7.1

LEGAL FRAMEWORK

INTRODUCTION

This sub-section details how and to what extent the country's legal framework—laws, regulations, guidelines—supports the conservation and sustainable management of forests. The legal framework includes regulations, mechanisms to clarify property rights, codes of practice, periodic planning and review, and public participation. One indicator (7.1.e) also deals with special values—environmental, cultural, social and scientific—and this includes the participation of Indigenous people.

A key element of the approach adopted in the 1992 National Forest Policy Statement involved negotiating 10 Regional Forest Agreements (RFAs) between the Commonwealth and State Governments. Operating for 20-years, RFAs provide for a reserve system, and for harvesting in forests outside the reserve system to comply with ecologically sustainable forest management (ESFM) principles, which provide resource certainty to industry; ensure that harvesting is at sustainable rates; and protect wildlife habitats, biodiversity, water quality, soils and heritage values. This is backed up by a Forest Industry Structural Adjustment Package (FISAP) funded at the Commonwealth and State Government levels to help forest industry businesses and workers adjust to changes in the native forest resources available to industry resulting from the RFA process.

RFAs are based on scientific assessments of forest values and uses in a region, and on consultation with stakeholders. One of the key achievements of the RFAs was the establishment of comprehensive, adequate and representative (CAR) reserve systems, based on nationally agreed criteria, also known as the 'JANIS criteria'.

The JANIS criteria set out targets for the conservation of ecosystems:

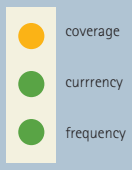
- 15 per cent of the pre-1750 distribution of each forest type;
- 60 per cent of the existing distribution of each forest type if vulnerable;
- 60 per cent of the existing old-growth forest;
- 90 per cent, or more, of high quality wilderness forests; and
- all remaining occurrences of rare and endangered forest ecosystems including rare old-growth forest.

This level of protection in RFA regions is very high by world standards. The application of the reserve criteria takes into account a range of regional priorities, including social and economic considerations. The criteria are guidelines rather than mandatory targets, designed to deliver good conservation as well as acceptable social and economic outcomes.

Further reading

JANIS (1996) Proposed Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia. Joint ANZECC/MCFFA National Forest Policy Statement. Implementation Sub-committee, Australian Nature Conservation Agency, Canberra

Indigenous peoples' property rights



Indicator 7.1a

Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it provides mechanisms to clarify property rights and establish appropriate land tenure arrangements that recognise traditional management practices and self-management as well as the existence of native title and the customary and traditional rights of Indigenous peoples

Rationale

The indicator is useful as it identifies changes to:

- the legal system and frameworks for land ownership and management, including self management;
- the legal system and frameworks for Indigenous land; and
- ownership and other inherent rights relating to land, particularly the rights and interests of Indigenous peoples.

The Commonwealth Government enacted the Native Title Act 1993 *and established an Indigenous Land Corporation in 1996 to purchase land for Indigenous groups displaced from their lands. States and Territories passed complementary native title legislation. The* Regional Forests Agreement Act 2002 *specifies that agreements between the States and Commonwealth Government about the management of forests must include the protection of Indigenous heritage values.*

This Indicator identifies and analyses mechanisms for strengthening the rights of Indigenous people through laws relating to land tenure and also by clarifying property rights in resources. It complements quantitative measures of title and other interests in indicators 6.4a(i) and 6.5d.

This State of the Forests Report is based on the five tenure categories described in indicator 1.1a. Some Indigenous tenures are contained within them, whereas native title rights can apply across them all.

The first Commonwealth law providing for Indigenous statutory title was the *Aboriginal Land Rights (Northern Territory) Act 1976*, which applied only to public land in the Northern Territory. It provided that a communal and inalienable title could be claimed where continued traditional occupation and use could be proved. Between 1981 and 1995, South Australia, New South Wales, Queensland and Tasmania passed broadly similar Acts. Western Australia has a process for transferring leasehold title to Indigenous communities.

The High Court of Australia recognised the existence of native title in 1992 and the Commonwealth Government enacted the *Native Title Act 1993* to provide mechanisms for determining it and give it statutory effect. Claimants must show continued association with land and the application of customary law. Applications are handled by an independent National Native Title Tribunal, which seeks mediation in preference to litigation.

The High Court decision on Cape York Wik Aborigines vs Queensland

The Commonwealth Government established an Indigenous Land Corporation in 1996 to purchase land for Indigenous groups displaced from their lands and consequently unable to show continued association. The States and Territories passed complementary Native Title legislation, the scope of which is summarised in Table 113. The *Regional Forests Agreement Act 2002* specifies that agreements between the States and Commonwealth Government about the management of forests must include the protection of Indigenous heritage values.

Table 113: Legal framework of property, customary and traditional rights of Indigenous peoples

Legal framework	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	C'wlth
Land rights									
Clarifies property rights	–	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Establishes land tenure that recognises traditional management practices and self management	–	Yes	Yes	Yes	Yes	Yes	No	–	Yes
Native title									
Existence of native title	–	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cultural heritage									
Recognises customary and traditional rights of Indigenous peoples	–	Yes	–	Yes	Yes	Yes	Partly	Yes	Yes
Allows traditional management on relevant public land (e.g., joint management)	–	Yes	–	Partly	Yes	Partly	Partly	No	Yes
Allows access to public land for traditional activities (foraging, hunting, ceremonial)	–	Yes	Yes	–	Yes	Partly	Partly	Yes	–
Allows access to sacred sites on public land	–	Yes	Yes	–	Yes	Yes	Partly	Yes	–
Allows access to sacred sites on private land	–	Yes	Yes	–	Yes	Partly	No	Yes	–
Allows access to sacred sites on leasehold land	–	Yes	–	–	–	Partly	No	–	–
Protects Indigenous peoples' cultural heritage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intellectual property rights									
Protects Indigenous intellectual property	–	Yes	–	Partly	Partly	Partly	No	–	–

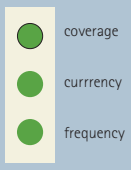
Where information is available:

Yes: Indicates that the legislation or mechanism exists and is fairly comprehensive

Partly: Indicates that the legislation or mechanism exists but does not cover all aspects or is limited in its application.

No: Indicates that the legislation or mechanism does not exist

Planning, assessment and review



Indicator 7.1b

Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it provides for periodic forest-related planning, assessment, and policy review that recognises the range of forest values, including coordination with relevant sectors

Rationale

This indicator shows how the legal framework demonstrates a regional commitment to achieving sustainable forest management.

Australia has four main national forest policy documents. All States and Territories have formal requirements for periodic review of forest-related planning processes for all publicly managed forests—generally every 10 years. Mechanisms exist in all States and Territories for vegetation management on private forests.

This indicator shows how Australia's legal framework demonstrates a commitment to achieving sustainable forest management. The indicator is similar to 7.2 b, which contains further relevant information. Laws, regulations and guidelines that encourage appropriate management and use of our forests form an essential part of the practice of sustainable forest management.

Forest policy framework

Australia's national forest policy framework is set out in four main documents.

National Forest Policy Statement

The National Forest Policy Statement provides a framework for the management of forests, in particular native forests. It has an underlying goal to develop an economically viable and ecologically sustainable forest industry. One of the key outcomes of this policy was the development of Regional Forest Agreements.

Regional Forest Agreements

The Regional Forest Agreements aim to create a balance between the environmental, social, economic and heritage values of the forests and provide certainty for the forest industries.

Plantations for Australia: the 2020 Vision

This policy seeks to enhance regional wealth creation and international competitiveness through a sustainable increase in Australia's plantation resources. It has a target of 3 million hectares of commercial plantations by 2020. Average annual plantings of 75 000 hectares are required to meet the target and current average plantings indicate that Australia remains well on track.

Forest and Wood Products Action Agenda

The vision of this Agenda is 'maximising sustainable and profitable activity for tree growing, value adding and marketing of Australian forest and wood products'. To achieve this, the Action Agenda identifies twelve strategic imperatives that industry, governments and other stakeholders need to address.

Australia's States and Territories have primary responsibility for forest management. Legislated procedures exist in all States and Territories for native forests and plantations on public and private land. Some of these procedures are administered by, and require coordination between State and local governments, statutory authorities and regional management authorities. In Victoria for example, mechanisms, overseen by local government and Catchment Management Authorities, are in place for vegetation management on private land.

The National Forest Policy Statement recommends regular inventory and review procedures for the range of forest values. The Australian Government enacted the *Regional Forest Agreements Act 2002*. It requires Annual Reports and amendments to RFAs to be tabled in the Federal Parliament. Complimentary legislation does not yet exist in all States where RFAs are in place, except for Tasmania which enacted the *Regional Forest Agreement (Land Classification) Act 1998*. Similarly, the New South Wales *Forestry and National Parks Estate Act 1998* provides for the New South Wales Forest Agreements.

Reviews of planning and assessment occur periodically at the regional level through the Regional Forest Agreement (RFA) process in those States where Regional Forest Agreements are in place (New South Wales, Victoria, Tasmania and Western Australia). The first review was completed for Tasmania in December 2002. Reviews of the other regions will be made between 2003 and 2006.

Regular reviews are also required under a range of legislative and regulatory instruments. Examples of forest related values incorporated in these reviews are listed in Table 114. This table includes both public and private forests. Reviews of forest management and other plans at the sub-regional or district level also occur at regular intervals and are described in indicator 7.2b.

Table 114: Legislation that provides for periodic forest-related planning, assessment, policy review and coordination with relevant sectors for all forest land tenure

	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	C'wlth
Biological diversity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Productive capacity	–	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Ecosystem health and vitality	–	Yes	–	Yes	–	Yes	Yes	Yes	Yes
Soil and water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Socio-economic	–	Yes	–	Yes	–	Yes	Yes	Yes	Yes
Periodic policy review	Yes	Yes	–	Yes	Yes	Yes	No	Yes	Yes
Coordination with relevant sectors	–	Yes	–	Yes	Yes	Yes	Partly	Yes	Yes

Where information is available:
Yes: Indicates that the legislation or mechanism exists and is fairly comprehensive
Partly: Indicates that the legislation or mechanism exists but does not cover all aspects or is limited in its application.
No: Indicates that the legislation or mechanism does not exist

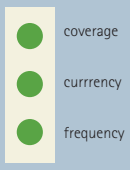
Further reading

Commonwealth of Australia (1992). National Forest Policy Statement: A New Focus for Australia's Forests, 2nd edition. Australian Government Publishing Service, Canberra.

TRPDC (2002). Inquiry on the Progress with Implementation of the Tasmanian Regional Forest Agreement (1997): Background Report. Tasmanian Resource Planning and Development Commission, Hobart.

TRPDC (2002). Inquiry on the Progress with Implementation of the Tasmanian Regional Forest Agreement (1997): Final Recommendations Report. Tasmanian Resource Planning and Development Commission, Hobart.

Public participation



Indicator 7.1c

Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it provides opportunities for public participation in public policy and decision-making related to forests and public access to information

Rationale

To assess whether the legal framework ensures transparency and participation in public policy and decision-making at the regional level.

The environmental impact and planning legislation of the Commonwealth and State Governments contains various requirements for public consultation, and the National Forest Policy Statement calls for public consultation in forest planning. Avenues for public involvement in the management of forests on privately owned or leasehold land exist through planning legislation.

Australia has well-established practices for providing opportunities for public participation at several levels, from public policy to public forest management. The model generally adopted in Australia follows one established by the Land Conservation Council in Victoria in 1970 for a review of the use of public land. It consists of:

- Announcement of plan or review to be made.
- Publication of a factual document describing the geographical, ecological, resource and social attributes of the area.
- Request for submissions about how the area should be used.
- Draft Plan issued, usually containing a statement of the number and nature of the submissions received.
- Draft Plan explained in public meetings and to stakeholders and individuals.
- Request for second submissions.
- Final Plan prepared and submitted for approval.

In all States and Territories, the processes for public consultation and participation extend to the management planning level for publicly managed forests. They include providing information on resources, impacts, uses and values, discussion papers on alternative plans, invitations to provide comment or written submissions, discussion forums and public meetings.

Public participation in the use of private forests is facilitated under planning legislation administered by local government. For example, planning consent may be required for activities that impact on forest and non-forest values—such as water, heritage sites. Indicator 7.1b describes some of the planning processes.

The effectiveness of public participation in influencing final decisions has not been assessed, but is thought to vary widely. Consultation is thought to have been least effective with the Indigenous community, due to the longer lead times required for consultation and to reach consensus within the community.

The RFA process included extensive consultation with the various forest management agencies, stakeholders and the public. Reports and maps resulting from assessments of the natural, cultural, social, resource and economic values were produced for public comment. Governments and stakeholders then negotiated options for forest use, which were reported and displayed for public comment. The nature of the consultation varied between States. For example, Consultative Forums were established for the regions in New South Wales to bring the general community, stakeholders and Government representatives together. Various stakeholder groups also had formal representation on the various technical committees, supporting the assessment process.

Case study – Namadgi National Park

Nature conservation reserves in the Australian Alps extend across adjoining areas in Victoria, New South Wales and the Australian Capital Territory. With the Commonwealth, these Governments entered a Memorandum of Understanding to formulate policies and management practices that were consistent across jurisdictions.

The Namadgi National Park at the northern end of the Australian Alps has an area of 106 000 hectares, representing 48 per cent of the area of the Australian Capital Territory. It has many natural values, significant Indigenous and non-Indigenous cultural sites, provides an important water resource, and is widely used for recreation. In 2001 the Australian Capital Territory Government entered into a joint management agreement with the local Indigenous people. It appointed an Interim Management Board with an Indigenous Chairperson to provide strategic advice on the preparation of a new management plan.

