radio and television clearly could play a major role in any promotions program. While paying for media time might not often be cost-effective for a program that addresses plantation related issues in a rural context, rural media often provides opportunities to air information as part of general news services. Small circulation regional and local newspapers and regional radio can be very good at this. Using these opportunities will require developing relationships with the journalists involved. It might also require media skills training for representatives of the plantation business or organisation.

Activity 2.2

Starting with your responses to Activity 2.1 and the communication methods outlined above, develop and document a program of promotional activities that reflects the subjects, issues and stakeholders you have identified and that allows for the priorities accorded to each stakeholder or stakeholder group and for the relative practicality and likely cost-effectiveness of different communication methods. Summarise your program in the table below or other convenient format.

Activity 2.2: Program of promotional activities

Issue to be addressed	Proposed promotions activity
Concern over effects on wildlife habitat from developing blue gum plantation	Publicise regulatory requirements to reserve habitat through company web site and newsletters; organise interviews on regional radio
Concern over job losses	Negotiate with state regional development organisations to commission research into employment effects of plantation forestry and wood products manufacturing; publicise results as above
Concern over potential reduction of flow in Murray River	Use interviews with local media organisations to explain the company's plantation expansion plans and published CSIRO research to show that effects on flow will be negligible
Neighbours worried about smoke, dust and fire risk from plantation operations	Engage public relations firm to develop Good Neighbour Charter using community consultation methods

ADDRESSING COMMON CONCERNS

The fundamental tools and resources needed to develop a plantations promotion program are a knowledge and understanding of the technical, scientific and economic basis for the issues that the program will address and data and sources of information from which to develop the content of the program. These tools and resources will help identify how a plantations program can respond to identified issues. An introduction to the main areas of concern commonly identified with plantations, as listed in section 6 above, is provided below. The sources of this and additional relevant information are in ***References, sources and further reading***.

Effects on water use and salinity

Trees have a longer growing season and usually more foliage than annual crops and pastures. Tree canopies intercept rainfall, a significant proportion of which then evaporates rather than infiltrates into the soil. Tree root systems often penetrate deeper than the roots of pastures and many agricultural crops, so that trees use more of the water that has infiltrated into the soil. Taking these factors together, forests tend to intercept and use more of the available rainfall than other crops and pastures, so that there is less runoff from forested catchments than from those other land uses. However, these factors are all highly variable across catchments and for different plantations and other vegetation types, and should therefore be considered in context.

Until the 1980s, most plantations were established on native forest sites so that there would have been little long-term change in water use by vegetation in those catchments. Since the 1980s, most plantations have been established on farmland that had been cleared of forests many years previously. This led to concern in some regions, especially in the Murray-Darling Basin during the severe drought from the late 1990s to mid 2000s, that plantation expansion would reduce water supply for agricultural or domestic use. That concern was increased by studies that assumed that the area of plantations in the Murray-Darling Basin would increase by more than 300%, when little increase was likely and an increase of 10% would have been a realistic target. Such studies understandably led to alarming over-estimates of the effect on water use.

Putting those concerns in perspective, when promoting plantations we could point out that:

- Plantations in most situations occupy only a few per cent of the total catchment area (Table 4). Small changes in the far more extensive land uses in the rest of the catchments could have greater effects than marginal increases in plantation area.
- Plantations tend to be aggregated in certain localities, so that further up the catchment in smaller and smaller sub-catchments the plantation proportions of the sub-catchments are larger. The hydrological research shows that it is difficult to detect an effect where less than 20% of a catchment is reforested. That proportion tends to be reached or exceeded only in smaller upper sub-catchments.
- Concerns about water use by plantations arose during the decade when the plantation area was expanding rapidly. There is currently little likelihood of further substantial expansion.
- The alternative use for any additional water used by plantations is usually irrigated agriculture. Whether that water use is efficient, and whether plantation forestry is a better use for it, in socio-economic as well as in environmental terms, should be considered objectively.
- A plantation's water use increases after planting, reaches a peak when the growth rate is highest and is less for some years after plantations have been thinned. The hydrological effect can vary widely depending on location in the catchment. Various factors can therefore be assessed to manage the actual plantation water use.
- Plantations and farm forests have been shown to be a useful way to manage dryland salinity. Western Australian salinity control programs that include reforestation with eucalypt and pine plantations have slowed the rise of salinity in the Kent River, stabilised salinity in the Warren River and reduced salinity in the Collie and Denmark Rivers.

The rate of development of new blue gum plantations in south-east South Australia was exceptionally high in the decade from about 1996 to 2005. Concerns then grew about the effects of the trees on the regional aquifers

that are the source of water for irrigated agriculture and other purposes. This led to plantation forestry being included in the water allocation plans that govern the allocation and trading of rights to use groundwater. To enable this, a 'deemed rate' of water use in megalitres per hectare per year is determined for plantations where the water table is less than 6 metres of the surface. This volume is taken into account together with agriculture, aquaculture and other water users by introducing a water licensing system for commercial forests. Existing plantations are allocated a license for the deemed volume. People and organisations planning to develop new plantations must acquire a water allocation license if the area to be planted constitutes 10% or 20 ha (whichever is greater) of the total area of the property.

A review undertaken by CSIRO for Forest and Wood Products Australia concluded: *"The impacts of plantations on water security have probably been over-emphasised when considered at a regional and national scale. This is especially so when considered at whole-of-catchment scale, the amount of water intercepted by plantations when compared with downstream users and other components of the water balance. Local scale impacts are important in some areas especially where plantations occupy a large proportion of a unit of water management. For several jurisdictions, groundwater issues emerge as the primary concern, despite the recent national emphasis on the impacts of plantations on surface water supplies. For many of the catchments supplying drinking water and environmental flows, native forests exert the overwhelming control on water availability."* (Polglase and Benyon 2009).

