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**INQUIRY INTO THE LONG – TERM SUSTAINABILITY
AND FUTURE OF THE TIMBER AND FOREST
PRODUCTS INDUSTRY**

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Submission by
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1. Institute Policy Position 1.4: Timber Production and Biological Diversity
2. Institute Position Paper (April 2020): Sustainable Timber Harvesting in Native Forests

Executive Summary

The Institute of Foresters of Australia and Australian Forest Growers (hereafter referred to as the 'Institute') is Australia's independent national body representing forest scientists, technicians, growers and managers with professional and practical expertise in managing private and public land native forests and plantations.

With this submission, the Institute addresses the forestry science, environmental, economic and community impacts and opportunities for forestry in Australia. This submission reports against all of the Terms of Reference of the inquiry.

The Institute's approximately 1,000 members are engaged in all aspects of forestry, as well as nature conservation, natural resource and land management, research, administration, and education in Australia and overseas. We advocate balanced land use that meets society's needs through ecologically sustainable management of forests, including for timber supply and biodiversity conservation, while addressing the fire and conservation issues arising from a changing climate.

The Institute is wholly reliant on fees from its members and vigorously defends its professional independence. Therefore, this response to the Terms of Reference represents the collective experience of members from all States and Territories of Australia in the future development of a vibrant and ecologically sustainable forest industry for Australia coupled with excellence in management of forested conservation areas.

The Institute is strongly committed to the principles of ecologically sustainable management of forests, conservation of biodiversity, provision of sustainable and equitable livelihoods, and the management processes, systems and practices which translate these principles into sustainability outcomes.

Australia is heading for a timber supply crisis. Most house building and internal fitting depends on a ready supply of timber at an affordable cost. Australia's population is expected to increase from 21 million in 2011 to at least 30 million by 2035. Unless urgent action is taken now to develop domestic supplies of timber for this increasing population, Australia will need to import an increasing proportion of its timber needs. Imported timber is subject to price fluctuations/increases and competition from emerging economies, particularly China and Southeast Asian countries. Imported timber is often produced from areas which do not have the same rigorous standards of forest practices as Australia and has associated carbon costs of transport.

Australian domestic softwood timber supply is expected to remain relatively static for the next decade and beyond, based on current policies, and growth in the area of plantation that produces timber for housing has not kept pace with population growth or timber demand over the past 15 years. Australian domestic hardwood timber supply is decreasing and expected to continue to decline due to continuing removal of native forests from commercial timber production, especially State-owned forests.

Alternatives to wood for building materials, including concrete and steel, do not contribute to greenhouse gas emissions mitigation as well-managed forest do and sawn timber from plantations takes at least 25 years to grow. That is why action needs to be taken now to avert a looming timber crisis. New plantations need funding and suitable land.

In summary, steps which need to be taken now are:

1. Focus any increase in the conservation reserve system on forest habitats that are not adequately represented in the CAR system, rather than continuing to remove timber production forests that are well-represented in conservation areas.
2. Expand the area of planted forests to produce sawlogs.
3. Ensure that forestry in Australia meets or exceeds world's best practice.
4. Change the narrative and vision in Australia to embrace active and adaptive forest management, across all land tenures, to provide solutions to the challenges that Australian forests are currently facing.

Opportunities for and constraints upon the NSW timber industry

Australia has an outstanding competitive advantage in forestry because we are relatively forest rich - 20% of land area is forest or 7.5 ha/person. The trade deficit in timber products is currently \$2 billion/yr. (Australian Bureau of Agricultural and Resource Economics and Sciences, 2021). This is expected to increase because Australia's coniferous plantation estate is declining, and demand is increasing due to a rapidly increasing population and a steady per capita consumption.

Opportunities

Australia should replant and expand its softwood estate to provide local structural timber to meet future domestic housing demands. The impacts of the 2019/20 bushfire season on NSW's hardwood and softwood plantation estate were severe. Areas of the existing plantation estate that were catastrophically impacted should be replanted and opportunities taken to consolidate and expand the estates around the existing industry.

An over-reliance on timber imports should be discouraged if Australia is to reduce its contribution to the global carbon footprint and avoid the risk of price spirals due to increasing international competition for a diminishing world supply.

Institutional superannuation investment is a possible source for funding the expansion of the plantation estate. In recent years, US companies have been purchasing plantation assets from State established softwood resources and failed MIS hardwood estates. The diverse age distribution of some estates has provided investors with an immediate return and an ongoing sustainable revenue stream.

Well-managed harvesting could be used to strategically manage bushfire risks and enhance forest health and resilience. Silvicultural treatment, including thinning of forest areas for strategic fire breaks can help reduce the risk of severe landscape scale bushfires which will help conserve biodiversity across the landscape. Silvicultural treatment can also help improve forest health in cypress and red gum forests. Australia can learn lessons from the US where policies on forest management were changed after heavy losses of forest to fire and insect attack more than a decade ago. The timber industry is now setting up thinning and sanitation harvesting of ponderosa forests in Arizona after being closed decades ago. This new approach has been supported by environmental groups (*Peter Aleshire June 2010, Dave Atkins US Forest Service April 2011*).

Productive native forests can generate large volumes of residue timber for industrial applications, while still maintaining high standards of ecological sustainability. The South-Western Cypress Assessment Report in Western NSW by the NSW Natural Resources Council (NRC) has documented large areas of densely stocked private cypress forests. Thinning of this resource for products, including small sawlogs, vineyard posts and biomass, would provide a welcome economic activity for those communities, help restore and maintain forest health and reduce the risk of severe bushfires whilst conserving biodiversity.

Forests are a very effective means of sequestering carbon. Forests have the potential to make a significant contribution to Australia's efforts to mitigate greenhouse gas emissions. With the appropriate policy, mechanisms and safeguards in place, climate change actions could be enhanced through effective management of native forests

and plantations. Moreover, carbon can also be stored in processed timber products and forests can to some extent provide carbon-neutral substitutes for fossil fuels.

There is a need to recognise the benefits that forests, and plantations can make to climate change and include positive initiatives to encourage and support investment in carbon forests and plantations. Such an approach should recognise the stored carbon in wood products and the ability of wood to substitute fossil fuel emissions.

Lack of certainty about how carbon can be priced and how carbon stored by forests and plantations can be included in any future cap and trade system severely limits investment in carbon plantations or plantations based on carbon and other commercial values.

New technology and training in timber processing, forest growing, and the harvesting and haulage sectors can lead to innovation, job creation and productivity gains. Realising these gains requires an increased investment in education, research, and training.

Plantations and multiple use native forests should be better recognised as valid, sustainable land uses. In some instances, provisions are included in local government planning schemes which discourage or prevent use of land for plantations. Whilst such obstacles are within the jurisdiction of local and State governments, strategic planning principals for enhancing a forestry resource and industry could be advanced by an updated National Forest Policy. Education and training of land use planners is critical to developing a greater understanding of the role of forestry in regional development.

Constraints

Australia now has one million hectares of hardwood plantations that were established rapidly over the last two and half decades, mostly under Managed Investment Schemes (MIS). They were established to supply export chips for the Asian paper industry and hence the species planted were selected for pulping properties.

The contention that substitute timber is readily available from the hardwood plantation estate when timber harvesting is excluded from native forest areas is incorrect. Australia's plantation estate cannot provide the same quality of timber that is currently harvested from native forests. Ongoing demand for timber with special characteristics of strength, durability or appearance, coupled with declining supply has resulted in an increasing reliance on imported tropical hardwood timbers, in many cases from forests that are not managed to high environmental standards applied in Australia. There is a risk that excluding harvesting from Australia's native forests is creating harmful environmental consequences in the tropical forests of Southeast Asia.

Australia's solution to ensuring imports are sourced legally has been to introduce legislation, that penalises importing merchants who cannot demonstrate their timber has been harvested legally. Whilst this is a positive development, it is important to understand that in some countries *legally harvested* provides no guarantee of ecologically sustainable forest management.

The questionable effectiveness of the conservation strategy of expanding the conservation reserve system. The transfer of large areas of public native forest from

multiple use management to the conservation reserve system by State Governments does not necessarily result in improved conservation of biodiversity.