A discussion paper was released in March 2002 that set out the important values and the key issues. Seventy written submissions were received from the public over the next three months.

In January 2003, bushfires burnt more than 70 per cent of the Park's area. Nevertheless, preparations for the new Namadgi National Park plan continued. A report that combined the scientific literature and community submissions was issued in June 2003. It contained a statement of the Park's significance and a detailed elaboration of the values at world, national, alpine region and Australian Capital Territory levels.

Workshops were held in June 2003 in the Australian Capital Territory and in a community in nearby New South Wales to seek agreement on a framework of objectives, goals and principles from which the final plan will be prepared.

Further reading

Commonwealth of Australia (1992). National Forest Policy Statement: A New Focus for Australia's Forests, 2nd edition. Australian Government Publishing Service, Canberra.

Best practice codes

coverage
currrency
frequency

Indicator 7.1d

Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it encourages the development and application of best practice codes for forest management

Rationale

Codes of practice indicate a commitment to compliance with environmental management systems and continuous improvement in forest management practices.

All the States and Territories have legislation or administrative arrangements that specify management plans or codes of practice, or both, for forest management and use. Some have codes relating to fire management. Private sector forest managers have also developed codes. Local governments may use codes for forest planning purposes.

Until recently, codes of forest practice concentrated on timber production in native multiple-use forests. Codes of forest practice are being developed for nature conservation reserves, and the trend in private forest management is towards the adoption of voluntary codes of practice, in line with standards set for public lands.

The development of many of the codes has incorporated a public consultation phase. Some States and Territories—for example, Victoria—incorporate processes for periodic independent scientific review.

There are codes covering public forests in Western Australia, the Australian Capital Territory, Queensland and New South Wales. South Australia and Western Australia have joint private/public sector codes for plantations developed and used by the parties. In Tasmania and Victoria arrangements are legislated for both public and private native forests and plantations.

The *Tasmanian Forest Practices Act 1985* was amended in 2002 to require the development of forest practice plans for all relevant forestry operations including forest clearance across tenures, regardless of whether the purpose is timber harvesting or conversion to another land use. The five-year review of the Regional Forest Agreement recommended that the State complete a Reserve Management Code of Practice for its conservation reserves. This is being developed for release and implementation in 2003.

Victorian code of forest practice

Private sector forest managers have developed codes. Local governments may use codes when considering planning permits for forest-based activities. There are two major projects underway to develop new statewide codes: one covering all plantations in New South Wales and the other for all private forests in Queensland.

For private forests in New South Wales, the expectations of government and the community are reflected in the CRA process and complementary land management legislation such as the *Native Vegetation Conservation Act 1997*. This Act applies to native vegetation management on private lands and provides for:

- the conservation and management of native vegetation on a regional basis;
- encouragement and promotion of native vegetation management in the social, economic and environmental interest of the State;
- protection of vegetation of high conservation value;
- improvement of the condition of existing native vegetation;
- the encouragement of revegetation of land;
- prevention of inappropriate clearing of vegetation;
- promotion of the significance of vegetation;
- recognition of social, environmental and economic values.

Public forest agencies in most States and some of the major forestry companies have implemented or are currently developing environmental management systems. These are likely to play an important complementary role to codes and other forms of regulation. The case study below provides an example of the complementarity between the Australian Forestry Standard and the environmental management system process. Tables 115 and 116 outline the details of the application of codes according to tenure and the range of themes they cover.

States where Regional Forest Agreements are in place report progress annually. The Tasmanian Forest Practices Board audits compliance with 122 questions on a 15 per cent sample of all forest harvesting, roading and quarrying operations in that State. Average compliance on multiple-use forests has fallen from 97.3 per cent in 1998–99 to 96.7 per cent in 2001–2002. For non-RFA regions, assessment of progress takes place through annual reports by State and Territory forest agencies.

Table 115: Legislative requirement to apply codes of practice by tenure by State and Territory

Tenure	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Multiple-use forest	Compulsory	Compulsory	Not developed	Compulsory	Not developed	Compulsory	Compulsory, Fire management	Compulsory
Nature conservation reserves	Not developed	Fire management	Not developed	Not developed	Not developed	Compulsory	Fire management	Not developed
Other crown land	Not developed	Compulsory	Not developed	Voluntary	Voluntary	Compulsory	Compulsory, Fire management	Voluntary
Leasehold land	Not developed	Compulsory	Not developed	Voluntary	Voluntary	Compulsory[1]	Compulsory	Voluntary
Private land	Not developed	Compulsory	Voluntary	Bring developed	Voluntary	Compulsory[1]	Compulsory	Voluntary
Plantations	Compulsory	Compulsory	Voluntary	Bring developed	Voluntary	Compulsory[1]	Compulsory	Voluntary

Source: National Forest Inventory (2003)
[1] The code of Fire Practice does not apply on these tenures

The Australian Forestry Standard (AFS) is based on internationally agreed criteria, and embodies forest management performance requirements, which support continuous improvement toward sustainable wood production in Australia. The Standard is voluntary and will help promote access to both domestic and international markets for timber products from certified forests. It is applicable to all forests managed for wood production, regardless of type and scale of ownership.

A voluntary Chain of Custody (CoC) standard has been developed to complement the implementation of the AFS. The idea is to track the movement of wood from certified forests through various processing stages and then to the eventual delivery of products to wholesalers or retailers.

Independent and specialist certification bodies undertake certifications, assessments and audits against either the AFS or the CoC standard. In Australia, the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) accredits certification bodies to audit and certify compliance with either the AFS of the CoC standard. This provides an assurance that certification bodies are both competent and independent in regard to their certification activities. Certification marks or labels related to the AFS or the CoC standard can be fixed to a product to indicate that the product originated from a forest certified to the AFS.

Table 116: Range of content themes in codes of practice used in forests, by State and Territory, 2000

Content theme	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
Planning								
Care of soils	-	✓	-	✓	✓	✓	✓	✓
Water quality and flow	✓	✓	-	✓	✓	✓	✓	✓
Site productivity	✓	✓	-	✓	✓	✓	-	-
Timber harvesting plans	✓	✓	-	✓	✓	✓	✓	✓
Access to the forest								
Planning and siting roads	✓	✓	-	✓	-	✓	✓	✓
Road design and construction	✓	✓	-	✓	-	✓	✓	✓
Upgrading existing roads and tracks	✓	✓	-	✓	-	✓	✓	✓
Rock quarries and gravel pits	✓	✓	-	D	-	✓	✓	✓
Bridge, causeway and ford construction	✓	✓	-	✓	-	✓	✓	✓
Road maintenance	✓	✓	-	✓	-	✓	✓	✓
Harvesting			✓					
Design, planning and equipment	✓	✓	-	✓	-	✓	✓	✓
Wet weather	✓	✓	-	✓	✓	✓	✓	✓
Snig tracks and landings	✓	✓	-	✓	-	✓	✓	✓
Water quality and stream protection	✓	✓	-	✓	✓	✓	✓	✓
Salvage operations	✓	✓	-	✓	-	✓	✓	
Steep country	-	✓	-	✓	-	✓	✓	✓
Conservation of other values								
Flora	✓	✓	-	✓	✓	✓	✓	✓
Fauna	✓	✓	-	✓	✓	✓	✓	✓
Rare or endangered species	-	✓	-	✓	✓	✓	✓	✓
Landscape	✓	✓	-	✓	✓	✓	✓	✓

continued over

Table 116: Range of content themes in codes of practice used in forests, by State and Territory, 2000

Content theme	ACT	NSW	NT	Qld	SA	Tas	Vic	WA
continued from previous page								
Archaeology (cultural heritage)	✓	✓	-	✓	✓	✓	✓	✓
Geomorphology	-	✓	-	-	✓	✓	-	-
Forest establishment								
Reforestation	✓	✓	-	-	✓	✓	✓	✓
Maintaining forests								
Fire management	✓	✓	-	D	✓	✓	✓	✓
Pest, disease, weed control	✓	✓	-	✓	✓	✓	✓	✓
Use of chemicals	✓	✓	-	✓	✓	✓	✓	✓
Thinning	✓	✓	-	✓	✓	✓	✓	✓
Non-wood products/uses								
Apiary	-	✓	-	D	-	-	-	✓
Grazing	-	✓	-	D	-	-	✓	-
Tree ferns	-	-	-	-	-	✓	-	-
Recreation	-	✓	-	D	-	-	-	✓
Socio-economic								
Occupational Health and Safety	-	✓	-	-	-	✓	✓	-

✓ = The content theme exists in a code of practice that is used in the State/Territory but it is not necessarily covered on all land tenures. This table should be read in conjunction with Table 116

D = Draft Code of Practice

Note: Some of the content themes listed above are not in the main forestry-related code of practice for the State/Territory but are in a separate document—e.g., Code of practice for fire management

Further reading

Davies, P., Hart, R., Mitchell, C., Laffan, M., Wright, D. and Smethurst, P. (1999). Forest Practices Code Review of Soil and Water Provisions. Report to the Forest Practices Advisory Council. Forest Practices Board, Tasmania, 150 pp.

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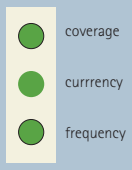
Gerrand, A.M., Miller, R.J., Joslin, A. and Catton, C. (2002) Incentives for forest plantations in Australia. Country report, part of a 9 country study presented to FAO Asia–Pacific Forestry Commission in Mongolia – Aug 2002. 48pp.

Specific values and participation by Indigenous people



Indicator 7.1e

Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests, including the extent to which it provides for the management of environmental, cultural, social and/or scientific values in forests, and ensures the participation of Indigenous peoples in all aspects of forest planning and management

Rationale

This indicator provides for qualitative and quantitative measurement of the legal framework to include special environmental, cultural, social and/or scientific values in forest management; including the recognition and inclusion of Indigenous perspectives and value systems. It allows for Indigenous self-determination through the articulation of values by Indigenous people.

This indicator is designed to provide an analysis of the legal framework through data collected for other indicators.

The assessments of Indigenous heritage, economic values and social values, including community needs, are part of the Regional Forest Agreement process. Processes for formally securing Indigenous engagement in active forest management for timber production vary between jurisdictions.

This indicator concerns the involvement of Indigenous peoples in the planning and management of forests so as to consider the special values of importance to them. It covers several levels from Commonwealth legislation to Indigenous management of their own lands.

The Comprehensive Regional Assessment process (part of the Commonwealth-State Regional Forest Agreements process) includes assessments of Indigenous heritage, economic values and social values. Written agreements provide explicitly for mechanisms of consultation to identify and protect Indigenous heritage and to incorporate Indigenous views in management. Agreements are subject to the Commonwealth Government's *Native Title Act 1993* (see indicator 7.1.a).

Processes for formally securing Indigenous engagement in forest management vary between jurisdictions. For example, in New South Wales:

- Aboriginal Land Councils, elders and other groups are consulted during the preparation of management plans and identification and protection of sites and artefacts of Indigenous significance.
- Aboriginal Cultural Heritage Officers are employed in many forest regions to manage heritage values in forests and facilitate communication with local Indigenous groups.
- Memoranda of Understanding document local procedures for the management of Indigenous issues.
- Co-operative Management Arrangements provide for management of shared forest by State agencies and local Indigenous communities.
- There are joint ventures with local Indigenous communities.

Aboriginal site identification near Bellbrook Community, Kempsey, New South Wales

Part 4A of the New South Wales *National Parks and Wildlife Act 1974* allows for specified reserves to be transferred to Indigenous people, leased back to the Government and managed jointly. Other States and Territories have structures in place to facilitate transfer of lands to Indigenous people. Provisions also exist for land to be leased back to the government.

Large areas of forest in Australia used for purposes other than timber production are not subject to RFAs. The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* may apply in these areas (the Act still applies in RFA regions, except for Part 3 of the Act which requires 'environmental approvals'). The principal objects of the Act include:

- recognising the role of Indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity;
- promoting use of Indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge; and
- promoting a co-operative approach to protection and management of the environment involving governments, the community, land-holders and Indigenous peoples.

These goals are pursued in collaboration between the Commonwealth and the States and Territories. Bioregional plans—similar in principle to RFAs—have been developed to integrate broad-scale socio-economic, cultural and biodiversity conservation goals, with customary fire management regimes being re-established in western Arnhem Land, Northern Territory. More recently, regional natural resource management plans under the National Action Plan on Salinity and Water Quality and the Natural Heritage Trust (NAP/NHT) have been developed and these provide for participation by Indigenous communities and encourage the use of Indigenous knowledge where appropriate to reverse land degradation

Cultural differences can present challenges to effective involvement of Indigenous people in forest planning and management. It is important to recognise that Indigenous people acknowledge that the use of forest resources is not necessarily incompatible with the maintenance of customary practice and protection of culturally important values.

Case studies – Indigenous fire management and maintenance of forest and associated values in Northern Australia

- *Fire behaviour and wildlife status in an actively managed clan estate*

The clan estate centred on the outstation Korlorbirrahda in Central Arnhem Land is one of the few places where Indigenous management has not been interrupted. A study of fire behaviour and an inventory of flora and fauna found that the fauna was more abundant than elsewhere, the flora was as rich as in the nearby World Heritage areas of Kakadu National Park, and stands of the fire-sensitive native cypress pine (*Callitris intratropica*) were larger and healthier than elsewhere. Moreover, the fire sensitive monsoon vine thicket and rainforest was preserved so that the vegetable foods important to Indigenous people remained abundant.

The traditional owners coordinated the activity among neighbouring clans to reduce the risk of wildfire and protect sites. Full restoration of the benefits of customary management is likely to require restoration of similar levels of coordination. The Caring for Country Unit of the Northern Land Council is seeking to build that coordination.