Table 4: Land use in catchment areas with above 600mm average annual rainfall

Land use	Plantations[5]		Agriculture %	Native forests %	Other uses %
Catchment	Proportion of catchment %	Proportion of all Australian plantations %			
Millicent Coast, South Australia	13.6	8.8	72.2	11.1	3.1
Glenelg, Portland, Hopkins, Victoria	7.2	9.2	74.9	17.0	0.8
Lachlan, Macquarie–Bogan, NSW	1.5	3.6	73.9	17.0	3.1
Murrumbidgee, NSW	4.0	6.2	53.8	40.0	2.2
Upper Murray, NSW–Victoria	2.5	2.2	27.1	68.1	2.5
Northern Victoria[1]	2.2	2.9	43.1	52.9	1.8
Tamar, Esk, Northern Tasmania	4.1	2.2	29.9	63.9	2.1
North-west Tasmania[2]	9.6	4.4	35.0	54.1	1.2
Western Australia[3]	5.7	16.3	35.0	58.1	0.3
South-east Queensland[4]	2.5	9.6	47.5	48.2	1.8

1. Northern Victoria data are for the Goulburn, Broken, Ovens and Kiewa River catchments
2. North-west Tasmania data are for the Smithton-Burnie Coast, Mersey, Rubicon and Forth River catchments.
3. Western Australia data include all catchments in south-west Western Australia from Perth to Albany.
4. South-east Queensland data are for the Brisbane, Burnett, Maroochy and Mary River catchments.
5. Based on plantation areas as at 2005, when the total national plantation area was 1.74 million hectares compared with 2.00 million hectares in 2013. The plantation percentage will therefore have changed slightly in some regions, but probably by less than 0.1% of the total catchment area.

Source: Australian forest profiles, Plantations, Bureau of Rural Sciences, 2008.

Soils and nutrients

As for other crops, most of Australia's plantations are in blocks of uniform age and one species and are managed intensively to optimise yield. This has led to concerns over whether plantation forestry is sustainable in terms of effects on soils and nutrients and use of chemical fertilisers and pesticides.

Plantation establishment requires cultivation and removal of grass and other competing vegetation. This means there is potential for soil degradation and erosion. However, unlike for annual crops, only a portion of the site is affected and this happens only once during production periods ranging from 10 to 30 or more years. The area affected by cultivation of annual crops in Australia each year is hundreds of times greater than that disturbed by plantation forestry.

Most soil erosion in plantations is from roads and tracks. Good design, correct drainage measures and adequate maintenance minimises that erosion. The planning and precautions that must be applied to these practices are controlled by codes of practice that apply to plantation forestry across Australia. Given the reduced frequency of soil disturbance, it is likely that establishing plantations on farmland and grazing land will lead to reduced soil erosion and improved run-off water quality.

Some people are concerned that plantations will have adverse effects on soil quality, such as increasing acidity and removing nutrients. It is possible that some soil properties will change after reforestation with plantation trees. However, just as in agricultural production systems, such changes can be monitored and managed if necessary.

In longer plantation production cycles, nutrient losses have been shown to be low, especially when compared with almost every other agricultural crop on an annual rate basis. Shorter plantation production cycles, particularly for eucalypts, lead to higher nutrient loss rates, especially for calcium, but annual removals are still usually less than for agricultural crops.

While there is less scientific evidence about long-term productivity of forest plantations than for other crops, plantations remove lesser amounts of nutrients from the soil from year to year than agricultural crops. Most of the more mobile nutrients are recycled through the site as tree leaf litter decomposes and silvicultural practices usually aim to retain as much of the nutrients on the site as practical. Fertilisers can redress deficiencies in plantation forestry, just as they are commonly used in agriculture.

Activity 2.3

Investigate the silvicultural practices used in plantations you are involved with and consider their likely effects on quantity and quality of water run-off and on soil quality. Are there any adverse effects and if so, how are they managed? What 3 messages might you wish to promote about these issues and what would be your chosen mode for each? Summarise what you have found, in a table such as provided for the following activity or other convenient form.

Herbicides, insecticides and other pesticides

Plantation forestry, as with most agricultural enterprises, requires the use of pesticides for crop protection and to enhance production. Pesticides are chemicals or chemical mixtures used to control weeds, insects, fungi and other things that adversely affect growth or health.

A survey of chemical pesticide use found that plantation forestry accounted for 0.7% of total chemical pesticide use in Australia (Jenkin and Tomkins 2006). Of the expenditure on pesticides used in plantation forestry, 99% was on herbicides and 1% on insecticides. With one exception, all chemical pesticides used by the Australian plantation forestry industry were developed for agricultural use and are used in agricultural food production systems. The exception is sulfometuron methyl, which is used for weed control for a range of industrial purposes.

The Australian Pesticide and Veterinary Medicines Authority regulates chemical pesticide use in Australia. The same regulatory process applies to the Australian plantation sector and to agricultural producers and other chemical pesticide users. The maximum legally permitted rate of chemical application is specified on the product label. The survey found that actual application rates used in plantation forestry were generally substantially lower than the maximum rate permitted. Most pesticide use in agricultural production is by individual farmers and land managers.

Herbicide use in plantation forestry is usually confined to the first year or two of a plantation crop cycle, which could be 10 years for a short rotation pulpwood crop or up to 30 years for most pine plantations. For the remainder of the crop cycle, pesticides are only used to treat pest or disease outbreaks. Since trees tend to recover from insect pest outbreaks, it is often not necessary to use pesticides unless the impact is severe or is repeated from year to year. In comparison, pesticide use in agricultural production systems tends to be much more frequent and pre-emptive, at least annually in most crops and in some cases multiple applications in each year of for each crop.

Applying pesticides from the air by using helicopters or fixed-wing aircraft raises the issue of potential drift of chemicals from the plantation site to adjoining farms or other land. This is, of course, also an issue for agriculture. The national survey of pesticide use found that plantation forestry accounted for a maximum of 0.5% of the land aerially treated with chemical pesticides. This doesn't change the need for plantation managers to take full responsibility for ensuring that aerial spraying activities are only undertaken when weather conditions are suitable and that other safeguards are implemented. These requirements are specified in standard operating procedures, codes of practice and/or other regulatory documents and systems.