To achieve national and state biodiversity conservation objectives it was necessary and sensible to place many forests into the Comprehensive, Adequate and Representative (CAR) reserve system. This approach was supported by the development of the Regional Forest Agreements (RFAs). However, continued unstrategic transfer of native forests into the CAR reserve system does not clearly add value to conservation outcomes but does clearly reduce opportunities for active and adaptive management practices that could be designed to support conservation goals. The EPBC Act, State level environmental laws and regulations, Regional Forest Agreements and Forest Practices Codes have all contributed to ecologically sustainable management and use of forests outside of formally protected areas.

Despite the extensive placement of NSW forests into the CAR reserve system, the incidence of landscape level severe bushfires and impacts of invasive species (pests and weeds), such as caused by deer, foxes and feral cats continues to increase.

With an increasing awareness of the impact of climate change and its compounding effect on other threats to forest biodiversity, there is an urgent need to introduce more active and adaptive management for the entire forest estate, including the CAR reserve system. The recent severe landscape level fires highlight the inadequacy of the minimal management intervention strategy applied in most protected areas. Insufficient management of forest fuels, closure and lack of maintenance of roads and service trails and inadequate funding of many protected areas has made large areas of NSW's forests vulnerable to severe fires and forest types, such as rainforest gullies that previously were not known to carry fires, were incinerated in the recent fires.

Moreover, the downsizing of the timber industry and forestry management has led to the loss of bush skills and heavy equipment that is essential for managing forest fires and assisting with post-fire recovery.

Misguided perceptions of the forest industry negatively affect public discourse and lead to decisions based on opinion rather than evidence. Society's desire to embrace sustainable living is to be applauded, but the view that this requires native forests to be permanently included in the CAR reserve system misses the point that forests can be managed for ecological sustainability whilst also providing forest products and services. The dynamic nature of ecosystems, contributions that the forest industry can make to conservation, fire and climate change mitigation, and time scales that the forest industry operates with are often overlooked in public debates.

Australia has high-class sustainable forest management regulations. The Regional Forest Agreements aimed to balance the social, environmental and economic values of key forested regions. The RFA's established a framework for the CAR reserve system, ecologically sustainable management and use of forests, and the long-term stability of forests and forest industries. The long-term stability of forest industries has remained illusory as increasing areas of native forest have been transferred into the CAR reserve system. This is despite the development of a comprehensive regulatory system and the codes of practice.

The lack of certainty over timber supply has created a high sovereign risk to investment in the timber industry. Despite assurances given about timber supply, the

industry has been subject to changeable Government policies that have seen access to production forests curtailed. Such uncertainty dampens investment in new forest related developments and innovation. Past decisions such as the banning of use of native forest residues for biomass production are not clearly based on available evidence that such approached can be managed sustainably.

The NSW Circular Economy Policy Statement (2019) notes that a 'circular economy values resources by keeping products and materials in use for as long as possible. Maximising the use and value of resources brings major economic, social and environmental benefits. It contributes to innovation, growth and job creation, while reducing our impact on the environment.'

Yet there are indications that native forests are not valued for the wide range of goods and services they can sustainably provide. The ecologically sustainable management of forests can bring the major economic, social and environmental benefits, and contribute to innovation, growth and job creation, while reducing our impact on the environment that the Circular Economy Policy Statement calls for. But this requires addressing misperceptions about forestry and building a shared vision for an holistic approach to forest management that incorporates all forests values. Specific actions to assist this process could include:

- Government supported education programs through schools, universities and the community.
- Government facilitation of respectful dialogue between forestry and other interests.
- Engage the ACCC to assess the legality of actions of civil society campaigns where legal agreements have been established for legitimate industry operation.

Recommendations

The Institute:

1. Considers that wood can be sourced from plantations and native forests on private and public land managed according to the principles of ecologically sustainable forest management and implemented in accordance with relevant codes of practice.
2. Encourages maximum value recovery from all trees harvested in both native and planted forests.
3. Supports public policy frameworks and private sector investment to develop Australian processing industries that add value to the wood produced in Australia's native and planted forests¹.
4. Recognises that timber production is a renewable, low energy use industry that need not threaten biological diversity².
5. Advocates for enhanced government and industry initiatives to provide clear and evidence-based information on the social, economic and environmental values of forest management available to students, interested groups, forest industry focused entities and the community at large

¹ Woodchip from Australian Forests, Institute Policy 8.2. Points from this policy serve as a generic response to the use of wood for any high-volume use of wood for any industry application.

² Timber production and biodiversity, Institute Policy 1.4,

6. Advocates the ongoing development, auditing and review of Codes of Practice, and associated forest regulation, to cover all significant forest management activities, irrespective of land tenure³.
7. Promotes further training and education in forest management for production and conservation as well as developing skills and expertise to support advances in wood processing technologies.

Opportunities for diversification, value adding and product innovation

Value adding

Over the decade 2007–08 to 2017–18, total consumption of paper products consistently exceeded total domestic production. The difference was made up by paper and paperboard imports averaging 1.7 million tonnes per year (Australian Bureau of Agricultural and Resource Economics and Sciences, 2021). There remains a significant opportunity to process wood fibre from forest residues and mill waste domestically.

Similarly, over the past decade the volume of roundwood exports has increased dramatically. Generally, these exports are sourced either from forests remote from established industries or from species/sizes not traditionally processed by domestic mills. However, considering the severe impact of the 2019/20 bushfires on the NSW plantation estate, there is an immediate need for industry and Government to work together to redirect suitable logs destined for export to domestic processors.

Biorefineries as an alternative industry for value adding chip residues

Biorefinery systems require similar resources and supply constraints as pulp and paper. Forest residues from short rotation hardwood plantations can provide a source of feedstock for a biorefinery or supply bio-energy markets.

Industry initiated R&D in Northern NSW suggests there is merit in establishing technology on a small scale that produces electricity, oils, syngas and charcoal from residues. The model takes advantage of the highly variable nature of the plantation estate, and the need to find a market for thinnings and other non-merchantable parts of the tree.

There is merit in developing technologies and applying them on a scale that provides existing industries opportunity for diversification. Given the challenges of acquiring suitable land for establishing plantations to satisfy industry, it is unlikely that a large-scale industry could be conceived. However, the introduction of a carbon price may provide added incentive for this change.

Engineered wood products utilise wood more efficiently than solid timber products

Laminated beams carry greater loads in longer spans than equivalent end-sections in solid timber. They exhibit minimal lifecycle analysis (LCA) values when compared with aluminium, steel and masonry. Domestically, the availability of high-quality logs is declining due to the withdrawal of native forest from harvesting and the fact that most hardwood plantations are managed for short rotation pulpwood.

³ Forest Regulation and Codes of Practice, Institute Policy 2.8, preamble to points of the policy

There is a need to develop resource and engineering solutions to satisfy markets for structural and feature solid timber products for domestic and industrial use as well as satisfying growing international demand for building products. Big River Timbers at Grafton, NSW have successfully developed laminated bridge components for the widespread replacement of timber bridges in Queensland.

Cooperative Research Centres (CRC) for Wood Innovations and CRC for Forestry are making a valuable contribution to the growth and utilisation of plantation hardwoods. A collaborative approach that pursues knowledge and advances in genetics, silviculture, wood quality and innovations relating to composite products and processing technologies will be essential for maintaining traditional markets and developing new products. It is noteworthy that significant effort has focused on southern resources (i.e., *Eucalyptus nitens* and *E. globulus*) and product options.

While there are several projects focusing on genetics, wood quality and adaptive technology, a similar commitment for the northern species and product possibilities will require a similar effort. Given that sub-tropical and tropical growing conditions cannot compete with the rates of growth reached in temperate regions, structural products are a more suitable market opportunity over pulp products. There is a challenge to develop a suitable market for thinnings, growing wood that has good characteristics for structural products, and developing processing and engineering solutions

Recommendations

The Institute:

1. Considers it important to take advantage of value adding of native forest harvest residues or specific purpose plantations in the local manufacture of pulp and paper.
2. Supports the use of forest residues for bio-energy and bio-refineries, providing always that such uses are based on ecologically sustainable forest management and support biodiversity conservation objectives.
3. Encourages value adding through adaptive technology for engineered wood products, including through support of CRC's and other Industry research initiatives.