- *Adaptive management of fire for the partridge pigeon in Kakadu National Park*

The sedentary partridge pigeon (*Geophaps smithii*) uses small territories of only a few hectares in eucalypt forests. Although foraging birds favour sites that have been burned, they nest on the ground among patches of unburned vegetation during the dry season.

Maintaining burned and unburned patches in a few hectares is dependent on fine scale use of fire, preferably beginning early in the dry season when patchy burns are easiest to achieve. The forest habitat most used by partridge pigeons is the area burned first in the customary seasonal sequence of Indigenous fire managers. Implementing such fine scale burning over large areas is a challenge for land managers, even in such comparatively well-resourced sites as Kakadu National Park.

A small-scale adaptive fire management experiment that drew on the knowledge of traditional owners and other Indigenous people was conducted. This provided a forum for a valuable exchange of information and opportunities for collaboration for non-Indigenous park managers, traditional owners and other Indigenous land managers.

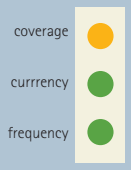
Further reading

Fraser, F., Lawson, V., Morrison, S., Christophersen, P., McGreggor, S. and Rawlinson, M. (2003). Fire management experiment for the declining Partridge Pigeon, Kakadu National Park. Ecological Management and Restoration 4: 93–101.

Yibarbuk, D.M. and Whitehead, P.J. (2001). Fire ecology and Aboriginal land management in central Arnhem Land, northern Australia: a tradition of ecosystem management. Journal of Biogeography 28 (3): 325–344.

7.2

INSTITUTIONAL FRAMEWORK



Public information and education

Indicator 7.2a

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to facilitate public involvement and provide public education, awareness and extension programs that make forest-related information available

Rationale

An institutional commitment to building community awareness and support is essential for the sustainable management of forests.

There are many opportunities for public involvement in forest-related matters, and governments are committed to public participation in forest management, extension activities and provision of information.

Most States and Territories have a legislative and institutional commitment to allowing public participation in the management of both native multiple-use forests and nature conservation reserves. The commitment is often less in plantations that are publicly managed as corporate or commercial enterprises. There is no similar commitment in private forests.

All States and Territories have forest extension and education programs. Some of these have a legislative basis. The level of implementation varies, depending on the available resources. In New South Wales a program for monitoring progress and achievement in environmental education has begun. The 'Learning for Sustainability' program, which includes forests, was developed and released by the New South Wales Government in December 2002. The plan was developed through wide consultation with the environmental education community.

All public forest-management agencies publish forest-related information and technical research papers. New South Wales and Tasmania each prepare annual reports on their performance. The Australian Government coordinates both the national State of the Forests Report and the State of the Environment Report. Much of this information is available on State, Territory and Australian Government agency websites, and through national programs including the National Land and Water Resources Audit, the Natural Heritage Trust and the Australian Greenhouse Office.

The Australian Government and some States and Territories have developed formal processes for facilitating communication between conservation and industry organisations and relevant government Ministers and agencies. These provide an avenue for contributing to the development of sustainable forest-management policies.

Table 117 shows the extent of opportunities for public involvement in forest-related matters. Actual visitor numbers to the various forest attractions—e.g., guided/interpretative walks, world forestry and environment days, and similar activities—could be used to gauge the level of public involvement, but these figures are not readily recorded or available. It is therefore impossible to measure the use of the services noted in the table. However, in New South Wales there is an annual reporting requirement for State Forests and for National Parks and Wildlife Services that provides greater detail on these activities.

Table 117: Number of public involvement opportunities, public education, awareness and extension programs, 1999–2000

	ACT	NSW[1]	NT	Qld	SA	Tas[1]	Vic[2]	WA
Number of public involvement opportunities								
Interpretation centres/walks	–	21	–	–	–	7	120	–
Guided interpretative walks	–	3 534	–	–	–	45	20	–
Displays in public places	–	266	–	2	–	12	117	–
Volunteer programs	–	2 507	–	1	–	5	16	–
Public Forums	–	1 606	–	–	–	–	42	–
Number of public education/awareness segments								
Radio	–	2 500	–	–	–	–	–	–
TV	–	500	–	–	–	–	–	–
Press	–	750	–	7	–	–	–	–
Number of reports/publications for:								
General public	–	295	–	6	–	82	80	–
Primary schools	–	29	–	4	–	14	5	–
Secondary schools	–	107	–	10	–	14	5	–
Tertiary institutions	–	222	–	–	–	14	–	–
Extension programs	–	38	–	–	–	–	–	–
Number of extension programs								
Forestry related	–	62	–	3	–	–	1	–
Vegetation management/conservation	–	4	–	7	–	–	3	–
Number of people using forest related website	–	216 000	–	–	–	50 000	–	–
Expenditure on public involvement, awareness and extension ($'000)								
School/children programs	–	600	–	40	85	–	240	–
Communication with general public	–	300	–	1 201	-	–	220	–
Extension programs	–	200	–	498	-	–	12	–
Other	–	5 400	–	3	-	–	–	–
Total expenditure ($'000)	–	6 500	–	1 742	85	–	472	–

Source: National Forest Inventory (2003)

[1] Nature conservation reserves and Multiple-use forests

[2] Multiple-use forests and some Nature conservation reserves programs

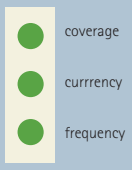
Case study – Community engagement: outcomes and opportunities on the Central Coast of New South Wales

In 2002 an association of community groups, an Aboriginal Land Council and a plant nursery business from the Central Coast of New South Wales contacted State Forests. The groups were interested in forests and the debate regarding their management. Of particular interest was the relationship between native forest harvesting in the Watagans forests, and the water supply for the growing Central Coast community.

State Forests has since undertaken a formal facilitated process, which has resulted in the development of a community engagement protocol (The Ourimbah Protocol) and an action plan of projects to be undertaken.

Conservation planning, Willis Reserve, Smiths Gully Landcare Group members, Victoria

Planning and review



Indicator 7.2b

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to undertake and implement periodic forest-related planning, assessment, and policy review including cross-sectoral planning and coordination

Rationale

Periodic regional planning, assessment and policy review by the responsible institutions provide the basis for continuous improvement in forest management.

All jurisdictions undertake planning, assessment and review for public forests. There are limited planning and assessment processes for private native forests, except in Tasmania. Planning and assessment for plantations is generally comprehensive. The National Forest Inventory provides continental-level forest-related information.

This indicator concerns the processes of planning and review for forest policy and management. It is closely related to indicator 7.1b.

Planning for public forest land is conducted at several levels. At the national level, the Primary Industries Ministerial Council, the Natural Resource Management Ministerial Council, the Forest and Forest Products Council and the Land and Water Biodiversity Council co-ordinate policy and planning for all natural resources. Policy is set out in agreed documents such as the National Forest Policy Statement and the Plantations for Australia: The Vision 2020. The former, released in 1992, takes account of cross-sectoral issues. The latter was reviewed and re-launched in 2003 and focuses on issues for the plantation sector.

The National Forest Inventory—a cooperative program of the Commonwealth and the States and Territories—provides continental-level forest-related information. More detailed resource inventories are carried out by State and Territory agencies.

All jurisdictions, except the Northern Territory, have formal requirements for periodic reviews of planning for public forested lands. However, coordination between the public and private sectors is limited in all States and Territories except Tasmania. Detailed planning is undertaken in the multiple-use forests and nature conservation reserves. The hierarchy of planning in Tasmania's multiple-use forests, for example, is set out in Table 118.

Table 118: Hierarchy of planning in Tasmania's multiple-use forests

Authority or plan	Planning period	Review period
Forests Act	Indefinite	As required
Regional Forest Agreement	20 years	Within every 5-year period
District Forest Management Plan	10 years	Annually
Wood Production Plan	3 years	Annually
Coupe Harvesting Plans	Few months	Inspected when finished

Fire management plans are prepared jointly by forest agencies, conservation agencies and rural fire services in most States and Territories.

There is no legislated requirement on private owners to prepare forest management plans, except in Tasmania where all harvesting and clearing is subject to plans prepared under the Forest Practices Code. Some land owners make plans for their wood-lots, often as a part of general farm plans. Local communities sometimes develop regional vegetation management plans. In New South Wales these can be administered under the *Native Vegetation Act 1997* that controls forest clearing. Community approaches to planning are fostered in the Landcare movement, and in some cases through Regional Plantation Committees or similar bodies. Private corporations make detailed plans for their own plantations.

Case study – Western Australia: development of a new forest management plan

Western Australia has a long history of forest planning. Following the restructure of State agencies and their responsibilities in 2000, a new forest management plan is being developed. New legislation separated responsibility for the management of forests from the conduct of commercial timber operations. Nature conservation reserves, multiple-use forests and timber reserves are vested with the Conservation Commission of Western Australia, which is responsible for their planning. The Forest Products Commission is responsible for the harvesting and regeneration of the forest, the sale of forest products and associated industry development issues.

The new management plan has the objectives of achieving or promoting conservation, recreation, timber production on a sustained yield basis, water catchment protection, and some other prescribed uses. The focus is on the management of multiple-use forest where disturbance activities are permitted. Planning is for a 10-year period.

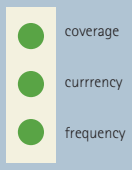
Opportunities for public participation in the development process for the new forest management plan have been significantly increased. These included a series of public forums and a stakeholder roundtable to provide input to a discussion paper, released in January 2002. Comments received in response to the discussion paper were incorporated in the draft plan. A second round of public forums was held during the statutory 2-month public comment period for the draft plan. Public submissions are being considered in finalising the Conservation Commission's proposed plan, which will then be assessed by the State's Environmental Protection Authority.

A Draft Forest Management Plan for the Swan, South West and Warren Regions was released in 2002. Planning for all land categories together allows the Commission to take a broad approach—in particular with strategies for the conservation of biological diversity.

Further reading

Ministerial Council on Forestry, Fisheries and Aquaculture (1997). Plantations for Australia: The 2020 Vision. Department of Primary Industries and Energy, Canberra.

Developing skills



Indicator 7.2c

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to develop and maintain human resource skills across relevant disciplines

Rationale

Appropriate levels of human resource skills are required to implement sustainable forest management.

The full range of training in the skills required for effective forest management is available in Australia. On offer are graduate and post-graduate degrees, diploma and certificate courses, operational competency certificates and refresher courses. There are also extension services, education and training available for landholders and community groups.

This indicator can be measured by identifying opportunities for obtaining formal qualifications, traineeships or their equivalents, and on-the-job training.

Graduate and post-graduate degrees: Australia provides the full range of training in the skills required for effective forest management for all values. Four universities provide specific professional-level forest science training: the Australian National University, The University of Melbourne, Southern Cross University and James Cook University (tropical forestry). Universities throughout Australia provide courses in natural resource management, environmental management, ecology, social sciences, economics, legal and information management disciplines.

Diplomas and certificates: Diploma and certificate courses are provided by tertiary Institutes of Technical and Further Education (TAFE) for field-based forest officers and operational staff. Increasingly, these are replacing the training traditionally provided by forest-management agencies. Tertiary education is becoming more readily available in regional centres. As a result of the increasing sophistication of forest operations, technical training has tended to replace on-the-job training.

Operational competency certificates: Traditionally, experienced workers provided on-the-job training for forest workers. This is becoming formalised in short on-site training courses that provide certificates of competency. These cover operations such as chain-saw operation and first aid. They are mandatory for harvesting workers in several States. A national training package is being developed that covers quality assurance and product care in the forest industries.

Refresher courses: Existing staff in public and private sectors maintain or enhance their skills through short refresher courses on topics such as remote sensing, planning, occupational health and safety and first aid, fire management and other operational skills.

Consultants: There is a growing private forest and land-management consultancy capacity that provides skills to the domestic and international forest sectors. Agencies are increasingly contracting work to private consultants, which broadens the skill base of the agency beyond its own staff. There is a growing tendency to employ people with a wider range of skills whilst outsourcing specialist skills.

Australian National University forest science students in callitris forest, Forbes, New South Wales

Farmers, small landholders and community groups: Australia has a long history of providing farmers and small landowners with government extension services including information and informal training through field days, tree seedlings and, in some cases, with financial assistance to establish small plantations, wood-lots and shelter belts.

Australia now has diverse programs for delivering forest extension information. The programs have been greatly expanded to capture both commercial and environmental goals, and given a community focus.

Commercial planting by farmers and small landholders is encouraged as part of the overall Vision 2020 policy of expanding the area of Australia's commercially productive plantations. Australian Forest Growers is an association of plantation owners dating from 1969 that provides training for its members through publications, conferences and field days. The Australian Master TreeGrower Program run by The University of Melbourne provides more formal training. The program consists of an eight-week course tailored to the needs of different regions.

Conservation planting and the protection of remnant vegetation in rural areas are encouraged as part of policies to counter the effects of salinity and preserve biodiversity. Community Landcare and Bushcare groups undertake many projects in this area, nationally. Greening Australia is an apolitical, non-profit membership-based organisation dedicated to managing and repairing native vegetation. Its extension services provide technical support, training and resources for community groups. It has been operating for 20 years and is mainly funded by Governments. It has 75 paid staff and 6 600 volunteers across Australia.

Infrastructure

coverage
currrency
frequency

Indicator 7.2d

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to develop and maintain efficient physical infrastructure to facilitate the supply of forest products and services and support forest management

Rationale

The development and maintenance of physical infrastructure underpins efficient forest management and use.

Australia's native forests and plantations are well serviced with infrastructure.