Lastly, it is useful to remember that chemical pesticides are expensive. Plantation managers and other users have a financial incentive to avoid and minimise their use. Considerable research has and is being put into working out the most cost-effective means of dealing with weeds and insects that affect plantation forests.

Activity 2.4

Summarise the operating procedures, codes of practice and/or other regulatory documents and systems that apply to use of chemical pesticides by your organisation.

Document, section	Requirement
E.g., Code of Forest Practice, section x	E.g., specifies weather condition restrictions for aerial spraying
E.g., company standard operating procedure	E.g., specifies pesticides that can be used, circumstances for use and allowed application rates
E.g., manufacturers instructions	E.g., permitted uses for pesticide; application rates

Biodiversity

Until the 1980s, most plantations were softwoods planted on land where there was previously native forest. The biodiversity of those plantations is clearly considerably less than that of the native forest previously on those sites. That is an environmental effect of growing wood. How serious that effect is depends on factors such as what proportion of the native forest type in the region was cleared, how much remains and how the plantation was designed with respect to retention of patches and buffers (Figure 3). It was required practice when these plantations were planned to reserve steeper slopes and riparian areas. Considerable areas of native forest had already been kept as National Parks and other conservation reserves. The proportion of native forest used for plantations in a region is therefore quite small, and there are considerable areas of similar native forest remaining within the same region. The regional effect on biodiversity is consequently likely to have been small.

Since the 1980s, most plantation expansion has been of eucalypts and the vast majority has been established on farmland or other previously cleared sites. Those sites clearly lacked the biodiversity of the original native vegetation that had been cleared to make way for agriculture many years before. Patches of native vegetation – even individual trees that survived from when the original native forest was removed – were usually retained. The biodiversity of the plantation should therefore be compared with that of the former agricultural land use, under which it is likely that the surviving native vegetation and trees might not have had much of a future.

Figure 3: Native forest interspersed with plantations.

Photo: University of Tasmania

Activity 2.5

Study the videos:

- *'Biodiversity and the importance of remnant vegetation',*
- *'Catchment scale impacts, managing salinity: A success story in the Denmark catchment', and 'Catchment scale impacts of commercial blue gum forestry on agriculture and conservation in South Western, Western Australia'.*

These are available at:
http://vimeo.com/channels/bluegumforestryinwa/videos/page:1/sort:preset.

Summarise the issues raised and the positive and negative effects of blue gum plantation establishment.

Social and economic impacts and benefits

Change has been a constant feature of agriculture in Australia ever since the first wheat was sown near Sydney Harbour, on a site that is now part of the Sydney Botanic Gardens, soon after the first fleet landed. Plantation expansion is only one of many factors that have contributed to that change, and with few exceptions is arguably a minor one. Just a few of the myriad contributing factors in the past century are:

- The soldier settlement schemes following both world wars; large rural holdings that had been settled by graziers in the colonial era were purchased by state governments for 'closer settlement', that is, they were sub-divided into much smaller lots to provide farms for returned soldiers. Unfortunately, many of these farms proved to be too small to be financially viable. This precipitated the need for farms to consolidate to remain viable and farms that were not viable could be bought for plantations.
- The collapse of the wool market from the 1960s when new synthetic fibres were developed and increasingly adopted so that demand for wool fell. This also made many farms less viable, so they could be bought for plantations.
- The emergence of the European Economic Community 'Common Market' from 1956, which affected world trade in agricultural products for many years afterwards. Australian agricultural producers lost a key market when Britain joined the European Economic Community in 1972.
- The increasing real cost of labour, which encouraged mechanisation of agricultural operations, leading to lower labour requirements and increased capital requirements and farms needing to be larger to remain viable.
- Globalisation of markets and a long-term decline in terms of trade, meaning that markets for agricultural products have become increasingly competitive and prices have become lower in real (that is, adjusted for inflation) terms.

For these and other reasons, the number of farmers in Australia has been declining for many decades. Over the 30 years to 2011, the number of farmers declined by 106 200 (40%), equating to an average of 294 fewer farmers every month over that period (ABS 2012). By far the dominant cause of this decline is smaller farms becoming

less financially viable over time and other farmers buying more land to achieve better economies of scale. Average farm size has therefore been increasing. From 1982—3 to 2002—3, the average size of Australian farms increased by 23%, from 2720 hectares to 3340 hectares (Productivity Commission 2005).

The reluctance of younger people to take over family farms contributes to this trend. This is shown by the median age of farmers, which increased by 9 years between 1981 and 2011, while the median age of other workers increased by 6 years. Over the same period, the proportion of farmers aged 55 years and over increased from 26% to 47%, while the proportion of farmers aged less than 35 years fell from 28% to just 13% (ABS 2012).

What happens when plantation forestry expansion is added to the mix?

The socio-economic effects of the plantation forestry industry evolve as the industry matures. Four main phases can be identified, each with particular features and consequences for regional employment, economic activity and social effects. The early or establishment phase is when new plantations are being developed but are not yet ready for harvest. An intermediate or early production phase can be identified between the establishment and production phases, when some harvesting commences and expansion is continuing. In the production phase the plantation area has stabilised and harvesting and replanting continue, but the wood harvested is exported from the region where it is grown because no processing industries have developed to turn the wood into finished products. In the mature phase, manufacturing industries have developed in the same region; this adds substantially to the economic activity arising from the recurring harvesting and replanting activities. There are bound to be exceptions to this general characterisation, but it helps to categorise and assess the issues.

Change in landuse

The main change of land use occurs during the establishment and early production phases, when land is being converted from a prior land use to plantation forestry. In most regions around Australia where new plantations have been established since about the 1980s the immediately prior land use was agriculture. Therefore, a portion of the farming population left the farms to retire or to continue farming elsewhere. During this phase in some regions there were frequent objections from the remaining farmers that the price of land had been pushed up by companies buying land for plantations. Perhaps those farmers were concerned because sooner or later they might have wanted to buy additional land. It is quite likely that land purchases by plantation companies did help push prices up, given the high level of demand for land suitable for plantation forestry. However a high level of demand for land for plantations only lasted for a few years (Figure 1), and during that time farmers who wanted to move out had the benefit of better prices for their land.