Environmental impacts of forestry

Sustainable commercial forestry in plantations and native forests can provide environmental benefits and enhance conservation objectives. Production forest landscapes are capable of sustaining biodiversity while providing goods and services. However, management of landscapes is complex and must account for spatial, temporal and cultural differences.

Australia has the responsibility to manage native forests and plantations in a sustainable manner. This includes reducing reliance on imported timber and timber products, especially where these are the products of land use change, deforestation or from, illegal sources.

Ecosystems do recover from disturbance caused by professionally executed timber harvesting, reforestation and prescribed fire management.

Forestry professionals have the skills to implement management strategies to meet forest owner's objectives and community expectations regarding commercial operations and maintenance of other forest values in native forests⁴ and plantations.

Management plans for forest and woodland landscapes should recognise the important ecological role of fire where appropriate and provide strategies to ensure that fire regimes are compatible with broad land management objectives and ecological characteristics and maintain protection of life and property.

Increased use of wood products is a practical contribution in the mitigation of anthropogenic carbon emissions.

Excluding timber production from native forests does not guarantee protection of biological diversity or enhancement of conservation values. Active and adaptive management is required, as demonstrated by the 2019/20 bushfire season.

Sustainably managed plantations are an increasingly important land use in Australia.

Plantation managers can and should work with governments and catchment management authorities to ensure that plantation development minimises adverse impacts on water quality and flows.

Regional Forest Agreements have provided the basis for setting a framework for economic, social and environmental management of forests and having a comprehensive, adequate and representative reserve system.

Impacts of plantations upon land and water availability for agriculture

Australia's plantations provide approximately two thirds of the domestic timber production, especially the bulk commodity products of construction pine timber and fibre for paper and woodchips.

Studies show that plantations show a higher level of biodiversity than the pastures they replace and provide habitat or resources for a range of species, including a selection of bird species considered to be at conservation risk.

Multiple use forests and plantations play an important role as firebreaks. A maintained plantation with firebreaks and adequate weed control can reduce the intensity of a fire, through reduced fuel availability and improved access for fire fighters. There are cases of plantations halting advancing fire fronts⁵. However, all forests, including plantations will be burnt under extreme conditions.

The establishment of plantations in water catchments can have both positive and negative impacts on stream water quality and quantity. Reforestation of some areas of cleared agricultural land with plantations can provide substantial environmental benefits, including greater protection of streams and stream banks, and an increase in water quality through providing a vegetation filter. Because trees use more water than annual crops and intercept more rainfall than pastures, there will be reductions in stream flows in some situations. The amount to which stream flows are affected depends on the percentage of the area of the catchment under plantation, and the effect of other land uses. In general, stream flows will stabilise within 10-20 years of

⁴ Timber Production in native forests: Policy 2.7

⁵ Institute Submission to Victoria Bushfire Royal Commission

establishment. Strategically placed plantations can have a positive effect on the amelioration of dryland salinity.

Australia has plantation area to more than void its carbon output. Australia's forests sequester more greenhouse gases from the atmosphere than they emit and thus help to offset Australia's contribution to greenhouse gas emissions. In 2005, plantations offset about 3.5% of total national greenhouse gas emissions. Sequestration of carbon occurs both in the growing forest and in the house construction and paper products forests produce.

Environmental Impacts from native forest areas

Australia's multiple-use native forests provide for biodiversity conservation, recreation, minor forest produce such as beekeeping, water production and timber production. Each of these are legitimate activities when properly regulated and conducted according to sustainability principles.

The federal government introduced illegal logging initiatives more than a decade ago to help stem the tide of illegal logging that occurs in less developed economies. This included a commitment to improving the competitive advantage of the local industry⁶. Australia's regulatory framework for native forest operations provides the market with a secure chain of custody and confidence that forests are sustainably managed. Australia has developed a comprehensive certification system in the Australian Standard® for Sustainable Forest Management and the Forest Stewardship Council has certified native forests and plantations in Australia. However, due to the continuing transfer of native forest to reserves, the future supply of native timber products is uncertain.

Contentious at the best of times, it cannot be argued that managing Australia's forests to compliment environmental and production outcomes is an easy task. What can be said, however, is that by allowing native forests to be used for active and positive production allows them to be monitored and protected against fire and invasive plants and feral animals.

Active and adaptive management for a broad range of benefits

In summary, the Institute considers that active and adaptive management of native forests, including renewable timber production in a minor portion, is vital to their sustainability and provides many benefits to Australian society. It also ensures that Australia meets more of its timber needs domestically, rather than sourcing timber and paper products from other countries, which may not be subject to the same level of environmental management standards that are applied in Australia.

The sustainable management of scattered, small-scale native forest timber production provides a broad suite of socio-economic benefits, including road access for recreation, fire control, eco-tourism and the production of non-timber products; while also providing ecological benefits in ways that include increasing structural diversity (uneven aged stands and forest mosaics) across the landscape, and by contributing a fire-fighting workforce that is a major component of efforts to reduce

⁶ <http://www.daff.gov.au/forestry/international/illegal-logging>: The site outlines the initiatives taken by the Government to reduce illegally logged products reaching and impacting on the domestic market. The policy and legislation are a direct approach on imports. However, the signals may indirectly provide market opportunity for locally sourced products

the threats of huge (stand replacing) wildfires that can cause major flora and fauna losses or profound changes to vegetation communities.

Sustainable management is underpinned by the CAR reserve system, complemented by active management of biodiversity outside of formal reserves.

The Institute supports ongoing research on timber harvesting in native forests to support this capability in Australia. This needs to encompass the development of adaptive management to protect biological diversity.

Concurrently, the Institute supports and encourages the use of Codes of Practice that promote best practice forest management; are based on best available science and knowledge; are subject to regular public review; and, have appropriate support, monitoring, compliance, audit, reporting and, where required, enforcement. In conclusion, public native forests and woodlands should be managed by people trained in the principles of sustainable forest management supported by professional knowledge and expertise in forest science.

As an example, in 2014 the NSW Natural Resources Commission submitted its final report to the NSW Government detailing recommendations and findings to improve the management of cypress forests in Brigalow and Nandewar State Conservation Areas. In summary, the Commission found that while small patches of dense vegetation provide habitat for native flora and fauna within a landscape mosaic, large areas of dense vegetation are likely to have negative impacts on a range of ecological values, including biodiversity. The Commission recommended that Government actively manage large stands of increasingly dense vegetation where it has potential to impact ecological values in the Brigalow and Nandewar State Conservation Areas.

Further, the Commission advised that the Brigalow and Nandewar State Conservation Areas be adaptively managed under new management plans, and that Government identify and apply alternative funding, cost sharing and cost recovery models for active and adaptive management in these areas.

Of note the Pilliga forest in Central-West NSW, which is predominantly a cypress forest of about 500,000 hectares in area, was known for its large koala population when it was an actively managed State forest. As a State forest the invasive and vigorously growing cypress pine was harvested and thinned, therefore encouraging other species such as eucalypt species to grow, thus providing food and habitat for the koala population. However, in 2005 the NSW Government converted about half of the forest into a State Conservation Area. It is now commonly known that the koala population of the Pilliga is in peril and has been so for about the last 10 years. While climate change and bushfires are impacting the koala population, the decrease in habitat and food source are compounding the problem for the species.

Notwithstanding the substantial increases in forest reservations over the past 20+ years and associated reductions in timber production levels, we have seen major bushfires become more prevalent, across national parks and reserves as well as State forests, with significant impacts on forest ecosystems and species.

The Institute contends the management of the CAR reserve system has not been clearly effective in reducing risks to forest ecosystems or species. The public misperception that forests can only be conserved by closing the timber industry and

placing public forests into the CAR reserve system is likely leading to poor land use decisions and not clearly enabling improved conservation outcomes.

The CAR reserve system is generally poorly funded, relatively passive, and allows less flexibility than is needed to effectively manage key threats such as fire, particularly at a landscape scale.