Australia is a modern, mature economy with good infrastructure. Forest management agencies build and maintain infrastructure for a range of purposes including timber harvesting, conservation and fire management. This infrastructure includes:

- road and trail networks;
- fire towers;
- buildings (workshops, sheds, etc.);
- bridges;
- dams and pumps;
- fences and gates;
- water points;
- helipads and air strips;
- signs;
- bush cottages for employees; and
- telecommunication facilities.

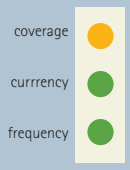
Construction of the South Face Road, Victoria

The road and trail networks allow visitors ready access to forests. More developed infrastructure for visitors includes information centres, picnic and camping facilities, interpretive walking trails and, in some instances, walks in the forest canopy (e.g., Tahune Airwalk in southern Tasmania).

Some road and port facilities were developed specifically for the export of timber products—for example, at Eden, New South Wales. The majority of log haulage and distribution of processed timber products occurs by road.

As a result of the Regional Forest Agreements, many nature conservation reserves now have roads that were originally constructed for timber harvesting purposes. Some of these have been closed if they are not required for management purposes. Commercial plantations are also well supplied with roads. However, roads in private plantations may not be available for public use. In remote areas of Australia, access is limited by road quality and seasonal conditions.

All forest and conservation management agencies maintain an efficient communications infrastructure to facilitate activities such as fire management, daily operational activities, law enforcement and for public safety.



Enforcement

Indicator 7.2e

Extent to which the institutional framework supports the conservation and sustainable management of forests, including the capacity to enforce laws, regulations and guidelines

Rationale

Enforcement of laws, regulations and guidelines mean that plans are implemented effectively.

For timber harvesting on public lands, compliance with the relevant legislation is generally high. Monitoring timber harvesting in private forests is probably not widespread, except perhaps in Tasmania. General public usage of public forests can also breach regulations. Monitoring and compliance vary.

States and Territories, in their capacity as land managers, use the following measures, singly or in combination, to investigate breaches of legislation and guidelines and to monitor compliance:

- enforcement officers;
- regionally-based specialist staff;
- field staff, including police officers and other departmental staff with special training as conservation officers;
- legally constituted bodies such as tribunals.

There can be prosecutions for non-compliance.

For harvesting on public lands, compliance with the legislation, regulations and guidelines is generally high and supported by public opinion. However, for recreational use on public lands and for harvesting on private lands monitoring is less extensive.

Table 119 demonstrates enforcement of regulations and guidelines for public forests in 1999–2000. These figures do not cover private forests. The regulatory system is different in each State and Territory and therefore the definition of a breach also varies. For example, 1 533 of the reported breaches in multiple-use forests in New South Wales were breaches of the agency's guidelines, rather than of State regulations.

Table 119: Number of officers involved in and breaches relating to enforcement of laws, regulations and guidelines in 1999–2000

	ACT	NSW[1]	NT	Qld	SA	Tas	Vic[1]	WA
Number of officials who enforce laws, regulations and guidelines in:								
Multiple-use forests	–	458	–	–	26	250	247	–
Nature conservation reserves	–	–	–	–	120	74	318	–
Private land	–	–	–	–	–	106	52	–
Leasehold land	–	–	–	–	–	–	–	–
Other crown land	–	–	–	–	–	–	–	–
Total number of officials who enforce laws, regulations and guidelines	27	826	–	305	146	430	617	5
Number of breaches of Codes of Practice in:								
Multiple-use forests	–	1 538	–	49	–	21	100	–
Nature conservation reserves	–	–	–	38	–	–	–	–
Private land	–	–	–	–	–	23	–	–
Leasehold land	–	–	–	18	–	–	–	–
Other crown land	–	–	–	23	–	-	–	–
Total number of forest management related breaches	–	1 538	-	128	-	33	100	–
Number of breaches relating to general public								
Animals (bringing into areas where they are not allowed)	–	104	–	44	40[2]	–	122	–
Behaviour	–	26	–	29	–	–	5	4
Camping in unauthorised areas	–	31	–	82	2	–	32	–
Fee avoidance	–	691	–	–	–	–	1	15
Removal of flora and/or fauna	–	–	–	–	–	–	–	66
Resource protection (dumping rubbish, soil disturbance, fires)	–	76	–	–	20	–	99	4
Damaging signs	–	–	–	7	–	–	18	–
Theft of forest produce	–	–	–	–	–	20	57	7
Unauthorised vehicle access	–	802	–	274	50	–	178	–
Others	–	–	–	13	–	–	117	2
Total number of breaches related to the general public	–	–	–	449	112	364	629	98

[1] For 2000–2001

[2] This includes fee avoidance

Further reading

Forest Practices Board (2002). Annual Report 2001-2002. Forest Practices Board, Hobart.

Case study – Enforcement by Tasmania's Forest Practices Board in 2001–2002

The emphasis of the forest practices system is to achieve high environmental standards through planning, training and education. Where problems arise, the Board expects that they will be dealt with through early detection and corrective action.

Corrective action may mean remedial treatment in the forest. However, it also means reviewing and improving systems to ensure that similar errors do not arise in the future. From time to time, serious errors occur that generally reflect inadequate systems or insufficient care. In these cases, penalties are appropriate to reinforce the importance that all parties must strive for full compliance with the requirements of the *Forest Practices Act 1985*. Legal enforcement may be taken in several ways.

- Forest Practices Officers may give verbal or written notification to require persons to take corrective action in order to comply with the Act or a forest practices plan.
- The Board may prosecute for failure to have operations covered by a forest practices plan, for failing to comply with a forest practices plan or for failing to lodge a certificate of compliance.
- The Board may impose fines as an alternative to prosecution.

The Board investigates all complaints relating to alleged breaches or poor practice and administers the Act. In the last two years 83 notices and prosecutions have been issued under this Act (Table 120).

Table 120: Notices and prosecutions under the *Forest Practices Act 1985*, 2000–2002

	2000–2001	2001–2002
Notices issued by Forest Practices Officers	37	39
Fines imposed by the Board:	1	5
Prosecutions completed	0	1

Fines imposed for offences under the Act during the year 2001–2002 were as follows:

- A landowner and contractor were fined $1 000 by the Board for offences related to the harvesting of 70 tonnes of timber without a current forest practices plan (FPP). The land was previously covered by an FPP but operations did not commence during the term of the FPP. When harvesting did begin, it was carried out within the streamside reserve of a class 3 stream, causing environmental harm.
- A forest manager was fined $1 000 by the Board for offences related to the harvesting of trees within a streamside reserve. The class 3 streamside reserve was incorrectly marked, resulting in the harvesting of trees to within 5 m of the stream over a 50 m section of the reserve. The offences did not result in substantial environmental harm.
- A forest company was fined $1 000 for offences related to the application of herbicide to an area excluded from treatment under a forest practices plan. The error was the second incident involving the application of herbicides to areas excluded within the plan. There was no evidence of any environmental harm as a result of the spraying.
- Firewood contractors were fined $1 750 for offences related to the harvesting of firewood on Multiple-use forest outside the boundary of a forest practices plan. The Board found that the contractors had not taken adequate care.
- A firewood cutter was convicted for cutting firewood on private land in an area reserved from harvesting under a forest practices plan. The reserve was originally included in the plan in order to protect a threatened species of stag beetle. The illegal cutting had been detected by a forest practices officer who had stopped the operation before any major harm was done to the beetle's habitat. The cutter was fined $1 500 plus $900 in costs.

Source: Forest Practices Board (2002).

7.3

ECONOMIC FRAMEWORK

INTRODUCTION

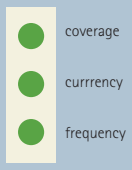
This sub-section is concerned with the economic environment and how factors such as investment levels, taxation policies and trade conditions affect forest management.

Forests provide a range of products that can be traded. The economics of this trade may affect whether the products are harvested and traded sustainably. In addition, funds are required for any form of conservation, management, or investment in and by the timber industry.

Indicators in this sub-section allow some tracking of the economic and fiscal framework in which forests meet the marketplace. They also provide a snapshot of policies affecting import and export of forest products.

Plantation forest planning

Investment and taxation



Indicator 7.3a

Extent to which the economic framework (economic policies and measures) supports the conservation and sustainable management of forests through Investment and taxation policies and a regulatory environment which recognise the long-term nature of investments and permit the flow of capital in and out of the forest sector in response to market signals, non-market economic valuations, and public policy decisions in order to meet long-term demands for forest products and services

Rationale

Government investment and taxation policies can affect investment in forest growing and timber processing industries.

Australia's investment policies enable domestic and international investment in forest growing and timber processing. The National Competition Policy aims to promote efficient competition between public and private businesses. Taxation law does not discriminate against investment in forestry. However, the long-term, capital-intensive nature of this sector has led to the inequitable treatment of forestry operations. Over the past few decades, the Commonwealth government has introduced a number of tax changes to address this. Funding has been provided to assist restructuring of timber industries affected by government forest use decisions.

This indicator is concerned with the fiscal regulations and economic policies that control the flow of money in and out of the forest sector.

The National Forest Policy Statement, Regional Forest Agreements, Plantations for Australia: the 2020 Vision, and the Forest and Wood Products Action Agenda, which are also relevant to investment in the forest and forest products industries, are described under indicator 7.1b.

Investment

Australia has stringent controls over land use changes and industrial development that aim to protect environmental cultural and amenity values. These controls generally apply equally to all land use change and developments. Provided those values are protected, private investment in the forest and forest products industries in Australia is generally free from industry-specific legal and regulatory constraints.

Australia's foreign investment policy aims to encourage foreign investment that is consistent with community and economic interests. Foreign investment in Australia is regulated primarily through a regime established under the *Foreign Acquisitions and Takeovers Act 1975*. The Commonwealth provides information and facilitation services and incentives to attract projects with significant net economic and employment benefits.

State government forestry agencies and large industrial companies have played major roles in the development of plantations for many years. State governments still dominate softwood plantation forestry in the Australian Capital Territory and in all States except Victoria. In contrast, most investment in hardwood plantations has been undertaken by the private sector.

Investment by superannuation funds and other financial institutions has become a significant factor in Australia. The Hancock Timber Resource Group, an institutional funds manager based in Boston, United States of America, and a consortium of Australian funds managers acquired the assets of the Victorian Plantations Corporation in 1998. In 1999, GMO Renewable Resources—another American-based funds manager—acquired a 50 per cent interest in Forestry Tasmania's softwood plantations.

Investment in forest products manufacturing is described in indictor 6.3a.

The Kyoto Protocol has the potential to enable investment in the forest sector. The Protocol allows companies and countries to offset greenhouse emissions by capturing, or sequestering, carbon dioxide in biomass. The New South Wales *Carbon Rights Legislation Amendment Act 1998* aims to facilitate trading in carbon sequestration rights. A number of Australian and foreign companies, including the Tokyo Electric Power Company, have undertaken small forestry investments in anticipation of securing carbon sequestration rights.

National Competition Policy

In 1995 the Council of Australian Governments agreed to a National Competition Policy to improve the efficiency of government business activities. This policy aims to promote efficient competition between public and private businesses and to ensure that government businesses have no competitive advantages or disadvantages compared with their private competitors.

Taxation on forestry

Since the classification in 1961 of forestry activities as primary production for taxation purposes, the treatment of forestry activities by tax legislation has created unintended inequities for small scale private investments in forestry. The main tax related issues are related to the seasonal and long-term nature of forestry, and the irregular cash flows associated with forestry investments over time.

Establishment and maintenance activities in forestry operations are highly seasonal dependent. For example, the usual cycle of plantation establishment operations in temperate regions of Australia is to begin site cultivation in spring or summer and complete planting when rain permits the following winter or early spring. While expenditure is often spread between two financial years, investors incur costs as a single event. The 12-month prepayment rule[1] generally allows investors in prospectus based forestry schemes to deduct the costs they incur from plantation establishment expenditure, against income in the same year that these costs are incurred, but gives managers 12 months within which to carry out these management activities. This deduction provision is confined to prospectus based forestry schemes, and is the only significant tax treatment for forestry investments in managed schemes that are different to investment in other sectors. It is designed to eliminate the inequitable tax treatment of such forestry schemes.

The decisions of individual investors to invest in forestry are also influenced by the treatment of selling the rights to harvest timber, rather than selling forested land. In order to secure a buyer, forest owners sometimes contract to sell logs from immature forests at some time in the future when the trees are ready for harvest. Current tax provisions treat such a contract as

[1] In 2002, the 12-month prepayment rule was introduced to provide certainty to investors in recognition of the long term nature of forestry.

creating and disposing of an asset. This creates a tax liability on the potential value of the contract at the time that the contract is made, even though no income will be received until the proposed time of sale.

'Period inequity' is another factor that influences individual's decisions to invest in forestry. This issue arises because individuals who invest in forestry receive no income for many years and then receive the returns from selling timber in one or a few large amounts. Such income is then likely to be taxed at the maximum marginal tax rate irrespective of the many years in which no income was received. Income averaging schemes (for example farm management deposits) designed to address the irregularity of income derived from primary production are of limited use for this problem.

Forest Industries Structural Adjustment Program

Following the Regional Forest Agreement (RFA) process, the Commonwealth in conjunction with States where RFAs exist have allocated nearly $100 million to the Forest Industry Structural Adjustment Program (FISAP). The aims of this program are to assist the continuing development of a competitive, sustainable and value adding native forest timber industry and help businesses and workers in the industry who have been directly and adversely affected by the operation of the RFA process.

Governments recognise that the RFA process has required significant adjustments in the native timber industry, and FISAP provides assistance to businesses and workers who have been forced to leave the industry as a result of RFAs. FISAP also provides financial assistance to existing and potential participants in the native forest hardwood timber industry. This is to encourage investment in capital equipment that will improve the performance of the harvesting and haulage sector and enhance the ability of the industry to process and add value to Australian native forest timber, and to increase marketing and promotional skills in the industry. Table 121 summarises assistance provided by the program to date.