In Tasmania, a substantial proportion of new eucalypt plantations on public and private land have been planted on native forest sites that supported fewer residents. The effects on the local population will therefore have been less.

Job creation

Also in the establishment and early production phases, jobs are created in plantation development management companies and in support services, such as machinery hire and operating, tree nurseries, tree planting and fertiliser and pesticide supply and application services. This job creation off-sets the job losses arising from fewer farmers and lower demand for agricultural support services. However, the people who take these jobs tend to be based elsewhere in the region or in regional centres, rather than in the same locality as the farmers who left. Small communities therefore lose population at the expense of larger towns and regional centres, just as they have been tending to do since the colonial era.

Employment in harvesting and primary processing increases during the early production phase and reaches a peak when the plantation area has stabilised, by which time there is a rough balance from year to year in the area harvested and re-established. In addition, large numbers of short-term jobs are provided in the construction industry by the development of primary processing facilities. For example, up to 900 workers were employed in the construction of the Visy Industries pulp mill at Tumut from 1999 to 2001.

During the mature phase, the processing of logs into wood products generates most employment in the plantation sector. Log processing industries have reached a substantial scale in the major softwood plantation regions, such as the Maryborough-Gympie area of south-east Queensland, Bathurst-Oberon area of central western New South Wales, north-east Victoria and south-west New South Wales, the Green Triangle region of south-western Victoria and south-east Australia, and south-western Western Australia and central Gippsland. The socio-economic benefit in these regions derives from the fact that the logs are processed into finished wood products – sawn timber, particleboard and other panels, plywood, pulp and paper, posts and poles, etc.

Economic growth

The effects of these activities on the value of regional output are illustrated for the south-west slopes region of New South Wales by the data in Table 5. Furthermore, there are many secondary processing businesses that turn the primary manufactured products into 'value-added' products. For example, sawn softwood timber is made into trusses and frames for house construction, mouldings, furniture components and other products; panels are made into joinery products; pulp is made into paper and packaging products. These activities add further to regional economic activity and employment.

Table 5: Value of output from plantations in south-west slopes region, New South Wales ($ million/ year)

Activity	1993–4	2002–3
Plantation management	$28.3	$45.7
Harvesting and haulage	$21.6	$32.1
Timber processing	$361.4	$549.8
Total value of output	$401.4	$574.5

Source: Schirmer (2005)

Most logs are processed into wood products within the regions where they are grown, whereas much of the agricultural products, such as wool, grains and livestock, leaves the growing region unprocessed. The plantation industry can therefore contribute proportionally more to regional employment and economic activity. For example, in 2005 the plantation forestry used about 9% of all land used for primary production in the higher rainfall part of the Green Triangle region but generated 30% of the gross value and 23% of the employment generated by primary industries in the region (Econsearch Pty. Ltd. 2005).

Development of processing industries to use most logs from hardwood plantations has only reached a minimal level of 'value-adding' in most hardwood plantation regions of Australia. This is because most of the production is pulpwood that is exported as woodchips. The benefits of domestic manufacturing are therefore largely unrealised.

Several regional studies commissioned due to concerns about the effects of forestry managed investment schemes 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 was significant plantation expansion from the mid 1990s through the 2000s. Conclusions of these studies are that:

- Plantations, including those funded by a managed investment schemes, generate more jobs than sheep and beef grazing and cropping once timber harvesting has commenced (Table 6).
- 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.
- 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 6: 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

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 wood
3. When plantations are producing wood at a steady rate of production.
4. The ranges given in brackets show the variation in employment as a result of 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 (2009a,b); Schirmer et al. (2008); Schirmer et al. (2005a,b). Data represent the average across the different regions examined in these studies.

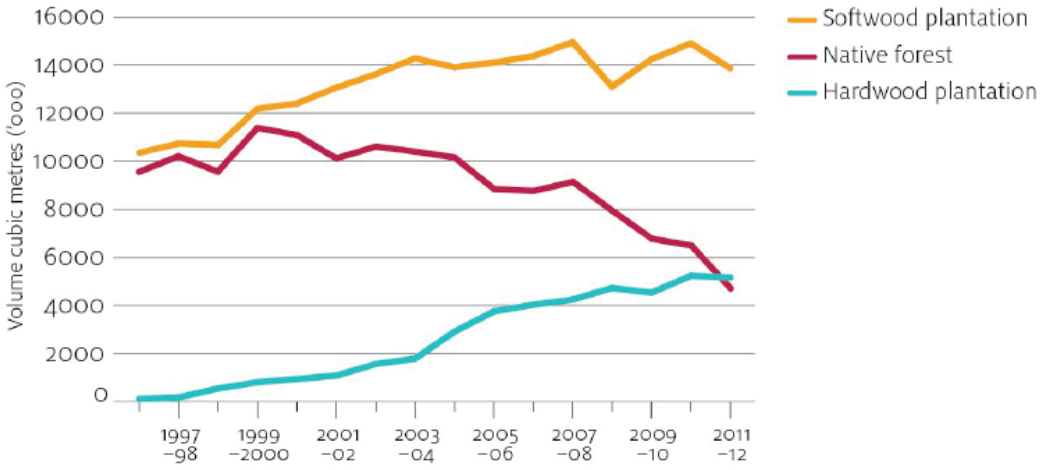
Source: Schirmer (2009).

Market opportunities for plantation products

Concerns about plantations could be addressed by not having them, and therefore avoiding the problem altogether. It might take a while and a fair bit of money, but they could all be removed and the land used for something else. However, there are several reasons why that would probably be impractical and counter-productive. The key reasons are outlined below.

Log supply from plantations has been steadily increasing for many years while log supply from native forests has declined, so that plantations now supply over three quarters of Australia's log harvest (Figure 4) and can continue to do so for many years (Figure 5). Production from native forests is likely to be stable in future (at best) or to continue to decline, almost entirely because of land use decisions by governments.