On the other hand, State forests that provide an economic return from part of their area, have traditionally been subject to an active land management model encompassing appropriate and timely interventions that cater for a broad range of forest values.

The Institute advocates for active and adaptive management of forests including as appropriate for the particular situation, various forms of sustainable timber harvesting, including ecological thinning and selective harvesting systems. These practices enhance structural diversity (uneven-aged stands and patch mosaics), strengthen the resilience of forested landscapes, and maintain the skills and workforce capacity of the forestry sector to contribute to forest and fire management strategies as it has done for generations. The Institute also advocates for more extensive use of fuel reduction burning, including Traditional cultural burning practices that can complement contemporary techniques, through the involvement of and collaboration with Traditional Owner groups.

In addition, there is a pressing need for more extensive seed collection to support forest restoration programs, such as in the young immature silvertop ash regrowth forests near Eden that have been impacted by successive wildfires and require direct human intervention to ensure effective regeneration. Without timely and effective regeneration, a large proportion of these forests are at risk of forest type change.

With respect to native forests and woodlands, the Institute considers there is potential for First Peoples to be more gainfully engaged and employed in bushfire prevention and mitigation, and in a range of environmental restoration and recovery programs.

The Institute recognises there are implications of timber harvesting on a range of other forest values and these need to be properly managed. A summary of the issues and management of these issues follows.

Fire management in many (although not all) native forests is essential to maintain their biodiversity, timber production, water production, and carbon stocks. Prescribed burning to reduce fuel loads in forests is an important tool in management of many native forests and thus should be implemented in all relevant forest area management plans. Fire management helps maintain those species which are dependent on periodic fire in the landscape. Because much of Australia's vegetation is adapted to fire, conservation values must be managed with the use of fire where appropriate.

The Institute would like to draw attention to two key issues relating to NSW's public native forests:

1. limitations associated with the State government's fire management program and its approach to protecting public forests from severe bushfires, and
2. The need for further investment in ongoing forest monitoring programs across public and private land tenures and all forest types.

In addition, the Institute considers there is a need for some government funding support to re-establish and strengthen regionally based programs and functions, such as those provided by Local Land Services and community-based organisations such as Landcare.

State government programs for protecting forests from severe bushfires

The capability to maintain NSW's forest and woodland biodiversity is strongly related to effective management of the bushfire threat that otherwise has the potential to inflict huge ecosystem damage. While many NSW forest ecosystems are adapted to periodic fire, the frequency and severity of recent NSW wildfires is unnatural, and the 2019-20 fires are the just the latest in a series of huge fires since 2003 to have strongly reinforced that point. Moreover, many of the recent landscape scale severe fires burnt into forest types that are highly susceptible to damage by fire, such as rainforest gullies.

Arguably, the nation's most successful forest management regime has been in southwestern WA since the 1960s, whereby 6 – 8% of the public forest has been annually fuel reduced. This means that at any point in time, between 30 – 40% of the forest contains fuels of less than 5 years of accumulation.⁷ Under these circumstances, summer wildfire generally runs into fuel reduced areas where it can be more easily controlled. This fuel management regime has kept WA's southwestern forests relatively free of the mega-fires that have afflicted SE Australia's forests, especially over the past 20-years.⁸

The expansion of the conservation reserve system at the expense of State forests has – especially in remote locales – been generally accompanied by a contraction in the size and quality of the road and track network due to a mix of park management philosophy and a lack of budgetary resourcing.⁹ This has made it harder to safely confine prescribed fuel reduction burns to planned boundaries, and at times has seriously impeded the capability to quickly access and attack wildfires when they are small and most controllable.¹⁰

There is concern that climate-induced changes to the length and severity of bushfire seasons will create further challenges for conducting fuel reduction burning by narrowing the window of opportunity. However, a trend towards longer and more severe fire seasons heightens (rather than diminishes) the importance of managing forest fuel levels.

The Institute considers that meeting this challenge will necessitate:

7 Burrows N. and McCaw L. (2013), *Prescribed burning in southwestern Australian forests*, The Ecological Society of America: *Frontiers in Ecology and the Environment*, Volume 11 Issue s-1, e25-e34.

8 M. Adams and P. Attiwill (2011) *Burning Issues*. CSIRO Publishing.

9 Ryan M. and Runnalls R. (2015), *Does timber harvesting in natural forests have any influence on fire management at the landscape level?* Unpublished paper presented to the Institute of Foresters of Australia Biannual Conference, Coffs Harbour, 2015.

10 *Goongerah-Deddick Trail Fire January – March 2014: Community Report*, Emergency Management Victoria, July 2014.

- A reversion back to undertaking more broadscale prescribed burning for fuel reduction and environmental objectives in remote areas in lieu of the current 'residual risk' approach which concentrates a reduced amount of burning in strategic areas adjacent to private and community assets;
- An innovative, active and adaptive approach to prescribed fuel reduction burning outside the traditional seasons, such as extending into either side of winter given an expectation that it may also become drier; and burning later into the evening when conditions allow during the traditional burning seasons; and
- A partial shift to other non-burning methods of fuel management, especially the use of mechanical methods that mulch or remove the fuels, especially near private or community assets where burning risks are problematic.

A major challenge will be in dealing with the increased costs of widely implementing these approaches. However, given the current over-reliance on aircraft use in firefighting, considerable amounts of money could potentially be saved and redirected towards fuel management and employing more field staff if aircraft-use were reduced in accordance with a proper cost-benefit assessment. Furthermore, any issues relating to increasing costs of implementing more effective fuel reduction programs should be considered in the context of the potentially far greater costs to NSW and its terrestrial ecosystems from *not* addressing fuel reduction risks, including potentially irreversible impacts (e.g., loss of particular forest types).

A more general concern about bushfire preparedness in NSW (and throughout SE Australia) is the gradual 20-year shift to a forest fire management approach strongly weighted towards emergency wildfire response in lieu of the traditional approach that was based on a reasonable balance between off-season wildfire mitigation (such as fuel reduction) and in-season wildfire suppression. This shift reflects the US experience and is strongly correlated with sharply increasing budgetary expenditure on aerial firefighting technology at the expense of traditional off-season preventative actions.¹¹⁻¹²

These consequences of this are now also evident in Australia (see Box 2 below); and according to some researchers and commentators they foster a self-sustaining cycle of massive wildfires which is regularly reinforced because each big fire increases community and political demands to further expand the fleet of firefighting aircraft. Recent research in Mediterranean countries, refers to this phenomenon as the 'firefighting trap' because nowhere in the world has increasing the numbers of firefighting aircraft ever reduced the incidence, extent, and severity of large forest fires.¹³

Large Air Tankers, as used during the 2019/20 fire season, are enormously expensive and have limitations in their use. However, to date no independent evaluation of their cost-effectiveness on the season's fire suppression outcomes has been made publicly available.

¹¹ Pyne, S., (2006) *The Still Burning Bush*, Scribe Publications.

¹² Williams, J.T. (2013), *Exploring the onset of high-impact mega-fires through a forest land management prism*, *Forest Ecology and Management*, Volume 294: 4 – 10, April 2013.

¹³ Moreira et al (2020), *Wildfire management in Mediterranean-type regions: paradigm shift needed*, *Environmental Research Letters* 15 011001.

The Institute considers that NSW could generate savings from reducing the expenditure on operational fire-fighting by increasing its annual program of prescribed burning. The additional expenditure on conducting an enlarged prescribed burning program should be more than offset by the savings generated through reducing expenditure on large air tankers, which currently dominates the cost of dealing with the fire threat.

Box 2. The shift to emergency wildfire response in lieu of preventative fire mitigation:

In the USA, the domination of aircraft-based emergency wildfire response arose because of a need to protect burgeoning suburbs, towns and other assets that were increasingly being built adjacent to or amongst flammable forests. But while this justified the approach, it is generally accepted to be failing to reduce the incidence, extent and severity of large wildfires because:

- It is focused on treating the symptoms rather than addressing the factors underpinning fire risk;
- Massive expenditure on aircraft reduces the budgetary resources for off-season activities such as fuel reduction and maintaining forest access that is integral to quickly containing wildfires while they are small;
- Aerial water/retardant-bombing under suitable operating conditions can be useful at saving houses and other community assets, but is relatively ineffective in controlling most forest fires (once they grow larger than one hectare); and
- An over-reliance on aerial water/retardant-bombing is partly displacing ground-based fire-fighting which although carrying higher fire-fighter risks, is integral to effectively containing wildfires.