Table 121: Commonwealth assistance provided through the Forest Industry Structural Adjustment Program

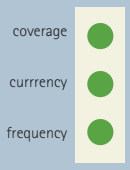
State	Commonwealth expenditure to 31 December 2002 ($ million)	Total Industry Development Assistance ($ million)
New South Wales	30.4	112.3
Queensland	2.2	12.5
Victoria	14.6	67.5
Western Australia	0.1	-
Totals	47.3	192.3

Source: National Forest Inventory (2003)

Further reading

Cummine, A. (2002). Plantations in the landscape – tax is not the villain. Australian Forest Growers 2002 National Conference. Australian Forest Growers, Deakin, Australian Capital Territory.

CCNCO (2001). Competitive Neutrality in Forestry. Commonwealth Competitive Neutrality Complaints Office Research Paper. Productivity Commission, Canberra.



Trade policies

Indicator 7.3b

Extent to which the economic framework (economic policies and measures) supports the conservation and sustainable management of forests through non-discriminatory trade policies for forest products

Rationale

Non-discriminatory trade policies provide equitable access to international markets

Australia's export industries operate in a trade environment where they continue to face barriers to market entry. Australia supports a policy that will lead to the removal of tariffs in wood and wood products and is pursuing WTO-consistent Free Trade Agreements. For countries not party to multilateral or bilateral treaties, Australia's tariffs on imports of forest and forest products range from 0 per cent to 5 per cent. However, Australia grants preferential tariff treatment for developing country products.

This indicator is concerned with the manner in which trade policies influence sustainable forest management. Such policies can be discriminatory or can encourage trade liberalisation.

Discriminatory trade policies include domestic price support, quotas, tariffs and other barriers, export subsidies, subsidies on inputs such as power, transportation and processing. Measures that distort market signals are import and export quotas. Another example is 'escalating tariffs', where countries impose relatively low import duties on minimally processed forest products such as logs, but progressively higher duties on more processed products.

Trade liberalisation can have positive and negative effects, depending on the accompanying environmental, economic and social policies. They are considered by some economists to be more appropriate than discriminatory policies in achieving environmental goals. Non-discriminatory trade policies for the forest sector are important as they provide access to international markets, allowing producers on all the benefits of sustainable forest management and ensuring true valuation of forest resources.

Exports

Australia's export industries operate in a trade environment where they continue to face barriers to market entry, such as tariffs, restrictions on import volumes and adverse domestic regulations. Australia's approach to opening markets uses a combination of bilateral, regional and multilateral strategies.

Over the past decade, Australia has taken a market-oriented approach to its economic and trade reform, with a general aim of increasing efficiency in the allocation of resources. This is evident in the recent reductions in production subsidies for various industries, particularly in the primary sector. Efficient allocation of resources is crucial for the development of an internationally competitive forest industry.

Given the export focus of Australia's forest sector, Australia supports a policy that will lead to the removal of tariffs in wood and wood products. Access to overseas markets is one of the many challenges to the development of a strong forest industry in Australia, and is currently being addressed through Australia's participation in various forums for multilateral trade negotiations, such as the World Trade Organisation (WTO), the Asia–Pacific Economic Co-operation (APEC) and the Association of South East Asian Nations (ASEAN). The WTO Doha round of negotiations on non-agricultural products aims to reduce or eliminate tariffs and non-tariff barriers. The negotiations commenced in November 2001 and are scheduled to conclude by January 2005. Forest products, including wood and paper products, are included.

Since the introduction of the Regional Forest Agreement framework, Australia has markedly reduced its restrictions on exports of forest products. Export controls are now restricted to hardwood woodchips derived from areas outside Regional Forest Agreements, and unprocessed timber destined for further processing.

Imports

Australia is also pursuing WTO-consistent Free Trade Agreements (FTAs) in order to complement multilateral negotiations and to build momentum for multilateral liberalisation. The Australia–New Zealand Closer Economic Relations is one of the world's most comprehensive FTAs. In 2001-02, nearly 20 per cent of all imports of timber products came from New Zealand.

For countries not party to multilateral or bilateral treaties, Australia's tariffs on imports of forest and forest products range from 0 per cent to 5 per cent. Australia, however, grants preferential tariff treatment for products from developing countries under the Australian System of Tariff Preferences for Developing Countries, the Papua New Guinea–Australia Trade and Commercial Relations Agreement and the South Pacific Regional Trade and Economic Cooperation Agreement. The average tariff rate applied on products from developing countries is 3.9 per cent. Since 1 July 2003, Australia provides tariff and quota-free entry for all goods from all least developed countries, and a number of small island developing countries. For determining least developed countries, the three United Nations criteria are applied, which relate to level of income, human resource weakness and economic vulnerability.

To protect against pests and diseases that are constraints to trade, Australia is committed to ensuring quarantine standards and regulations that are consistent with the WTO agreements.


Michael F. Ryan

Silvertop ash (*Eucalyptus sieberi*) forest

Further reading

Bhati, U.N. (2001). Import Tariffs – An Impediment to Market Access. Forestry Market Reports Series, 19. Forestry School of Resources, Environment and Society, The Australian National University, Canberra.

7.4

CAPACITY TO MEASURE AND MONITOR CHANGES

INTRODUCTION

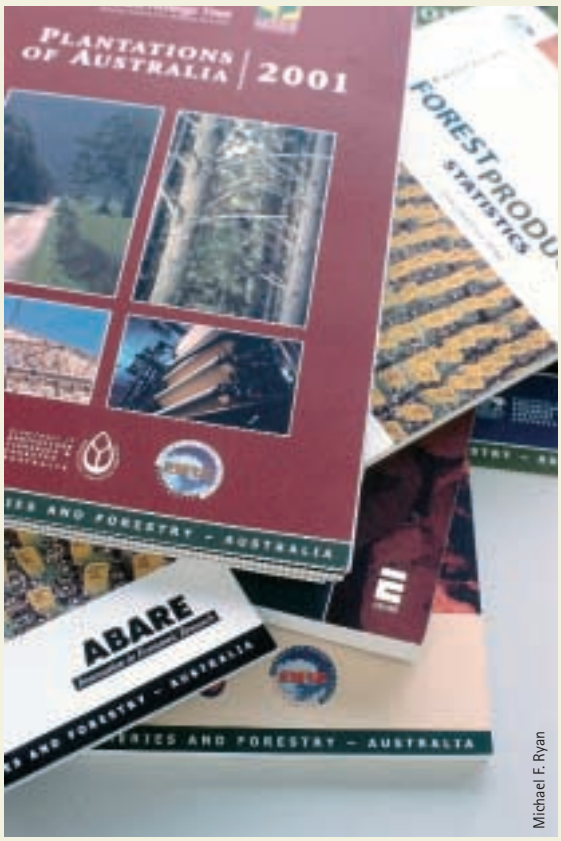
Australians expect that trends in the condition of their forests are monitored and reported to help with decision-making and sustainable forest management.

These three indicators are concerned with the capacity to measure and monitor changes in the conservation and sustainable management of forests. This involves assessing, monitoring and measuring forests and the reliability of the statistics that are thereby produced.

At a national level, the National Forest Inventory—a partnership between the Australian Government, State and Territory governments—is primarily responsible for undertaking national forest assessment and reporting. State and Territory agencies and private forest owners and managers also collect forest data.

However, data are far from comprehensive. Much assessment has focused on areas managed for commercial timber production. As a result, the main gaps in our forest information are for privately managed forests or concern non-timber attributes. Moreover, collecting data does not always guarantee its reliability. The statistical reliability of forest inventories, assessments and monitoring—as well as their frequency— varies across the country.

The issue of compatibility of assessments is central to indicator 7.4c, which considers Australia's compatibility with other countries in measuring and reporting on indicators. Compatible protocols for measuring and reporting improve the efficiency of data gathering by sharing information. Compatibility also enhances the accuracy and usefulness of global assessments.



Forest-related publications from the Bureau of Rural Sciences and the Australian Bureau of Agricultural Resource Economics

Availability of data

Indicator 7.4a

Capacity to measure and monitor changes in the conservation and sustainable management of forests, including availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with criteria 1–7

Rationale

To summarise data availability and currency under the regional framework of indicators.

There is a wide variation in the nature of data and other information used to describe the 74 indicators in this report, from detailed statistical data through to limited case studies. This report reveals there are 16 indicators with comprehensive data for coverage, currency and frequency, 2 indicators that do not have any data and 56 indicators with intermediate data.

Measuring and monitoring Australia's forests is necessary to assess sustainable forest management. For the purposes of this report, 7 criteria and 74 indicators are used. An understanding of the extent to which relevant and up-to-date information about the forests is available to report against the indicators, provides a measure of the capacity to demonstrate sustainable forest management. In turn, this allows for forest managers to review and prioritise data collection activities for relevant and timely measurement and monitoring.

This indicator provides a cursory data overview for each of the other 73 indicators (Table 122); the reader should refer to each respective full indicator description for a more comprehensive discussion of the nature of the data. It is not appropriate to make a comparison of the data status of indicators against one another. While some indicators depend on data for reporting, others are more narrative in nature. Similarly, some indicators rely on regional level data while others are only relevant at the national level.

In reporting the availability of data it is important to recognise that the level of reporting varies significantly between the States and Territories. For the purposes of this report Tasmania, Victoria and New South Wales reported comprehensively against the indicators in 2002. The remainder of the States and Territories contributed partial data in 2002 to supplement the comprehensive reporting that had occurred against a number of the indicators in 2000.

Legend for indicator coverage for Table 122

Key		Coverage	Currency[1]	Frequency[2]
Data complete at the national level	●	Whole country assessed	1998+	Annual to 5 yearly
Partial data	●	Incomplete data	1980 - 1997	Greater than 5 Years
Scientific studies or limited work available, or only required once	●	Case study	Incomplete	Once only
No data available	●	No data	No Data	No Data
Range of data coverage, currency and frequency[3]	○	Range	Range	Range

[1] Currency of available coverage
[2] Frequency of which the available coverage is updated
[3] The predominant response appears in the relevant background colour but is also a mix from other possible responses

Table 122: Data availability, coverage and currency to address each indicator

		Coverage	Currency	Frequency	Main Data Source
Criterion 1: Conservation of biological diversity					
1.1	**Ecosystem diversity**				
1.1a	Extent of area by forest type and tenure	●	●	●	State and Territory agencies
1.1b	Forest growth stage by tenure	●	●	●	State and Territory agencies
1.1e	Fragmentation of forests	●	●	●	National analysis on State and Territory data
1.2	**Species diversity**				
1.2a	Forest dwelling species	●	●	●	National analysis on State and Territory data
1.2b	The status of forest dwelling species	●	●	●	National analysis on State and Territory data
1.2c	Species monitoring	●	●	●	State and Territory agencies and public research organisations
1.3	**Genetic diversity**				
1.3a	Genetic variation in forest dwelling species	●	●	●	State and Territory agencies
1.3c	Genetic resource conservation plans	●	●	●	State and Territory agencies
Criterion 2: Maintenance of productive capacity of forest ecosystems					
2.1a	Forest available for timber production	●	●	●	State and Territory agencies
2.1b	Growing stock in native forests available for timber production	●	●	●	State and Territory agencies
2.1c	Plantations of native and exotic species	●	●	●	State and Territory agencies and private industry
2.1d	Annual removal of wood products	●	●	●	State and Territory agencies
2.1e	Non-timber forest products	●	●	●	State and Territory agencies and public research organisations
2.1f	Effectiveness of plantation establishment	●	●	●	State agency
2.1g	Effective native forest regeneration	●	●	●	State and Territory agencies
2.1h	Genetic resources in exotic plantations	●	●	●	State and Territory agencies and research organisations
Criterion 3: Maintenance of ecosystem health and vitality					
3.1a	Factors affecting forest health	●	●	●	State and Territory agencies and research organisations
3.1b	Air pollutants	●	●	●	Australian government organisations
3.1c	Changes in forest ecology as indicated by changed biophysical and chemical components	●	●	●	State agencies
Criterion 4: Conservation and maintenance of soil and water resources					
4.1a	Soil erosion hazard	●	●	●	None
4.1b	Protection of soil and water by forests	●	●	●	State and Territory agencies
4.1c	Forest stream flow	●	●	●	State and Territory agencies
4.1d	Soil organic matter	●	●	●	State agency
4.1e	Soil physical damage	●	●	●	State agency
4.1f	Biodiversity of water bodies	●	●	●	State and Territory agencies
4.1g	Physio-chemical properties of water bodies	●	●	●	National analysis on State and Territory data
4.1h	Persistent toxic substances	●	●	●	State agency