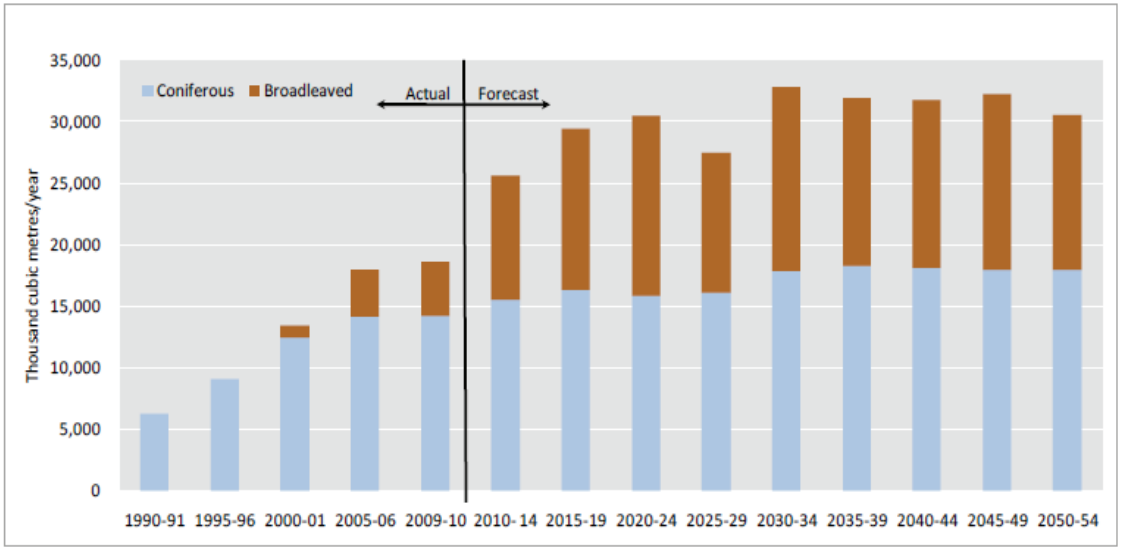
Figure 4: Log harvest by forest type, 1996–7 to 2011–12



Source: Gavran (2013)

The volume of softwood plantation logs shown in the graph above provide most of the wood used by industry to make the building products used for construction of houses and other buildings. This includes sawn timber, particleboard, medium density fibreboard, mouldings and plywood. The hardwood plantation logs are nearly all pulpwood that is exported in the form of woodchips to Japan and China, where they are used to make paper. Conversely, Australia imports around $2 billion worth of paper products each year.

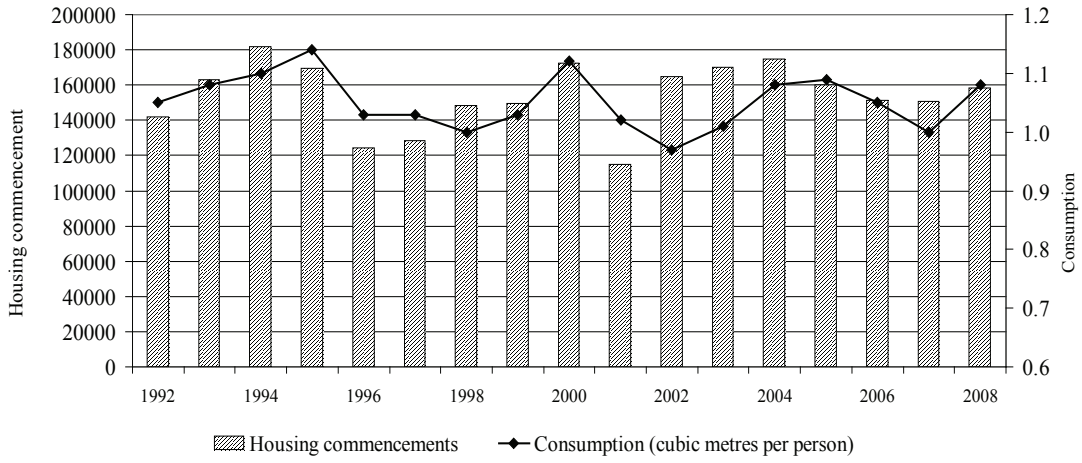
Figure 5: Actual and forecast annual average plantation log supply



Source: Gavran et al. 2012.

Domestic consumption of wood products has been proportional to population for many years, fluctuating with cycles of activity in home building and averaging close to 1.0 cubic metre per person (Figure 6).

Figure 6: Housing commencements and timber consumption, Australia, 1992–2008



If we still want to use wood products but don't want to grow our own wood, the alternative is to import it. A large proportion of timber consumed in Australia is already imported. However, importing even more of our wood products would come at a cost in social, economic and environmental terms. The economic cost is illustrated by the data in the table below.

Table 7: Value of wood products imports, $million

Product	2000–1	2005–6	2010–11
Paper and paperboard	2088	2187	2223
Manufactured paper products	378	426	557
Sawn timber	428	419	473
Wood-based panels	152	228	289
Wood pulp	317	225	180
Other wood products	471	532	685
Total wood product imports	3834	4017	4407

Source: ABARES (2012)