Until the responsible government agencies develop a stronger enthusiasm for and commitment to regular broadscale fuel reduction burning and more targeted mechanical fuel reduction treatments, the protection of forest and woodland biodiversity from the threat of wildfire will be tragically inadequate.

Indigenous engagement – Bushfire prevention and mitigation

The beneficial use of cultural burning and 'cool fire' by Traditional Owners has been widely acknowledged since the 2019-20 bushfires. With regards to future bushfire prevention and mitigation, traditional knowledge and cultural burning practices have potential to contribute further to positive social and environmental outcomes. Integrating Traditional burning into forest fire management could also help to reintroduce traditional knowledge to Indigenous communities where it may have been lost.

Prescribed burning for wildfire mitigation undertaken by state forestry and fire authorities since the 1950s has been based on a similar concept of preventative cool season burning to create a mosaic of low and moderate fuel zones.

While Traditional burning practices have been maintained or successfully re-introduced into the vast and sparsely populated landscapes of central and northern Australia, south-eastern Australia has far more densely populated mixed farming and forested landscapes, with more variable topography and a greater imperative for burn control to avoid property damage. These factors would be expected to create

challenges for utilising Traditional burning practices to the extent required to make a significant impact on reducing forest fuels at a landscape scale, especially given the limited window of opportunity for safe burning. Furthermore, some Indigenous fire practitioners have noted that the heavy fuel loads which are evident across much of the public lands of south-eastern Australia, may be a constraint to widely re-introducing Traditional burning practices.

It is likely that Traditional burning will be most suited to certain forest or woodland types, and so would be complementary to the current burning programs carried out by land and fire management authorities, rather than a replacement for them. Nevertheless, the Institute considers there is potential for engaging and employing Indigenous rangers and cultural heritage officers in these types of roles.

Monitoring impacts of forest land use change is vital in determining short- and long-term benefits. With the large transfer of land into the conservation reserve system over recent decades, it is time for a genuine cost/benefits analysis be undertaken to establish the cost and benefits to local and regional communities and biodiversity conservation.

Triple bottom-line accounting is required for societal equity and may prove to be fundamental for achieving conservation objectives.

The Institute advocates for further investment in **Cross-tenure forest monitoring programs** to support active, adaptive and accountable management of NSW forests, particularly across threatened ecosystems.

The Institute recognises the value of the NSW Natural Resources Commission's state-wide monitoring, evaluation, reporting and improvement program for NSW forests.

Sustainable timber harvesting can be in keeping with maintenance of biodiversity conservation across the landscape when there is a CAR reserve system (as provided in RFAs). Professional expertise must be employed in timber harvesting to better improve biodiversity outcomes in large areas of regrowth forests originating after fire and from previous timber harvesting. It has been demonstrated that adaptive silviculture in certain regrowth forests can contribute to reducing the time forests take to develop old-growth characteristics such as large trees and hollows important for some species.

Environmental restoration and recovery

In addition to bushfire prevention and mitigation, there are many different aspects to environmental restoration and recovery that offer potential for participation by First Peoples. Examples include:

- The collection and storage of native tree and understorey seed, primarily as a contingency to assist environmental recovery of fire sensitive communities after severe bushfires (e.g., ash-type forests);
- Restoring tree stocking in unstocked or severely understocked areas of regeneration arising from past timber harvesting or due to the effects of multiple bushfires in close succession;
- Restoration of native vegetation in targeted areas of bushland (e.g., in national parks or conservation reserves) that have become over-run with introduced feral plants and noxious weeds;

- Habitat supplementation in areas adversely affected by disturbance; e.g., the building and installing of nest boxes or chainsaw carving of artificial tree hollows in areas where sufficient habitat is lacking;
- Feral animal control to protect native wildlife;
- Restoration of native vegetation and habitat on degraded former agricultural lands.

Regrowth forests use more water than mature forests, active and adaptive management of these catchments can improve water yields. This has been demonstrated within Western Australia and Victoria through thinning of native forests to increase water production. If water production is a primary requirement, then ecological thinning should also be considered for the maintenance of forest health in forests subject to severe drought stress, such as river red gum.

Forests are an important component of global carbon storage with maintenance of carbon stocks a priority. Any consideration of forest as carbon stores must also recognise their value in producing products with low carbon emissions.

Government initiatives in relation to climate change

The Institute advocates the active inclusion of the forestry and timber sectors in all NSW Government initiatives for climate change mitigation schemes, including energy initiatives. Clean energy initiatives can benefit from the high standard of forestry regulation in Australia which provides an advantage and opportunity to include residues from forestry operations in bioenergy initiatives. The NSW forestry industry can grow local and export markets in wood residues for energy supporting research and development that integrates:

- Resource assessment
- Appropriate technology, and
- Fundamental economic assessment that will provide benefits to the forest and timber industry as well as contributing to clean energy initiatives and all other climate change mitigation initiatives.

The Institute considers that:

1. Implementation of forest carbon projects should promote sustainable forest management practices;
2. Forest carbon offsets should be used to supplement, not replace, efforts to reduce GHGs from burning of fossil fuels, as well as investment in renewable energy sources;
3. Efforts should be made to maximise the longevity of forest carbon sequestration and avoidance projects, while recognising the even temporary emission reductions are of significant value, as they allow time for investment and development in renewable energy sources and low-emission technologies; and
4. A positive contribution to the mitigation of climate change can be made by substituting the use of wood, where appropriate, for materials such as steel and concrete.

Floods

Forestry Corporation is NSW's second biggest manager of roads. The impact of the NSW 2020 Floods was to add further damage to road and bridge infrastructure on

Forestry Corporation land. The floods highlighted the importance of undertaking regular road and trail maintenance. In the absence of this, flood damage can be far greater due to blocked pipes and ineffective drainage.

If Forestry Corporation had not progressively scaled back its maintenance budgets over the past decade, the effects of the 2020 floods would likely have been lessened.

Wood supply issues

Australia has always been a net importer of forest products including timber and we are now paying a huge price for under investing in new softwood plantations and reducing the log supply from our native forests.

The past solution of importing the balance to meet demand is now proving difficult for a complex set of reasons. A lack of surplus supply from Europe, China's huge demand is soaking up New Zealand log exports, a significant lift in prices and demand in North America combined with logistical challenges with shipping and containers that has coincided with Australia's new housing boom. Together they have all worked to create a timber shortage.

Issues with the existing legislative framework

The Institute considers the existing legislative framework governing forestry in NSW to be complex, featuring an array of legislation, as well as multiple government agencies, statutory authorities and Government-owned corporations involved in managing a broad range of land values and services across public land tenures and landscapes.

Forests and plantations are a very effective means of sequestering carbon. This form of storage has potential to make a significant contribution to Australia's efforts to reduce greenhouse gas emissions. With the appropriate mechanisms, the government's carbon emissions policy could benefit managers of native forests and plantations. Any policy should recognise the reality and value of ongoing storage of carbon in processed timber products and the substitution of fossil fuel carbon emissions by use of forest sourced fuels.

Plantations and multiple use native forestry should be recognised as a valid and sustainable land use. Provisions in some instances are included in local government planning schemes which discourage or prevent use of land for plantations. Whilst such obstacles are within the jurisdiction of local and State governments, strategic planning principals for enhancing a forestry resource and industry could be advanced by an updated National Forest Policy. The role of State agencies, and professional land managers and planners would be essential in negotiating any such policy. Education and training of planners is also critical to a greater understanding of the role of forestry in regional development.

New technology and training result in productivity gains. These gains to Australia's timber processing, forest growing, and harvesting and haulage sectors through well trained people applying and adapting new technology. Effective training opportunities and facilities are needed to ensure adequate skills for a future vibrant forest and timber processing industry.