Table 122: Data availability, coverage and currency to address each indicator

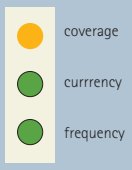
		Coverage	Currency	Frequency	Main Data Source
Criterion 5: Maintenance of forest contribution to global carbon cycles					
5.1a	Forest biomass and carbon stocks	●	●	●	Australian Government analysis
5.1b	Forest contribution to the carbon budget	●	●	●	Australian Government analysis
5.1c	Forest products contribution to the carbon budget	●	●	●	Australian Government analysis
Criterion 6: Maintenance and enhancement of long term multiple socio-economic benefits to meet the needs of societies					
6.1	**Production and consumption**				
6.1a	Value and volume of wood products	●	●	●	Australian Government agencies
6.1b	Value and volume of non-wood forest products	●	●	●	State and Territory agencies and research organisations
6.1c	Wood supply and consumption	●	●	●	Australian Government agencies
6.1d	Value of forest products as a % of GDP	●	●	●	Australian Government agencies
6.1e	Recycling	●	●	●	Australian Government agencies and industry
6.1f	Non-wood supply and consumption	●	●	●	State and Territory agencies and public research organisations
6.2	**Recreation and tourism**				
6.2a	Forest for recreation and tourism	●	●	●	State and Territory agencies
6.2b	Visitor activities	●	●	●	State and Territory agencies
6.2c	Visitor numbers	●	●	●	State and Territory agencies
6.2d	Unacceptable visitor impacts	●	●	●	State and Territory agencies
6.3	**Investment in the forest sector**				
6.3a	Investment in forests	●	●	●	Industry
6.3b	Expenditure on research, development and education	●	●	●	Australian Government agency
6.3c	Utilisation of new technologies	●	●	●	Australian Government agencies
6.3d	Return of investment	●	●	●	Australian Government agencies and industry
6.4	**Cultural, social and spiritual needs and values**				
6.4a(i)	Areas formally managed to protect indigenous values	●	●	●	State and Territory agencies and public research organisations
6.4a(ii)	Areas formally managed to protect places of non-indigenous values	●	●	●	State and Territory agencies
6.4b	Non-consumptive use of forest values	●	●	●	State agencies
6.5	**Employment and community needs**				
6.5a	Employment	●	●	●	Australian Government agencies
6.5b	Wage and injury rates	●	●	●	Australian Government agencies and industry
6.5c(i)	Viability of forest dependant communities	●	●	●	Australian Government agencies
6.5c(ii)	Viability of forest dependant indigenous communities	●	●	●	Australian Government agencies
6.5d	Land for Indigenous needs	●	●	●	Australian Government agencies

continued over

Table 122: Data availability, coverage and currency to address each indicator

	Coverage	Currency	Frequency	Main Data Source
continued from previous page				
6.6 Indigenous participation and management				
6.6a Maintaining and enhancing Indigenous values	●	●	●	Government agencies
Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management				
7.1 Legal framework				
7.1a Indigenous peoples' property rights	●	●	●	State and Territory agencies
7.1b Planning, assessment and review	●	●	●	State and Territory agencies
7.1c Public participation	●	●	●	Australian, State and Territory government agencies
7.1d Best practice codes	●	●	●	Australian, State and Territory government agencies
7.1e Special values and Indigenous people's participation	●	●	●	Australian, State and Territory government agencies
7.2 Institutional framework				
7.2a Public information and education	●	●	●	Australian, State and Territory government agencies
7.2b Planning and review	●	●	●	Australian, State and Territory government agencies
7.2c Developing skills	●	●	●	Australian, State and Territory government agencies
7.2d Infrastructure	●	●	●	Australian, State and Territory government agencies
7.2e Enforcement	●	●	●	State and Territory agencies
7.3 Economic framework				
7.3a Investment and taxation	●	●	●	Australian Government agencies and industry
7.3b Trade policies	●	●	●	Australian Government agencies
7.4 Capacity to measure and monitor				
7.4a Availability of data				
7.4b Monitoring and reporting	●	●	●	Australian Government agencies and industry
7.4c Compatibility with other countries	●	●	●	Australian Government agencies
7.5 Capacity to conduct and apply research and development				
7.5a Scientific understanding	●	●	●	State and Territory agencies
7.5b Assessing environmental and social forest values	●	●	●	Australian Government agencies
7.5c New technologies and their consequences	●	●	●	State agency
7.5d Predicting human impacts	●	●	●	State and Territory agencies
7.5e Predicting impacts of climate change on forests	●	●	●	State and Territory agencies and public research organisations
7.5f Silviculture and utilisation research	●	●	●	State and Territory agencies and public research organisations

Monitoring and reporting



Indicator 7.4b

Capacity to measure and monitor changes in the conservation and sustainable management of forests, including scope, frequency and statistical reliability of forest inventories, assessments, monitoring and other relevant information

Rationale

A comprehensive and current inventory provides the basis for all forest planning.

At a national level, the National Forest Inventory is primarily responsible for undertaking national forest assessment and reporting. State and Territory agencies and private forest owners and managers collect primary forest data. The majority of inventory and monitoring activities in native forests have focused on areas managed for commercial timber production. Australia's largest gaps in forest information are in privately managed forests and for non-timber attributes.

Australians increasingly expect that trends in the condition of forests are monitored and reported to support sound policy decision-making and sustainable forest management. The data collected under this indicator should demonstrate the timeliness and completeness of the information available at a range of scales from a national overview to forest management units.

National overview

State and Territory agencies and private forest owners and managers collect primary forest inventory data in Australia. The frequency and scope varies across the States and Territories and with the tenure. Some States and Territories only undertake inventories when new data are required and money is available for selected regions, while other States and Territories have regular programs. The inventories of States, Territories and private commercial companies are based predominately on spatial inventories underpinned by aerial photography, remote sensing and Geographic Information Systems (GIS) verified through ground-truthing and surveys. For all public forests managed for timber production, inventory and assessment are regularly undertaken, both for management purposes and to monitor and report performance. The highest statistical reliability in inventory undertaken in Australia occurs where there is consistent annual monitoring, which is most common for plantations.

All multiple-use forest management agencies are committed to sustainable forest management. To this end, many are moving towards measuring and reporting performance using a 'triple bottom line' approach, recognising that a balanced triple bottom line maintains economic prosperity, environmental quality and social responsibility. This approach is building on existing approaches to inventory and assessment in those States. Some State managers of public conservation forests are also adopting this approach. For example, in New South Wales, State Forests of New South Wales produce an annual report called the Seeing report for their public multiple-use forests and National Parks of New South Wales are producing a State of the Parks reports for the conservation forests. In Tasmania sustainable forest management reports have been developed for multiple-use forests for the last two years.

Ground truthing spatial data for forest inventory

At a national level, the National Forest Inventory—a partnership between Commonwealth, State and Territory governments—is primarily responsible for undertaking national forest assessment and reporting through the compilation and integration of disparate state supplied data into national classification schemas and national databases. This substantial undertaking involves integrating data with differing spatial scales, quality, classification methods and attributes, both within and between States. This process involves periodic calls for data to enter or update the National Forest Inventory and national forest resource assessments at least once every five years. Plantation forests are inventoried annually due to their dynamic changing nature and reported at both the state and territory level and nationally, and then in detail at a regional level every five years.

Australia's wide variety of forest types and their distribution results in varying data collection techniques ranging from coarse-scale remotely sensed data with low levels of accuracy (e.g., remote areas such as the Kimberley in northern Western Australia), through to data obtained from aerial photograph interpretation, to finer-scale field data of high accuracy (e.g., Tasmania). Inventory data based on permanent plots under State management represents the minority, and is likely to decrease further as reduced funding results in many of these plots no longer being maintained.

In addition to traditional forest inventory, broader forest assessments require a variety of social and economic data. This necessitates data collation from a wider range of sources including Commonwealth agencies (e.g., employment and production data from Australian Bureau of Statistics and Australian Bureau of Agricultural Resources Economics, salinity data from the National Land and Water Resources Audit, carbon data from the Australian Greenhouse Office) and research agencies (e.g., pests and diseases and soil health data from Commonwealth Scientific Industrial Research Organisation and the universities).

The majority of current inventory, assessment and monitoring activities in native forests have focused on the relatively small area of Australia's public forests managed for commercial timber production. Fewer resources have been allocated to the inventory of nature conservation reserves. Australia's largest gaps in forest information are in privately managed forests and for non-timber attributes. In the last five years information has been enhanced by the substantial investment in public forest inventory, which included environmental, social and economic data, through the Comprehensive Regional Assessment process. Private native forest managers do not have access to the same level of resources to undertake forest mapping or inventory, although, in New South Wales access to natural resources data for private land managers is being improved through the Community Access to Natural Resources Information (CANRI) Program. Commercial plantation forests have regular inventory, assessment and monitoring, however, public access to private inventory information is considered sensitive and is limited through data confidentiality agreements.

Two factors have recently had a significant impact on increasing the scope, frequency and quality of forest inventory, assessment and monitoring in Australia, in particular in improving information levels for the private forest estate. The first being advances in low and high resolution remote sensing technologies and sampling techniques, which offer opportunities to report and monitor forest attributes with greater accuracy and frequency and at a lower cost. The second is the increase in levels of interest and investment in collecting and monitoring ecosystem data for natural resource management.

National assessments, as listed in Table 123, include national reporting on some criteria where the State of the Forests report has not been able to provide comprehensive information. The national reporting of these assessments across all land classes and vegetation types make it difficult, if not impossible, to extract data for forests alone, and therefore the information could not be used for this report. It is, however, worth referring to the reports to get an impression of the state of these criteria across Australia, even if it is not possible to restrict the information to forests.

Table 123: National sources of data for assessing the state of Australia's forests

Agency	National Assessment	Scope	Collation frequency
Bureau of Rural Sciences (in partnership with other Australian, State and Territory agencies)	National Forest Inventory (spatial)	Forest type, extent, land-use and tenure	Annual updates (as required) to 5-yearly
	National Forest Inventory	Conservation indicators	5-yearly
	State of the Forests Report	Production indicators	5-yearly
	Montreal Process Country Report	Ecosystem health indicators	
	FAO Global Forest Resource Assessment	Soil and water indicators	
	Various other reporting	Carbon indicators Socio-economic indicators Legal and institutional indicators	
	National Plantation Inventory	Plantation forest inventory Farm forestry inventory Resource projections Wood availability	Annual and detailed 5-yearly
	Agricultural Land Cover Change (spatial)	Land cover change mapping	1990 and 1995
	Australian Land Use Mapping program (spatial)	Land-use survey	2000
Environment Australia	State of the Environment Report	Atmosphere, coast and oceans, biodiversity, land, inland waters, natural and cultural heritage and human settlement	5-yearly
National Land and Water Resources Audit	National Vegetation Information System (spatial)	Vegetation type and extent	5-yearly
Australian Greenhouse Office	National Greenhouse Gas Inventory National Carbon Accounting System (spatial)	Woody extent, land cover change monitoring and Biomass inventory	1970–2000
ABARE	Forest and Wood Products Statistics	Economic and resource data on native forest and plantation industry	Bi-annual
Australian Bureau of Statistics	Australian National Accounts National Balance Sheets Agricultural Survey/Census Labour Force Survey Agricultural Finance Survey Environmental Issues and Trends Report	Various employment, economic and environmental data on industry and resource	Annual
	National Census of Population and Housing	Various demographic, employment, education and other data for local areas and regions	5-yearly

[1] Only the NFI is designed specifically to analyse forest data; it is difficult to extract forest-only data from the other listed data sources

The scope of assessments and monitoring is generally increasing as the level of interest in forest ecosystems increases and broadens to include a range of non-timber attributes. There is a continuing need to balance interest in knowing against the capacity to pay for acquiring the knowledge. This balance also determines the scope and statistical rigour of the work.

In response to these shortcomings and the need for statistically reliable information for national level monitoring and reporting, a Continental Forest Monitoring Framework (CFMF) trial is being developed by the National Forest Inventory to provide the capacity to monitor and report on trends in the condition of a range of forest values including: biodiversity; timber and non-timber resources; soil and water; carbon; forest health (insect pests, diseases, weeds); and fire fuel status.

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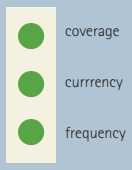
Compatibility with other countries



Indicator 7.4c

Capacity to measure and monitor changes in the conservation and sustainable management of forests, including compatibility with other countries in measuring, monitoring and reporting on indicators

Rationale

Compatible protocols for measuring and reporting enhanced co-operation and collaboration, and increase the efficiency of data gathering. Compatibility enhances the accuracy and usefulness of global assessments and improves global dialogue. Further, similar data sets allow for adjacent countries to assess their shared ecosystems.

Australia is a member of the Montreal Process and has been involved in scientific and technical co-operation with other member countries. Australia also reports forest-related activities to the United Nations Food and Agriculture Organisation (UN FAO) and other bodies collecting and reporting forest data internationally

Australia is actively engaged with the global community in measuring, monitoring and reporting indicators for sustainable forest management (Table 124). As a member of the Montreal Process, Australia has participated in annual Montreal Process Working Group and Technical Advisory Group meetings since 1993, and has reported progress with developing criteria and indicators of sustainable forest management for the Montreal Process countries. Australia has been involved in significant scientific and technical co-operation with member countries on all issues of criteria and indicator reporting. This has guided national report planning, reduced national reporting costs by the sharing of information, techniques and resources, and helped clarify international expectations for sustainable forest management reporting.

Australia has reported forest-related activities to the United Nations Food and Agriculture Organisation (UN FAO) since its establishment in 1945. Currently Australia is a member of the UN FAO Global Forest Resources Assessment Advisory Group and UN Economic Commission for Europe-FAO (UNECE-FAO) Team of Specialists. These groups collect and make available forest data for all countries and for industrialised countries, respectively. Involvement with the FAO Forest Resources Assessment ensures that Australia is engaged in resolving a range of global forest inventory issues, including forest definitions, and is able to contribute to them with current national reporting processes, such as this report.

Through these activities, the definition of forest used in Australia's State of Forests Reports is now more compatible with international forest definitions. However, due to Australia's unique forest ecosystems, there are still differences with regard to the UN FAO forest definition. These include a sparser cover of trees, with a lower threshold of 10 per cent crown cover under the FAO definition compared to the 20 per cent crown cover used by Australia. However, the FAO threshold of 5 metres height excludes some areas of Australia's forest-forming mallee and mangrove; Australia's National Forest Inventory definition of forest has a 2 metre minimum height boundary.