Market opportunities – carbon

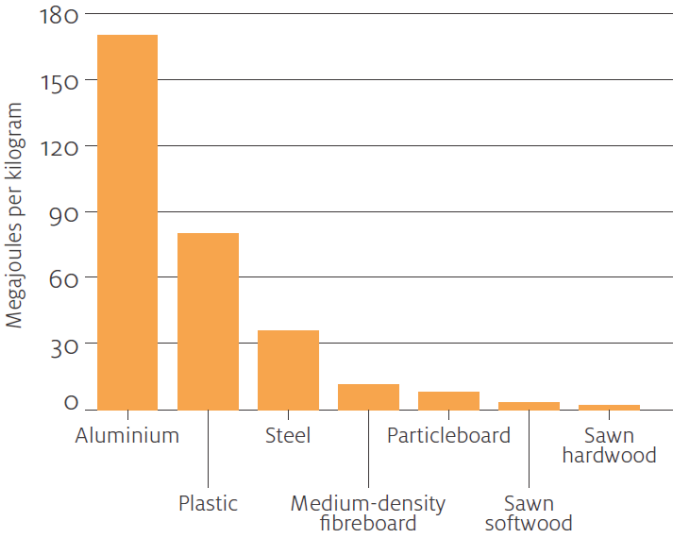
An alternative to having plantations to produce timber is to not use wood products, but to use materials made from metal or plastic instead. However, that also comes at a cost, especially in increased energy used, which has significant environmental repercussions if you are concerned about the effects of carbon dioxide emissions on the atmosphere. This suggests a market opportunity to promote plantations as a way of reducing carbon dioxide emissions.

Wood products contribute to carbon dioxide emissions reduction in four ways:[3]

- The trees sequester carbon as they grow and store it for the duration of the rotation in the bole, roots and other biomass that accumulates on the site and in the soil. For plantations established on farmland, where the original forest was cleared many years before, this means that the stored carbon increases to levels far higher than on the farmland. While a large proportion of this is released as carbon dioxide when the plantation is harvested and the stored biomass decomposes, overall in the long term the carbon stock is higher than it was before the plantation was established.
- Carbon is stored in manufactured wood products. The period for which it is stored ranges from short (for example, some paper products) to quite long (for example, structural timber in buildings and waste materials in land-fill).
- Many wood products generally can be substituted for more 'carbon intensive' materials, that is, materials such as metals, concrete and plastics that incur higher atmospheric carbon dioxide emissions during their production (Figure 7, Table 8).
- Wood waste from plantations, from silvicultural operations and final harvesting and from log processing, can be used for bioenergy and biofuels. This replaces energy produced from fossil fuels that would otherwise be used.

3 Refer to Australia's State of the Forests Report 2013, Indicator 5.1a, for details.

Figure 7: Embodied energy in new materials



Source: ABARES (2012)

Table 8: Comparison of material use and effect on carbon emissions and storage to build a typical 180m^2 house

House frame material:	Wood frame	Steel frame
Frame only	13 m^3 wood	5 tonnes steel
Other components	8 m^3 wood	8 m^3 wood[1]
Total carbon stored	9.7 tonnes	3.7 tonnes
Total carbon released to atmosphere	2.2 tonnes	6.6 tonnes
Balance of carbon	7.5 tonnes stored	2.9 tonnes released

Notes:
1. This comprises the wood components, such as flooring, architraves and joinery, of a steel-framed house.
Source: Turner (1990)

Codes of practice

Managing forests and plantations for timber production is arguably regulated far more closely than is management of rural land for other purposes, including agriculture.

Codes of practice for forestry operations (or similar regulatory instruments) have been in force in all states and territories for many years now, including since 1987 in Tasmania, and since 1989 years in Victoria. They typically provide mandatory minimum standards, operational prescriptions and guidelines for meeting environmental protection requirements during operations in native forests and plantations.

A key requirement of these codes of practice is that plantation establishment, management and harvesting operations be properly planned to ensure minimal environmental impacts. They specify measures to minimise erosion caused by site preparation, harvesting and road construction and maintenance, protection of water courses (through buffering of streams) and restrictions on the use of fertilisers and pesticides. In most cases, standard requirements have been specified for harvesting plans, and in some cases standardised plan formats have been developed. This aims to ensure that every operation is conducted in ways that meet the overarching requirements of forest management planning and environmental protection legislation.

The appropriate authority with responsibility for tree harvesting on public lands is the State government public land management agency. On private land, responsibility varies among states. For example, in Victoria private

land tree harvesting is a local government responsibility, whereas in New South Wales and Tasmania it is State government responsibility.

A key distinction between codes of practice and certification is that the former are mandatory but the latter is voluntary.

Certification

Certification was introduced to the forestry and wood products industries as a way to assure people that the wood products they use come from wood that is obtained legally from forests and plantations that are managed sustainably. It therefore has a potentially important role in a program to promote plantations as a sustainable land use.

The basic elements of forest certification are:

- A standard, or set of criteria, requirements and indicators, is developed using a participatory process involving representatives of sectors with an interest in how forests are managed. The sectors involved would typically include forest managers, community and environmental organisations, the timber processing industry and wood products consumers. The criteria, requirements and indicators cover environmental, economic, social and cultural factors that can be used to demonstrate that the forests are managed sustainably.
- Forest managers may opt to apply for certification, that is, participation is voluntary. Forest managers must therefore weigh up whether the costs of adapting forest management to meet the standard, if required, and the costs of achieving certification are warranted by any benefit in community acceptance or market advantage for their products.
- The organisation that manages the standard development accredits suitably qualified independent parties to assess whether the forest manager meets the requirements of the standard.
- If the requirements of the standard are met, the standard development organisation issues a certificate of compliance to the forest manager. The forest manager can use the certificate to assure customers and other interested parties that the forests are managed sustainably.

Two forest certification schemes operate in Australia. These are:

- The *Australian Forest Certification Scheme*, operated by Australian Forestry Standard Limited, a standards development company accredited by Standards Australia.[4] The 'Australian Forestry Standard' is the set of environmental, economic, social and cultural criteria and requirements developed by Australian Forestry Standard Limited that can be used to assess whether forests and plantations are managed sustainably. The international Programme for Endorsement of Forest Certification[5] endorses the Australian Forest Certification Scheme.
- The *Forest Stewardship Council certification scheme*.[6] The Forest Stewardship Council was formed in the United States of America in the early 1990s by a group of wood users and traders and representatives of environmental and human-rights organisations. The Council developed its 'Principles and Criteria for Sustainable Forest Management', which are now the basis for the certification scheme managed by FSC Australia. Three separate certification organisations have each developed a standard based on these criteria and principles.