Recommendations

1. The Institute encourages the fostering of co-ordination and sharing of knowledge and skills that exist within the industry and other land managers such as conservation agencies, ENGO's and the agriculture sector.
2. Recommends that active and adaptive forest management be acknowledged as having considerable potential to reduce Australia's carbon footprint and enhance environmental benefits.
3. Recommends the promotion of the sustainable use of forest and processed residues in the production of bio-energy.
4. Encourages government to review the cost/benefit and environmental impacts of native forests in reserves compared with commercial use and management of forests by professional foresters.
5. Encourages further investment in cross-tenure forest monitoring programs to support active, adaptive and accountable management of NSW forests, particularly across threatened ecosystems.

Creating a better business environment for NSW forest industries

Successful forest industries are dependent upon large and durable resource bases.

Future resource availability is critical to the sustainable development and growth of Australia's domestic forest industries. One of the greatest challenges is to attract new investment today that will be there to meet the industry's future demands.

Whether a sawlog plantation is hardwood or softwood, they require long term investment commitments. Recent hardwood plantation investment has been directed into short rotation (10-15yrs) plantations for pulpwood export markets. What is common to both the softwood and hardwood industries is that over the last fifteen years there has been little investment in new sawlog resources.

Investment models for saw log production;

Hardwood plantations perform best and are most viable on high site quality land with an annual rainfall more than 1200mm. Land with these characteristics is typically located within coastal river catchments and can produce a mean annual growth increment more than 20m³/ha/yr.

Softwood plantations (*Pinus* species) can perform well on moderate and high site quality land with annual rainfall more than 700mm.

Softwood plantation regions are now well established in NSW. There are good incentives for directing investment within these regions as they have established road and fire protection infrastructure and established wood processing markets. In NSW, it is commercially desirable to target land capable of producing a mean annual growth increment of 18m³/ha/yr. or better for new softwood investments.

The importance and value of high performing trees is driven by the time cost of money. All timber plantations have high upfront establishment costs. If the plantations are being established for the first time (first rotation) there is also the cost of the land to consider.

Upfront fixed costs must be carried for the life of the investment which will typically be between 25 and 40 years. Most of the revenue arises from sawlog sales at final harvest so, in simple terms, the quicker the plantations can be grown the shorter the rotation and the higher the return on the investment. The value of return from thinnings is also critical to the economic success and attractiveness for long term investment.

Although high quality land can deliver much better plantation performance and higher returns it also costs more and this needs to be factored into the investment model.

The value of land in coastal regions can be influenced by demand from people making lifestyle choices, rather than its agricultural capability. This is a major issue on the east coast of Australia where a high proportion of suitable land is located within 200km (weekend commuting distance) of city populations and or 50km of regional centres (daily commuting distance)

Being a living investment, sawlog plantations are exposed to a range of environmental risks over a long period of time. These include drought, hail, fire, wind, pests and diseases. A range of measures may be applied to mitigate these risks; however, they cannot be entirely avoided and as such need to be costed into the investment model and allowed for when estimating yield.

Market uncertainty is a significant risk for a crop which must be planted 25 to 40 years in advance of sale. For hardwood it is quite difficult to reliably estimate the value of sawlogs. This is due to very few plantations in Australia having reached commercial maturity and some technical uncertainties associated with the processing of fast-grown hardwood products. Hardwood plantation sawlog pricing is also affected by native forest timber pricing schedules that currently attribute a low value to small (plantation size) sawlogs. A much higher level of certainty exists for softwood sawlog prices with well-established markets that are relatively easy to monitor and track.

There are a range of other factors that can influence the profitability of sawlog plantations including proximity to wood processing markets and the existence of other plantations.

The financial returns from plantations are also dependent on the availability of markets for all the products. Softwood plantations need to be thinned at least once during the rotation to produce quality sawlogs of reasonable sizes, and the best sawlogs are produced from plantations that are thinned two or three times.

The scale of the plantation investment is important as it can directly affect the costs of management and harvesting. In general plantation forestry of any description is more viable when undertaken on a large scale. For example, the large private and State plantation estate in the Tumut/Albury/Wodonga Region of NSW and Victoria has attracted a full range of wood using industries including world scale sawmills, a pulp mill and a newsprint mill.

The ability to control the timing of a plantation's harvest (to align with optimal market conditions) is seen as a positive over other agricultural commodities. The unique features of a forestry plantation investment can also be seen as a positive for investors seeking to diversify their investment portfolio and is attractive to "patient" capital such as superannuation funds.

Commercial investment hurdle rates for sawlog plantations should be set at a level that takes account of environmental and market uncertainties and the long-term nature of the investment. For most investors, pre-tax hurdle rates (IRR) of between +7.5% and +10% are considered appropriate.

For hardwood timber plantations the current reality is unfortunately well below these target rates. On the NSW north coast internal rates of return (IRR) for first rotation hardwood sawlog plantations (land and trees) will commonly fall between -1% and +2%.

Rates of return for softwood sawlog plantations also fall well short of the desired commercial hurdle rates. On the NSW south-west slopes the pre-tax return (IRR) for a first rotation Radiata pine sawlog plantation (land and trees) will usually fall between +2% and +4%.

This reflects the high input costs and relatively low log prices obtained for plantation timber. Diversity in products and markets including valuing the carbon contained in wood products may improve the situation.

New business and investment models for plantation production

New marketable products are critical to improve the financial rates of return and commercial attractiveness of sawlog plantations.

National markets for carbon and biomass are emerging together and represent the most likely prospect for improving plantation economics.

A market for carbon sequestration is attractive as it provides a revenue stream in the early life of the plantation (years 2 to 15). This income can be used to offset upfront establishment and land costs.

However, if land acquisition costs are included, modelling indicates that a fixed price of \$40+/tonne of CO₂-e is required for new 'Kyoto-compliant' long rotation plantations to reach financial hurdle rates of between +7.5% and +10% (IRR). If land costs are excluded, then financial hurdle rates may be achieved if carbon is valued at \$20+/tonne of CO₂-e.

Note that the price of Australian Carbon Credit Units (ACCUs) is currently just \$16.55/t.

These modelled returns do not however put a cost on the proposed 100-year carbon maintenance (permanence) obligation. This obligation will require plantation investors to commit to three successive sawlog rotations with the second and third rotations not generating any carbon income apart from that which may be recognized for the carbon stored in the harvested wood products. The permanence issue is expected to be a major disincentive for the private sector whose investment horizons are much shorter.

Biomass and its emerging demand have created considerable interest within the forest industry as a renewable energy resource. For new plantation investments however, the product is likely to only have a marginal influence on the net present value. The Institute is aware that processors of softwood and hardwood are cautious but enthusiastic about bioenergy. It is obvious that resource size, feed stock characteristics and energy pricing will determine the uptake of bioenergy use in the forest industry. For example, initiatives surrounding the cost of bio diesel (pre-excite) and rules regarding its use may provide incentives for small scales (>20,000m³/y)

especially where the resource is dispersed¹⁴. For softwood processors (where the resource is consolidated) increasing costs of electricity may signal the uptake of cogeneration. What is universal is bioenergy has the potential to reduce waste disposal and provide savings in energy use.

The demand for biomass is currently governed by the value of Renewable Energy Certificates.

As a by-product, utilisation of biomass is more viable in final harvest operations than in thinning operations. Where residue markets exist, biomass is currently unable to compete with products such as pulpwood and small sawlogs. This may be due to a lack of demand. As such it is a by-product with a high harvesting cost and a very low residual stumpage value. Ongoing research on plantation biomass availability and production costs will provide a more definitive understanding of the product and its potential to enhance plantation economics. Preliminary investigations however suggest that the value of Renewable Energy Certificates (LRECs) may need to double before biomass can compete effectively with other plantation forest products in some markets.

Superannuation investment in plantations

Forestry plantations in Australia are an investment that is compatible with superannuation funds. This includes corporate or self-managed super funds. Superannuation investments attempt to include long term growth assets with low risk and stable regular returns. Superannuation funds are also comfortable with commitments which may span many decades.