In seeking to implement a Continental Forest Monitoring Framework (CFMF), Australia has consulted widely with international forest agencies that have undertaken a similar approach to forest inventory and monitoring. Many countries, such as the USA and some in Europe, have had such frameworks in place for some time and can offer insights and experience. Others—such as New Zealand, Canada and Japan—are in the process of establishing similar forest monitoring systems. Australia has invited representatives from the United States of America, Canada and New Zealand to sit as members alongside domestic experts on the CFMF Technical Advisory Group.

Table 124: International processes or agencies to which Australia reports forest information

International agency	Lead Australian body	Frequency
Montreal Process	Montreal Implementation Group/ National Forest Inventory	5-yearly
UNECE/FAO Temperate and Boreal Forest Resource Assessment and forest product statistics	National Forest Inventory	5-yearly
FAO Global Forest Resources Assessment	National Forest Inventory	5-yearly
Organisation for Economic Co-operation and Development (OECD)	Australian Government Department of the Environment and Heritage	Yearly
International Tropical Timbers Organisation	Australian Government Department of Department of Agriculture Fisheries and Forestry	Yearly
Convention on International Trade in Endangered Species	Australian Government Department of the Environment and Heritage	Annual
Convention on Biological Diversity	Australian Government Department of the Environment and Heritage	variable determined by decision
UN Framework Convention on Climate Change	Australian Greenhouse Office	Annual

Further reading

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7.5

CAPACITY TO CONDUCT AND APPLY RESEARCH AND DEVELOPMENT

INTRODUCTION

This sub-criterion measures Australia's capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services. The six indicators focus on research, its application and its consequences.

Effective forest policies rely on a good scientific understanding of the forest ecosystem. Many Australian forests are quite different from those found in other countries and so knowledge of them depends almost entirely upon Australian research. Australia conducts scientific research on forest ecosystems and forest products in several public research institutions, universities and companies in a wide range of disciplines. The results are disseminated by publication in scientific journals and research reports, in professional meetings and through extension programs.

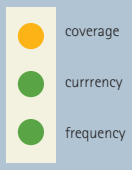
Another area under study concerns Australia's ability to predict impacts of human intervention on forests. For example, the extent to which management of native forests for wood production or for water yield or recreation can be compatible with, say, conservation of biodiversity or heritage values. Also, the interactions between forest and climate in relation to global warming and the carbon cycle.

But research and development is not just about the biophysical aspects of forests. It may also concern new technologies used in the forest industry. As with any industry, the arrival of new technologies can bring a mix of advantages and disadvantages to society, the economy and the people in the industry. Australia has so far not fully assessed the socio-economic consequences of introducing new technologies into the forest sector.

Another form of research is devising procedures for assessing the environmental and social values of forest. These have been developed and applied for some public forests under the Comprehensive Regional Assessment process. Methods are now being developed to include environmental values in national accounting systems.

Assessing timber regrowth in a stand of callitris

Research on forest ecosystems



Indicator 7.5a

Capacity to conduct and apply research and development aimed at improving forest management, including development of scientific understanding of forest ecosystem characteristics and functions

Rationale

A scientific understanding of Australian forest ecosystem characteristics and functions is needed to underpin sustainable forest management.

Australia conducts scientific research on forest ecosystems and forest products in several public research institutions, universities and companies in a wide range of disciplines. The results are disseminated by publication in scientific journals and research reports, in professional meetings and through extension programs.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia's major national research body. Its Forestry and Forest Products, Sustainable Ecosystems, and Land and Water, are the main divisions concerned with forests. The Forest and Wood Products Research and Development Corporation provides a national, integrated research and development focus for the Australian forest and wood products industry, funded primarily through industry levies and government appropriation. The Rural Industries Research and Development Corporation funds research by other organisations into rural questions including forestry. The Australian Bureau of Agricultural and Resource Economics conduct economic research into the forest and other sectors. The Bureau of Rural Sciences, Australian Greenhouse Office and the Department of the Environment and Heritage also fund and conduct forest-related research. A considerable body of research on forests is undertaken in Australia's universities. State and Territory government research agencies also conduct extensive research on forests under their respective jurisdiction.

Most public land management agencies and several public companies have research branches that focus on forests. Some non-government organisations conduct research on risks to forest ecosystems. Australia also has a comprehensive set of tertiary institutions where research is undertaken that contributes to the knowledge and understanding of forest ecosystems and management.

The Australian government encourages research bodies including universities, CSIRO and other government laboratories, to cooperate with industries, government and clients as a means of seeing that collaborative research is focused on needs. Such research is often applied through Cooperative Research Centres, generally known as CRCs. CRCs dealing with forest related issues include:

- Sustainable production forestry;
- Catchment hydrology;
- Freshwater ecology;
- Greenhouse accounting;
- Tropical rainforest ecology and management;
- Tropical savannahs; and
- Innovative wood manufacturing.

Research issues, priorities and outcomes of State, Territory, Australian Government agencies, research bodies and private industry associations are further supported through a series of committees, working groups and taskforces which report to the national Forestry and Forest Products Committee, and similarly to the national Land and Water Biodiversity Council.

The total forest research effort has not been calculated because research is spread among many bodies and disciplines—biophysical, social and economic—and many research projects are not specific to forests. Research themes include fire, water, pests, diseases, tree physiology, genetics, tourism, indigenous use, soil, carbon, flora, fauna and ecoservices.

The forest-related research conducted by State and CSIRO agencies, and their investment, is shown in Tables 125 and 126.

Table 125: Number of forest-related research projects by State agencies

Field	ACT	NSW	NT	Qld[1]	SA	Tas	Vic	WA
Year		2000–2001		1999–2000		2000–2001	2000–2001	2000–2001
Biodiversity	–	82	–	7	–	19	43	11
Productive capacity	–	13	–	10	–	56	37	4
Ecosystem health	–	55	–	6	–	28	24	6
Soil and water	–	7	–	7	–	2	15	2
Global carbon	–	7	–	–	–	–	1	–
Socio-economic	–	26	–	2	–	2	1	0
Total		183		32		107	121	23

Source: National Forest Inventory (2003)

[1] Data are for multiple-use forest management and Department of Natural Resources vegetation management only. Research papers may include scientific papers, published reports and other unpublished or internal reports in 1999–2000.

Table 126: Staff and expenditure in research and development by State and Territory agencies

Field	ACT	NSW	NT	Qld[1]	SA	Tas	Vic	WA
	2000–2001	2000–2001		1999–2000	2000–2001	2000–2001	2000–2001	2000–2001
Staff employed in research and development	10	1402	–	145	25	143	58	17
Expenditure on research and development ($ m)	1	7.13	–	13.94	2.5	2.6	4.5	1.1

Source: National Forest Inventory (2003)

[1] For multiple-use forest management and Department of Natural Resources vegetation management only

[2] Includes data from both State Forests of New South Wales and National Parks and Wildlife Service

[3] Expenditure by State Forests only—does not include scholarships for post-graduate programs

[4] Queensland's expenditure on research and development includes non-State-provided funds of $6.4 million and State-provided funds of approximately $7.5 million

Assessing environmental and social forest values

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Indicator 7.5b

Capacity to conduct and apply research and development aimed at improving forest management, including development of methodologies to measure and integrate environmental and social costs and benefits into markets and public policies, and to reflect forest-related resource depletion or replenishment in national accounting systems

Rationale

This indicator addresses methods that enable the environmental and social values of forests to be assessed against economic values to ensure sustainable forest management is achieved.

Procedures for assessing the environmental and social values of forests have been developed and applied for some public forests under the Comprehensive Regional Assessment process. Methods are being developed to include environmental values in national accounting systems.

Timber and other commercial forest products are traded and so it is relatively easy to determine their market prices. As the prices can be determined, the impacts on supply of commercial forest products of alternative policy decisions can be compared readily in monetary terms. Similarly, national accounting systems can, theoretically, include the value of commercial forest products and therefore monitor whether that value is increasing or decreasing.

Environmental and social values of forests are sometimes referred to as 'non-market' values and are consequently difficult to price. This distinguishes them from traded products, such as timber. While methods for estimating non-market values are improving and are being used more in environmental policy development processes, such as the choice modelling exercise as part of the Living Murray program, issues remain that inhibit widespread acceptance and use.

Indigenous peoples' customary use of landscapes, including forested areas, remains important as a source of non-cash income in many parts of remote Australia, but the operation of the customary economy is not routinely measured. As a result, comparisons of customary and non-market values with commercial values are difficult when policy options are assessed, and their inclusion in national accounting systems is limited.

Measuring coarse, woody debris in tall open eucalypt forest at Warra Long Term Ecological Research site, Tasmania

Case study – Market Based Instruments

As part of the National Action Plan for Salinity and Water Quality, under the Market Based Instruments (MBI) Pilots Program 10 natural resource management pilot projects are funded. The projects will take place over 3 years and aim to test more flexible arrangements for integrating economic activity with environmental outcomes, such as salinity mitigation and biodiversity conservation, and their ability to deliver these outcomes in a more cost-effective manner in comparison to standard regulation or grants programs.

Case study – BushTender Agreements, Victoria

BushTender is a new approach offering landholders the opportunity to receive payment for entering into agreements to provide management services that improve the quality or extent of native vegetation on their land. These services are based on management commitments over and above those required by current obligations and legislation.

The BushTender program enables landholders to establish their own price for the management services they are prepared to offer to improve their native vegetation. This price forms the basis for their bid, which is compared with the bids from all other landholders participating in the process. The successful bids are those that offer the best value for money.

The first BushTender Trial was conducted during 2001–2002 in two areas of Victoria—the north central region between Bendigo and Ballarat and in the north-east between Wangaratta and Wodonga. In June 2002 the BushTender Trial was extended to Gippsland.

Public forests

The managers of publicly owned forests in Australia have, for many years, developed and applied forest management planning procedures. Some of these are supported by computer-based modelling systems and assess the affects of forest management options on environmental, social and commercial values. While these procedures do not usually aim to measure non-market values, they provide ways to compare the different levels of output of market and non-market values resulting from options for forest management.

Economists have developed methods to enable market and non-market values to be integrated into decision-making processes. One of the main methods that can be applied to proposed policies or projects is 'benefit-cost analysis'. The Resource Assessment Commission tested the application of several methods, including benefit-cost analysis, to forest values in Australia during its Forest and Timber Inquiry. That inquiry led to the development of the National Forest Policy Statement.

The National Forest Policy Statement introduced Regional Forest Agreements. These were supported by Comprehensive Regional Assessments where all forest values were assessed to provide balanced management of environmental, social and commercial values, often with the aid of computer-based modelling systems—for example C-Plan and Forest Resource Assessment Management Systems (FRAMES) in New South Wales. The community consultation involved with the Comprehensive Regional Assessments is addressed in criterion 7.1c. The management of the identified environmental, social, cultural and other values is addressed in criterion 7.1e.

As the preceding examples show, various methods have been developed to integrate environmental and social costs and benefits into the development of public policy for forest use in Australia. However, their application is mainly to public native forests managed for multiple uses including timber production and represents only a small proportion of public native forests.

Private forestry

Environmental and social values of some privately owned native forests were assessed during the Comprehensive Regional Assessment process in some regions. Public policy for management of environmental and social values of private native forests is based on regulatory approaches such as planning legislation and codes of practice with no requirement to report on their outcomes. However, some of the larger private forestry companies include a level of environmental and social reporting of their operations as a part of their policy for ecologically sustainable development.

The forests owned by Indigenous people (see indicator 6.4.a(i)) are held under a form of communal title, but are most reasonably treated as private lands. Their owners have in some cases chosen to enter the mainstream economy through orthodox commercial forestry, and in other cases to seek options dependent on smaller-scale use of a wider range of resources (see case study below). Where orthodox forestry is preferred, tradeoffs in reduced options for the customary economy, or alternative enterprise based on non-wood products, have not been formally considered because the information needed is not readily available. Better understanding of the value of the customary economy and impacts of conventional forestry on other Indigenous values will require additional study.

Harvested river red gum logs (*Eucalyptus camaldulensis*)

National accounts

Including environmental and social values in national accounts is a relatively new concept. The Australian Bureau of Statistics is developing methods for accounting for environment values in the national accounts. National accounts that include environmental assets were published in 2002 (Table 127).

The environmental assets included in Table 127 are land (84 per cent of the total), sub-soil assets (minerals, oil and gas) and native standing timber. Many important assets relevant to sustainable forest management, such as soil and native flora and fauna, are not yet included. Concepts underlying how native forests are valued from a number of different perspectives clearly require further development.

Table 127: Australia's total assets ($ billion)

Asset category	1993	1994	1995	1996	1997	1998	1999	2000	2001
Financial	145	169	185	193	230	300	316	396	440
Buildings and structures	934	973	1 024	1 067	1 107	1 159	1 236	1 318	1 399
Machinery and equipment	251	257	265	268	274	291	301	312	317
Other produced assets	96	101	107	104	106	111	118	129	138
Environmental assets	631	676	721	736	816	882	966	1 062	1 160
Total	2 057	2 176	2 301	2 368	2 533	2 742	2 937	3 221	3 459

Source: Australian Bureau of Statistics (2002)

Further reading

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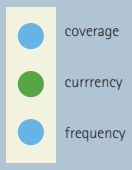
Red stringybark (*Eucalyptus macrorhyncha*) and long-leaf box (*Eucalyptus goniocalyx*) forest

New technologies and their consequences



Indicator 7.5c

Capacity to conduct and apply research and development aimed at improving forest management, including new technologies and the capacity to assess the socio-economic consequences associated with the introduction of new technologies

Rationale

New technologies can have positive or negative effects on the forest sector. It is important to assess these potential effects, in order to determine their consequences. The forest sector should be broadly defined to include forest research, management, protection, education, recreation, and tourism in addition to the wood and non-wood forest products industries.