The managers of most large Australian plantation estates now accept certification, using either or both of these schemes, as a usual business practice.

4 Standards Australia is a non-government organisation that is charged by the Commonwealth Government 'to provide contemporary, internationally aligned Standards and related services'; refer www.standards.org.au. Many Australian Standards are derived from internationally agreed standards developed and managed by the International Organization for Standardization, refer www.iso.org.

5 Refer http://www.pefc.org

6 Refer http://au.fsc.org

Activity 2.6

Research the codes of practice and or other regulatory requirements that apply to plantations that your organisation manages. You might find that a good place to start is the accompanying learning resource ***Manage tree harvesting to minimise environmental impact***. Summarise what you have found in up to about 400 words.

SEEK AND OBTAIN NECESSARY APPROVALS

After having decided which issues your plantations promotion program will address, how they will be addressed and which promotional modes and methods are appropriate, it is necessary to ensure that key stakeholders, especially decision makers within you organisation, support your plan.

Assessment 2

Prepare a briefing paper requesting approval to proceed. The briefing paper should summarise:

- the key stakeholders identified, the issues of concern to each and 5 issues that the program will address
- the tools, resources, data and information that the plantations promotion program will use to address each of those issues
- the proposed promotional modes and methods
- the costs and timelines for the promotions program.

3. IMPLEMENT A PROMOTIONS PROGRAM

This section of the learning resource addresses finalising and implementing the promotions program in line with promotional modes and methods, schedule, budget and other requirements. This builds on previous work in which you will have:

- identified target markets by studying the plantations in your region, who owns them and who has interests or concerns about them and what legislative and regulatory requirements and certification obligations apply
- worked out why plantations of various types were established in your region and identified the issues and concerns that have arisen
- devised a timeline and budget for implementation of the program
- considered which promotional modes and methods are suitable for addressing the issues and concerns identified
- researched the issues to understand the causes of the concerns and how a promotions program can respond to them.

Implementing the program will require a documented plan that specifies:

- the issues and target stakeholder sectors that the promotions program will address
- the messages or arguments that will be used to respond to each issue and target stakeholder sectors
- promotional modes and methods to be used for each issue and target stakeholder sector
- the schedule for implementation, including start and finish dates for the entire program and for individual activities
- tools and resources required
- personnel required, and the role of each person
- a process to monitor the quality of the program, such as a method to record the use, uptake, participation in and responses to each promotional activity.

The plan can be submitted for authorisations and approvals in line with organisational requirements and, once those have been obtained, can be used to communicate the program to coordinating personnel.

Assessment 3

Using your responses to previous activities, assemble a plan to implement your promotions program:

1. select 5 examples of issues to address
2. identify the target stakeholder market for each issue
3. select an appropriate promotional mode or method for each combination of issues and target stakeholder market
4. propose a response or message to address each issue selected
5. estimate the resources, personnel, time and costs required for each promotional activity
6. develop a timeline
7. work out how the effects of each activity can be monitored.

Summarise the plan in a table such as provided below or other convenient form.

Issue	Target market	Response	Resources	Cost	Monitoring method

Concern over effects on wildlife habitat from developing blue gum plantations	Local environmental groups	Explain planning and code of practice requirements
		Implement system to monitor effects
		Publicise environmental benefits of reforestation
			Staff time
			Consultant ornithologist
			Newsletters
				$ salaries
				$ fees
				$ publishing
					Responses from stakeholders
					Local media coverage

Concern over job losses	Local government, general community	Commission research into employment effects
		Publish results
			Staff time
			Consultant socio-economist
			Brochures Newsletters
			Web site
				$ salaries
				$ consultancy fees
				$ publishing
					Local media coverage
					Publication down-loads

Neighbours worried about smoke, dust and fire risk from plantation operations	Neighbours, general community	Engage public relations firm to develop Good Neighbour Charter using community consultation methods; publicise through local media, company web site and newsletters	Staff time or community relations firm
			Brochures Newsletters
			Web site
				$ staff time or consultancy fees
				$ consultation expenses
				$ publicity
					Event attendance
					Responses from stakeholders
					Local media coverage
					Web site visits

4. MONITOR AND REVIEW THE PLANTATION PROMOTIONS PROGRAM

As for all workplace programs and projects, monitoring and review are required to ensure compliance with organisational and legislative requirements and obligations. Monitoring and review also ensures that you, your colleagues involved in coordinating the program and others in your organisation learn from the experience. The effects and achievements of the program can therefore be assessed and the design and implementation of future plantation promotions programs can be improved. Reviewing the program in this way can be referred to as a cycle aimed at continuous learning and improvement.

Specific questions to be asked at this stage could include:

- did the program achieve its objectives with respect to each issue addressed?
- was the program completed on time and within budget, and, if not, why not?
- did the program activities selected prove to be the most appropriate for the circumstances, or can refinements be identified for future programs?
- are further promotional activities required to respond to feed-back received?
- were additional issues identified during the program that warrant attention in subsequent programs?
- is training and development desirable for project staff to improve their effectiveness for subsequent programs?
- are any other actions required and were areas for improvement identified?

These and other questions can be considered 'performance indicators'. As well as being used to review the program, performance indicators can be incorporated into:

- staff employment contracts and agreements
- organisational business plans
- contracts for engagement of consultants and other service providers, such as consultants engaged to implement elements of future promotions programs.

Stakeholders within the management organisation should be consulted when selecting performance indicators for the project so that the indicators selected reflect the range of interests and responsibilities.

The starting point for this work should be to collate the data collected on each of the monitoring methods used for each issue addressed in the program.

Assessment 4

Either using your own promotions plan, or another's, evaluate the success of the activity. Did it achieve its objectives? What were the challenges and what might be your recommendations for improvement in future?

5. BRINGING IT ALL TOGETHER

When you feel that you are getting close to being ready for assessment you should meet with your assessor to agree on:

1. the most appropriate method(s) of assessment to be used to determine competence against the Unit of Competency
2. the timing of the assessment task(s).