In 2010, Queensland's principal pine plantation estate was purchased for over \$600 million by Hancocks, a major US superannuation company. This estate comprises over 200,000 hectares of well managed softwood and hardwood plantation with established timber markets and a relatively "normal" age distribution. This means that income will be reasonably stable with increases due to real increase in prices.

Other large superannuation funds from the US have also purchased the plantation assets of the failed Timbercorp MIS company and the land from the failed Great Southern Plantations. These two purchases total in excess of \$700 million.

More than \$1.3 billion has been invested by US superannuation companies into Australian forestry plantations. This is a clear demonstration of the suitability of forestry plantations, and the land they are established upon, to the superannuation industry.

US companies who have made major investments in Australian plantations may be more prepared to invest in new plantations on nearby land in order to meet growing domestic demand, to consolidate their estate (& achieve economies of scale), and or to enhance the "normality" of their estate. Such investment would be proportioned to manage the investment/income ratio of the whole project.

If market drivers (such as carbon and biomass) do not materialise in the short term other direct incentives from Government may be needed.

¹⁴ Palmer (unpublished): preliminary R&D funded by Hurfords Timber, Southern Cross University and Tech Vouchers NSW.

Incentives in the form of loans for the early years, subject to guarantees of minimum stocking and quality of the plantation would be a way of securing commitment to long rotation new plantations. In theory this could also be suitable for Australian superannuation companies managing funds for Australian workers. The Federal Government acted in a similar manner toward the states in order to establish softwood resources owned and managed by the states in the middle of last century.

Recommendations

The Institute:

1. Encourages Government surety for resource availability for new investments.
2. Encourages research and development into new business opportunities such as carbon and biomass markets. This provides prospective investors in sawlog resources with opportunities for markets for downgraded products and thinnings in early stages of the life of an investment.
3. Recommended governments address National forest policy issues with the view to providing industry confidence in investing in the industry. Pursue options for local retirement funds to invest in developing sawlog plantations and value adding industries.
4. Encourages Government to embrace recommendations from the Pulp and Paper Industry Strategy Group in relation to resource security, investment strategies for business development and infrastructure.
5. Encourages enterprises that seek to value add all forest products.

Social and economic benefits of forestry production

The forestry and wood products industries contribute significantly to national and regional economies. They provide materials for home building, construction, furniture making, paper manufacturing, packaging and other industries and add to the diversity of employment opportunities, especially in rural areas. Their annual value of turnover is around \$23.9 billion. The industries contribute 0.5% of Australia's gross domestic product and \$5.6 billion of export income (Australian Bureau of Agricultural and Resource Economics and Sciences, 2021).

Data on employment provided by the forestry and wood products industries published by the Australian Bureau of Statistics data suggest that the industries provided 76,200 jobs in the industry employment classifications 'forestry' and 'wood, pulp and paper manufacturing' (Australian Bureau of Agricultural and Resource Economics and Sciences, 2021). This is substantially less than an earlier industry survey conducted by ForestWorks, which suggested total employment was some 120,000 people when more industry sectors were included¹⁵.

Various regional studies also provide data on employment in the industries. It is evident from these other sources of data that the industry employment classifications used by the ABS do not cover the forestry and wood products industries comprehensively. This means that government policy decisions might be made based

¹⁵ MIG 2008. Australia's State of the Forests Report 2008. Montreal Process Implementation Group for Australia, Bureau of Rural Sciences, Canberra.

on inadequate data on the potential employment effects. The Institute believes that the inquiry should consider this issue as a high priority for further investigation.

Recommendation

The Institute:

- Encourages the Australian Government to review data collection processes used by the Australian Bureau of Statistics to ensure that data on employment in the forestry and wood products industries is comprehensive and accurately portrays the industries.

Potential energy production from the NSW forestry sector

Biofuels

There is the potential to harvest approx. 242,703 green metric tonnes of biofuel per annum from residues remaining after harvesting of plantation forests.

These comprise 302,000 ha of pine plantations and 87,100 ha of eucalypt plantations, both of various species. Because of current economic conditions, biofuel from the pine plantations will come from the residue left after conventional clear-felling for sawlog and pulpwood. In harvesting this biofuel, it is good practice to only harvest the stem wood. If 302,000 ha of pine plantations are managed on an average of 30 years and yield 20 green metric tonnes (gmt) of stem-wood residue per hectare, after clear-felling there is potentially **201,000 gmt** of biofuel available per year. This would be enough to generate **20.1 Mw** of power in wood fired power stations.

The thinning of eucalypt plantations at approx. 12 years of age to produce woodchips is a developing source of potential biofuel. These stands are often harvested using whole-tree extraction and delimbed, debarked and chipped at roadside. This leaves a stockpile of mixed bark, broken small stems, branches and leaves at roadside, a tempting source of biofuel.

Given 87,100 ha of this type of eucalypt plantation in NSW, with a 40-year rotation and approximately 19 gmt of biofuel per hectare, there is a potential to harvest 41,370 gmt of biomass from NSW's eucalypt plantations per year. This would generate approx. 4.1 Mw if burnt in wood-fired power stations.

There is also significant potential for energy production from NSW's productive native forests. Recent NSW DPI studies have indicated more than 1M tonnes of biomass is available per annum on the north coast of NSW alone.

It appears that there is significant potential to develop relatively small local wood-fired power stations to utilise this biofuel and generate up to 195 Mw per annum.

However, collective figures of residue available for feed stock are only one aspect of the potential for an industry. Economic and technical constraints may inhibit small or large use of biomass for energy initiatives. The interaction resource size and distribution, feed stock characteristics, competition for the resource by other markets, and energy pricing will determine the uptake of energy production from forest products.

There are also silvicultural constraints associated with supplying such a market. While there is advantage in removing woody debris (carbon rich), such as small stems and branches, the retention of leaves and bark, which are rich in essential trace elements, advances the sustainability of the site for future rotations. Intensive harvesting such as this may require greater applications of nutrients, compromising the sustainability of an operation.

Biomass

Biomass generated 0.8% of electricity in Australia in 2018-19, from bagasse and wood waste.

Australia has wood pellet plants with a capacity of over 0.65 Million tonnes aimed at export (World Bioenergy Association) to Europe and Asia.

11 million hectares of timber productive forest in Australia are certified as sustainably managed.

Biochar

Biochar is produced by burning biofuel in a retort with restricted oxygen supply. Approximately half of the biofuel is converted into a gas which can be used to power generating equipment with the remainder forming a charcoal-like material known as biochar. In agricultural applications this can be incorporated into the soil when sowing seed, and this enables the carbon in the biochar to be locked up in the soil for many decades, potentially up to 100 years. This would be an effective method of extracting carbon from the atmosphere.

It has been noted that biochar also has a positive effect on plant growth, by mobilising available nutrients. This makes this process attractive in agricultural and forestry applications. There may be merit in including the process as a tool for carbon sequestration. However, this will depend on the stability of the char (carbon).

It is unlikely that any significant volumes of biochar could be incorporated into the soil as part of the re-establishment of forestry plantations, because of the limited tillage involved in forest establishment. Therefore, forestry's contribution to the biochar system will mainly be in the provision of woody biofuel.

Cogeneration

A benefit of sawmilling and wood manufacturing facilities is their capacity to be energy neutral, generating their own power resource from waste management systems. With most mills lucky to recover 40% of log volume, generating power using mill residue as a fuel source creates two economic solutions to what would otherwise be expenses. An expensive aspect of processing in the softwood industry is seasoning and drying, using kilns. The heat generated in cogeneration can be used to drive seasoning plants while augmenting power supplies. Such applications are commonplace for significant softwood processors. Margins are small and all optimisations are usually employed to remain competitive.

Naturally, these incentives diminish with the volume of log allocation, cost of energy and waste disposal options. The return for woody waste from particleboard manufacturers, horticulture markets and smaller niches may reduce the incentive to embark on the capital expense for small processors.