Australia has not comprehensively assessed the socio-economic consequences of introducing new technologies into the forest sector.

Employment and economic development in regional (or non-urban) areas is an important social issue in Australia, and one in which the forest sector can be an important player. As in any industry, new technologies can affect the forest sector in many ways. These effects may include:

- Decreased employment, replacing labour with technology;
- Increased certainty—some technologies may remove the impact of seasonal variations;
- Changes to employment;
- People with different skills may be required;
- Different jobs may be created;
- There may be reduced physical hardship;
- Increased safety;
- Improved production efficiency;
- Increased contribution to economic growth; and
- Increased profits for those in the industry.

However, there is little information on whether any changes in the forest sector are attributable specifically to the introduction of new technologies. Although there have been significant changes in employment and location of the wood harvesting and processing industries, the effects of introducing new technologies are confounded with concurrent effects of concentration of production into few sites and a major shift of production from native forests to plantations.

The spatial distribution of Australian industries that rely on forests creates a more difficult overall problem. In most local areas, agriculture is a more important industry than wood processing so that changes in the two industries may confound local effects. The proportion of agriculture that is dependent on forests, as opposed to cleared land, is unknown. While there is a capacity to assess the consequences of new technologies, these assessments are not commonly carried out. As a result, the data on this indicator are limited.

Case studies – New technologies, Tasmania and Victoria

Victoria has provided information on a number of new technologies and their socio-economic impact.

- *Cording and matting*

Definition: according to the Forest Practices Code, cording and matting is the use of suitable logs, bark or vegetation to spread the weight of the load and separate machine tyres of tracks from direct soil contact during harvesting operations, thus reducing ground pressure and rutting. With matting a complete cover over the soil is created using an excavator before machinery operates over the site.

This technique aims to minimise soil disturbance by reducing ground pressure, compaction, rutting and puddling caused by machinery during harvesting operations. The major benefits of this technique include:

- Enabling harvesting to continue in wet weather;
- The possibility of extending harvesting periods into winter;
- Minimisation of dust in summer;
- Improved safety;
- Cost savings on machinery; and
- Improved efficiency and effectiveness in the restoration of the coupe following the completion of harvesting operations.

These benefits have significant socio-economic consequences. Contractors will be guaranteed continual employment throughout their contract period as well as having the potential for work during winter.

- *Shovel logging*

Definition: Shovel logging is any harvesting system that uses excavators or tracked loading machines with log grabs to lift and move logs while the harvesting machine is stationary.

This technique minimises soil compaction and disturbance on harvesting coupes. It has similar advantages and socio-economic impacts to those of cording and matting.

- *Mechanical harvesting*

Definition: Using tractors and other available technologies to improve the efficiency of harvesting, hence replacing manual harvesting.

Mechanical harvesting has a number of advantages. These include:

- Increased productivity;
- Increased competitiveness in global markets;
- Improved safety in harvesting operations; and
- The ability to operate in a broad range of environmental conditions.

The major socio-economic effect of this technology may be a decrease in employment. It has been suggested that increased adoption of productive mechanical devices can often lead to a decrease in employment, however, there has not yet been any evidence to support this view.

Source: DNRE (1996) and Wilkinson (2001)

Mechanisation, such as the introduction of machinery in thinning operations, may cause employment levels to drop even during periods of increased production

Further reading

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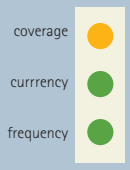

Predicting human impacts

Indicator 7.5d

Capacity to conduct and apply research and development aimed at improving forest management, including enhancement of ability to predict impacts of human intervention on forests

Rationale

The ability to predict impacts is required to ensure that long-term objectives are likely to be met.

Models relating to predicting the impacts of human intervention on the six recognised forest values are available or under development for the majority of States and Territories. Models are most advanced for wood production and carbon, and to a lesser degree for soil and water conservation, and impacts on biodiversity.

Australia's forests are, to a significant extent, the products of human intervention, both before and after European settlement. The nature of interventions and impacts on forests has changed, along with socio-economic demands. In addition, plantation forests have been established on an increasing scale over the past 130 years.

This indicator is closely related to the development of scientific understanding (indicator 7.5a), which underlies any predictive ability. It should also be read in conjunction with indicator 7.5e, which is concerned with predicting impacts from human-induced climate change.

In order to manage Australia's forests sustainably, prediction of the likely effects of management actions on forest values is helpful. Examples include:

- The extent to which management for wood and non-wood production (for example harvesting, water yield, fire control, grazing and recreation) are compatible with conservation of biodiversity, soil, water and heritage values.
- The rate of growth of wood production forests and hence the sustainable yield.
- The effect of changing fire regimes on the forest ecology and on the risk to life and property.
- The interactions between forest ecology and climate in relation to global warming and the carbon cycle.

Table 128 summarises the current state of models for predicting the impacts of human activities on forests. Models are most advanced for wood production, with some available for soil and water conservation, and impacts on biodiversity. This bias is also reflected by information provided in indicator 7.5.a. Predictive ability depends on the availability and accuracy of data.

Productive capacity of forests

The traditional empirical approach to predicting how well trees will grow on particular sites has been to establish permanent plots across a range of sites that differ in factors affecting growth, for example rainfall, evaporation, water table depth and soil properties. Tree performance was then predicted by extrapolating these permanent plot data to a landscape scale. Over the past decade or so, however, a number of physiologically, or hybrid empirical-physiologically based models of tree growth have been developed and are being tested for their capacity to predict forest growth. For example, the model known as 3PG (Physiological

Table 128: Availability of models to predict impacts of human intervention on forest properties

	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Australia
Biodiversity	UD	UD	–	✓	–	UD	UD	UD	–
Productive capacity	–	UD	–	✓	✓	✓	✓	✓	–
Ecosystem health	–	UD	–	✓	–	UD	–	UD	UD
Soil and water	–	✓	–	UD	–	UD	✓	UD	–
Carbon	–	UD	–	UD	✓	–	–	–	✓
Socio-economic	–	✓	–	UD	–	–	UD	–	–

UD = Model under development

✓ = Model available

Processes Predicting Growth) calculates the sun's energy absorbed by forest canopies and from this deduces the biomass production of leaf, stem and below-ground parts. The efficiency of these conversions is modified by site and environmental factors and stand age.

Growth models at the stand level are used in plantation forestry, and in some regrowth native forests managed for wood supply. A notable example is STANDSIM, which has been used in Victoria for the past two decades. This model was developed to predict growth of fast-growing eucalypt forests undergoing self-thinning. It has been modified to predict how mechanical thinning of young stands concentrates log volume on fewer trees, thereby reducing rotation lengths and increasing the value of individual logs. In Western Australia, growth models are available for the jarrah (*Eucalyptus marginata*) and karri (*E. diversicolor*) forests. Predictions of growth and timber yield in uneven-aged native forests are also made with models.

Soil and water

A large effort is made by forest and land management agencies to monitor catchments and assess the effects of disturbance at different sites on erosion, sediment movement and water quality. In New South Wales, the forests in the Eden region have been a main focus for modelling. Models of the effect of stand age on the quantity of water yielded from forested catchments have been made for mountain forests in Victoria.

Biodiversity and forest health

Models to predict impacts of human activity on forest biodiversity take several forms, including the prediction and mapping of vegetation distribution and wildlife habitat. Queensland is well advanced in this regard with a wide range of models to predict forest grazing intensity, habitat quality, flora and fauna distribution and old growth. Data analysis or case studies have been undertaken for all models, largely concentrated in the Brigalow and South East Queensland biogeographic regions with the intention to apply them progressively to other forested regions. In Western Australia, FORESTCHECK, an integrated forest monitoring system, is under development to yield data suitable for modelling a range of human impacts.

Modelling of the distribution and responses to disturbance of individual species may aim to assist in the conservation of threatened species. For example, in Tasmania, forest snails, velvet worms, freshwater crayfish and the swift parrot (*Lathamus discolor*) are subjects of this approach. Another example is to model so called keystone species—such as, forest owls in the south-eastern Australian forests—with the expectation that prescriptions for such species will assist in conserving other sensitive species and the forest environment as a whole. In Victoria, Population Viability Analysis models have been developed that rank management options for arboreal mammals at risk of extinction.

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Predicting impacts of climate change on forests

Indicator 7.5e

Capacity to conduct and apply research and development aimed at improving forest management, including ability to predict impacts on forests of possible climate change

Rationale

The ability to predict impacts of climate change is required to ensure that long-term sustainability objectives are met.

Australia has a well-developed climate forecasting and modeling capacity. There have been few studies, however, to link this to the possible impacts of predicted climate changes on forests

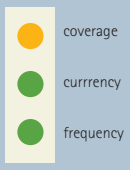
Australia has a well-developed climate forecasting and modeling capacity and can forecast potential future climates for different regions of the country based on current scientific understanding (refer to indicator 3.1.a). However, few studies have been done on the possible impacts of predicted climate changes on forests. Further research is required on the impacts of climate change on the distribution of major tree species, forest ecosystems and fire regimes.

An example of a study that does link climate forecasting to forest impacts is one carried out by CSIRO and the Rainforest Cooperative Research Centre. This research analysed the environmental controls on tropical forest distributions within the humid tropics of north Queensland and used these relationships to estimate likely past distributions under late Pleistocene to Holocene climates, and to provide spatially explicit assessments of their sensitivity to future climate change.

Detailed modelling of climate change has produced estimates for decreased rainfall and higher temperatures in much of southern Australia, while part of the north-west may receive higher cyclonic falls. However, further research is required on the impacts of climate change on the distribution of major tree species and forest ecosystems and on fire regimes.

Rainforest, Osborne Island, Western Australia

Silviculture and forest utilisation research



Indicator 7.5f

Capacity to conduct and apply research and development aimed at improving forest management, including per cent of native forests and plantations that are formally supported by silvicultural and utilisation research

Rationale

Targeted research is required to support the forest industry. This indicator concerns the scientific basis for silviculture and harvesting in native forests and plantations managed for production of timber and other products.

In many jurisdictions production native forests and plantations are formally supported by silvicultural and utilisation research.

The capacity for research in forest ecosystems is covered in indicator 7.5a. In addition to this, it is appropriate for specific research relating to forest products industries to be undertaken. This will ensure long-term viability of the resource and its marketability. A wide range of research funded by governments and the private sector provides that basis (Table 129). It is important to note that although the figures in Table 129 identify the area of forest in which silvicultural and utilisation research is formally supported, this does not imply that research is undertaken across all forest types or all localities.

Table 129: Per cent of production forests and plantations formally supported by silvicultural and utilisation research

	ACT[1]	NSW[2]	NT	Qld	SA	Tas	Vic	WA
Native forests								
Public land	*na*	–	–	*100*	–	*100*	*100*	*100*
Private land	*na*	–	–	*5–10*	–	*100*	–	[3]
Plantations								
Public land	–	–	–	*100*	*100*	*100*	–	*100*
Private land	–	–	–	*90–100*	–	*100*	*100*	[3]

[1] There is no harvesting of native forests in the Australian Capital Territory

[2] Research priorities and needs are under review

[3] Exact amount not given

The Forestry and Forest Products Committee, comprising the heads of Australian and New Zealand Government agencies responsible for forestry, administers the Research Priorities and Co-ordination Committee that coordinates and prioritises forestry research nationwide. It is advised by groups of researchers and managers from the public and private sectors concerned with:

- Genetic resources;
- Forest measurements and information;
- Land and water resources;
- Native forest management;

- Plantation management;
- Fire management;
- Forest health.

While private sector companies commission some research, governments fund most. One major source is the Forest and Wood Products Research and Development Corporation, which receives funds from the private and public sectors. Most of the research results are in the public domain and freely available to all forest owners and managers

Public native forests and plantations managed by government agencies employ scientifically and technically trained people who apply the results of research, as do the larger private sector forest and plantation owners. Government extension services advise smaller private sector forest and plantation owners.

Identified areas for future industry related research include:

Native forests:

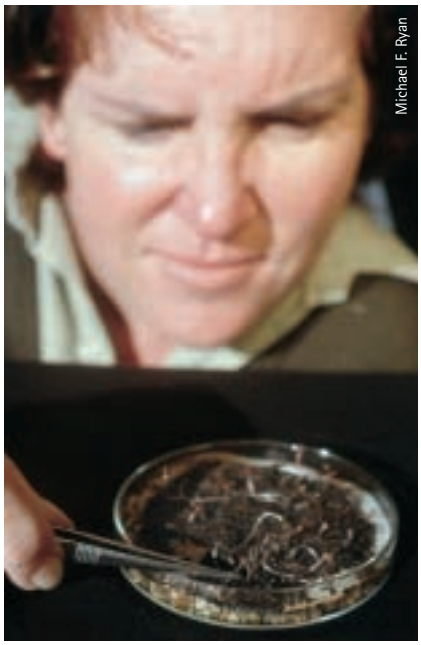
- ecological and hydrological impacts of timber harvesting;
- regeneration techniques for particular forest types and species; and
- management of wildfire.

Plantations:

- hydrological impacts of timber harvesting;
- selection of species for particular regions and sites;
- silvicultural techniques, such as cultivation, fertilisation, thinning and pruning;
- breeding to improve productivity; and
- use of timber plantations to provide environmental services such as salinity mitigation and carbon emission reductions.

Native forests and plantations:

- protection from pests and diseases;
- harvesting systems and machinery;
- occupational health and safety for forest workers; and
- management systems and techniques.



Eucalypt seed viability testing, East Gippsland, Victoria

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