At AQF Level 5 it is expected that you can collect and compile a range of data types and interpret, communicate and use this data. For this reason it is strongly recommended that a holistic approach be taken to assessment.

To demonstrate competence it is recommended you develop a promotions plan for development of a plantation in your area as a change in land use. For example, you could plan to promote the development of a small privately-owned plantation on agricultural land.

Step 1 – Develop a plantation promotions plan

If you do not have access to such a situation, you can develop a plan for an exemplar ***privately owned plantation***, with case study material provided by yourself or the assessor OR a plan to address an issue for an existing plantation. Regardless of approach, the completed Plan would need to ***describe***:

1. scope, purpose and objectives of the plan and assumptions
2. audience and stakeholders (including colleagues)
3. Likely issues related to plantation management
4. Impact of relevant legislation and regulations ie catchment plans, local government planning on plantations
5. consultation process ***for development of plan and outcomes***
6. Key messages
7. the range of promotions methods and tools and justification for choice
8. Required resources including budget and timelines
9. Approvals required
10. Risk assessment
11. Success criteria

Please note that the plan should include an explanation of why this program would appeal to stakeholder in terms of costs and benefits, the benefit and need for the promotions program.

Step 2 – Implement and review a plantations promotions plan

Provide a report for on the following aspects of this promotions project:

- ***Implementation activities and outcomes***
- ***Evidence of the effectiveness of the project***
- ***Amendments required to ensure that the objectives, quality and performance targets are met, and***
- ***recommendations for future programs.***

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SELF ASSESSMENT

Before commencing on your summative assessment take a few minutes to review this workbook and ensure you feel that you are confident about your skill levels related to this topic.

Use the table below to help you check your skills which have been taken from the *Required knowledge and Skills* section of the relevant Unit of Competency. Before commencing your final assessments it is important to review any sections in which you feel unsure. Please always ask your assessor/lecturer questions about areas you are unsure about.

In the table below, read the list of skills and knowledge you should have after completing this workbook.

1. Put a tick in the "confident" column if you can do this now and a brief comment re why you believe you have this skill.
2. Put a tick in the next column if you feel you need more practice and must review the work before completing final assessments also a brief comment as to why.
3. If you require further training, complete the third column listing what training is needed. Show this list to your supervisor or assessor and ask for more time or training before completing the summative assessments.

Skills/knowledge you should have	Confident	Need Practice	What additional training do I need?
REQUIRED SKILLS			
Technical skills sufficient to identify species suitable for plantation establishment for a range of soil types and climates; determine appropriate establishment techniques for a range of conditions; determine appropriate silvicultural regimes for a range of plantation types			
Communication skills sufficient to use appropriate consultative, communication and interpersonal techniques with colleagues, stakeholders and community groups			
Literacy skills sufficient to accurately prepare a range of reports, documentation and submissions where precise meaning is required; present written and oral information to a wide range of individuals and groups; use and adapt complex maps and diagrams			
Numeracy skills sufficient to monitor and maintain timelines and budgets; analyse qualitative and quantitative information and data			
Problem solving skills sufficient to demonstrate time and project management			
Planning and organisational skills to coordinate the acquisition of required resources, authorisations and approvals and to develop a promotions program			
REQUIRED KNOWLEDGE			
Applicable Commonwealth, State or Territory legislation, regulations, standards, codes of practice and established safe practices relevant to the full range of processes for promoting plantations as a sustainable form of land use			

Skills/knowledge you should have	Confident	Need Practice	What additional training do I need?
Environmental protection requirements, including the safe disposal of waste material			
Organisational, site and management standards, requirements, policies and processes for developing and managing a plantation promotions program			
Environmental risks and hazards			
Role of wood or waste products in generating renewable energy through biomass			
Minimising environmental impact			
Using energy effectively and efficiently			
Using material effectively and efficiently			
Species suitable for plantation establishment for a range of soil types and climates			
Types of plantation design appropriate to achieve a range of objectives			
Plantation establishment techniques			
Silvicultural regimes suitable for a range of plantation types			
Effects of plantation on soils, water quality, water quantity and biodiversity compared to other land uses			
Levels of use of fertilisers, herbicides, insecticides and other chemicals compared to other land uses			
Socioeconomic impacts of plantations on rural communities			
Use and demand for plantation products nationally and internationally			
Market opportunities for plantation products, including carbon storage			
Harvesting methods suitable for a range of plantation types			
Economic benefits of plantations compared to other land uses			
Fire protection and suppression in plantations			
Established communication channels and protocols			
Problem identification and resolution strategies			
Types of tools and equipment, and procedures for their safe use and maintenance			
Appropriate mathematical procedures for estimating and measuring, including calculating time to complete tasks			
Procedures for recording and reporting workplace information			

FEEDBACK

This learning resource has been developed to guide you through available topical information and to set activities for you to do that help you gain knowledge and skills appropriate to your work place or situation. Your competency will be assessed through your successful completion of the activities to a satisfactory standard and submitting these for review. Please complete the following table to notify us of an errors and suggested improvements.

Resource title	***Promote Plantations as a Sustainable Form of Land Use***

Page	**Description of error**	**Suggested improvement**
	web site link doesn't work	update link
	reference obsolete or unavailable	provide currently relevant or accessible reference, such as ...
	The activity is unrealistic and unhelpful	change it to ...

Additional comments

Click here to email your feedback form to ForestWorks

ACKNOWLEDGEMENTS

Preparation of this training resource has been a collaborative effort between ForestWorks and the Institute of Foresters of Australia. It is one of a set of seven as follows:

1. Manage sustainability in the workplace (assessment framework only)
2. Implement sustainable forestry practice
3. Manage tree harvesting to minimise environmental impact
4. Undertake carbon stock sampling of forests and plantations
5. Manage sustainable tree inventory
6. Promote plantations as a sustainable form of landuse
7. Build and maintain community relationships.

Project team

The project drew on the depth and breadth of technical knowledge and subject matter expertise of IFA staff, members and other experts.

Technical review

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Steering committee

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