Opportunities

Very large opportunity for

- High growth potential of biomass production under sustainable forest management
- regional employment growth
- renewable energy production - electricity and 3rd generation transport biofuels
- large and growing export market for wood pellets

Constraints

- Multitude of conflicting legislation and rules – mostly all restricting sustainably produced biomass industry growth

Carbon sequestration

This section focuses on the impact of a carbon price on the Australian forestry sector and the barriers to the development of markets for forest carbon.

The Institute believes the main barriers and market distortions are:

1. Permanence, land use flexibility and ongoing liabilities;
2. Risk to alteration of land use suitability criteria;
3. Public perception issues;
4. Simplicity of participation; and
5. Options to incentivise long rotation plantations.

These barriers, and options to address them, are discussed below.

Permanence, land use flexibility and ongoing liability issues. Forest carbon storage is potentially reversible if a tree is harvested without replacement, or damaged due to natural disturbance. Therefore, a number of rules have emerged to ensure the permanence of forest carbon offsets or permits.

Previous carbon standards and schemes implemented in Australia have required some type of guarantee in regard to the permanence of the carbon sequestration or storage. In most cases, permanence has been defined as maintaining the forest or plantation for a period of between 70 – 100 years. This usually involves legal creation of carbon rights through a land use restriction or covenant registered on land title. This can cause problems where carbon benefits are typically accrued up front, but the liability to maintain forest carbon storage is inherited by future generations, long after the financial benefits of the carbon storage have been claimed. There is a perception that such an approach will de-value land encumbered with carbon rights, due to reduced flexibility of future land use (URS, 2008). Commercial plantation companies have also indicated that access to finance may be restricted later in the rotation, due to the lender's negative perception of the carbon liability. Should the value of carbon increase high enough, there is a risk that forest owners may decide not to harvest at all in order to avoid incurring a carbon debit. Such an outcome would have a significant impact on Australia's timber supply.

An alternative approach to address permanence issues is to credit forest carbon storage according to the 'tonne-year' approach. This approach was considered by the Intergovernmental Panel on Climate Change (IPCC) in 2000 (Noble et al, 2000). It represents a mechanism to allow forest owners to receive credits not only for the quantity of carbon storage, but also for the *duration*. The tonne-year accounting

method is based on the principle that CO₂ and other greenhouse gases have a residence time in the atmosphere during which time they will exert radiative forcing (i.e., warming). If the bulk of warming caused by CO₂ occurs over a period of 100 years from the time of its emission, then there is *time value* in even temporary periods of forest carbon storage. The tonne-year approach disperses crediting over a nominal (say 100 year) period, whereby the forest carbon project developer would receive a proportion of the full credit for each year the forest carbon remained in storage. Only upon maintaining the forest for 100 years would the forest carbon owner receive full credits for the carbon stored. Conversely, those forest owners not wishing to maintain their forest for the full period would not receive full credits for their carbon storage, but they would not incur a liability upon exit from the scheme.

Ultimately, the tonne-year approach was not adopted for forest carbon accounting under Article 3.3 of the Kyoto Protocol, on the grounds that it was 'too complex'. However, given the perverse outcomes and complexities arising under the current approaches to permanence, the Institute considers that it is now timely to reconsider the tonne-year approach. The Institute believes that Australia's forest monitoring processes are now at the point where a tonne-year approach to accounting could be readily verified via the NCAS model and its associated remotely sensed imagery.

Advantages of tonne-year accounting over the current approach to permanence are:

- Prevents devaluation of land used for forest carbon storage, therefore increases likelihood of landholder participation;
- Encourages long term carbon storage by rewarding landholders for each year of carbon storage;
- Rewards the 'right' sort of forest carbon projects, providing a stream of benefits for long term forest planning, rather than rewarding 'get rich quick' schemes which could leave Government with large liabilities if carbon companies become insolvent;
- Provides a similar time schedule of credits for slower growing biodiversity or sawlog plantations, as it would for rapid sequestration in fast growing plantations. This would ensure proper consideration of species selection for the specific location, rather than encouraging the planting of fast-growing species which may not be adapted to the area; and
- Provides significant benefits to the Government, who could account for the carbon benefits in Australia's national accounts upfront but could spread devolution of the credits over a period of 100 years.

The Institute believes that such a policy setting will encourage both large commercial forest products companies and small-scale agroforestry developers to participate in markets for carbon offsets. Previous policies have not provided support to these groups.

Simplicity of participation. The Institute is aware of many landholders who are interested in planting trees on their properties to generate carbon credits. However, the current rules are simply too complex, and preclude participation of all but large corporate entities or NGOs. The Institute suggests a simplified opt-in approach to participation in carbon markets, whereby credits are generated simply by registering the forest and submitting land title documents. The Institute considers that the NCAS model and associated remotely sensed imagery permits a 'light touch' approach to forest carbon accounting. Landholders opting into the simplified system could be

awarded the same quantity of credits that the Australian Government would claim for that piece of land under its Kyoto (or its successor) reporting obligations. A landholder could meet the requirements of the system simply by maintaining the forest canopy. Those wishing to improve on the NCAS estimates should retain the option to do so under the current self-funded, independent third-party verification approach.¹⁶

Recommendations

The Institute advocates the active inclusion of the forestry and timber sectors in all Government initiatives for climate change mitigation schemes, including energy initiatives.

Clean energy initiatives should appreciate the high standard of forestry regulation in Australia as an advantage and opportunity to include residues from native forestry operations in bioenergy initiatives.

The Australian forestry industry has the opportunity to grow local and export markets in wood residues for energy

Supporting Research and Development that integrates:

- Resource assessment
- Appropriate technology, and
- Fundamental economic assessment

will provide benefit to the forest and timber industry as well as contributing to clean energy initiatives and all other climate change mitigation initiatives.

The Institute considers that:

1. Implementation of forest carbon projects should promote sustainable forest management practices;
2. Forest carbon offsets should be used to supplement, not replace, efforts to reduce GHGs from burning of fossil fuels, as well as investment in renewable energy sources;
3. Efforts should be made to maximise the longevity of forest carbon sequestration and avoidance projects, while recognising the even temporary emission reductions are of significant value, as they allow time for investment and development in renewable energy sources and low-emission technologies; and
4. A positive contribution to the amelioration of global warming can be made by substituting the use of wood, where appropriate, for materials such as steel and concrete.

Land use competition between the forestry and agriculture sectors

The Institute supports a free market as the best mechanism for determining land use. Landowners should be free to use and trade their land as they judge best unless there are compelling reasons for community intervention (Garnaut 2011).

¹⁶ The following references refer throughout this TOR - URS, 2008. Market Opportunities for Victoria's Forestry and Forest Products Sector from Emissions Trading. Final Report. Prepared for the Victorian Department of Primary Industries. May 2008. Available at: http://new.dpi.vic.gov.au/data/assets/pdf_file/0005/45977/Market-Opps-for-forestry-from-ETS.pdf

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

Theoretically, in areas of high land values, long rotation forestry investments are less competitive with agricultural uses such as horticulture and dairying. While forestry enterprises might seek highly productive sites, carrying the cost of the land through until the end of the rotation (when most of the return on investment is realized) is a risk that often precludes such operations from high value land.

For example, over the last two decades, rapid expansion of hardwood pulpwood plantations driven by Managed Investment Schemes coincided with escalations of rural land prices. From 1999 to 2009 in the Albany, WA region the expansion of tree plantations and vineyards saw rural land prices rise up to 300%. Much of the competition for land was between plantation managers and graziers. Given the effect of high cost of land on the discounted rate of return, Institute suggests that the inflation of land values contributed to the demise of failed MIS's.

However, there can be significant synergies between the farming enterprise and growing trees on farms, through for example, by providing employment when other seasonal work is not available.

Farm forestry, which integrates plantation forestry or native forest management into farming enterprises, has the potential to create essential forestry resources as well as providing benefits to a grazing or agricultural enterprise.

In the context of environmental benefits, water yields are affected by forestry operations. It is worth acknowledging that for the majority of Australia's agricultural land, forest cover has prevailed in previous times. Over time, the removal of trees for the purpose of agriculture has resulted in a number of land degradation examples that have adversely affected the performance of the desired agricultural pursuits. The use of agroforestry systems for rehabilitation and maintenance of sustainable agriculture is a positive outcome for these communities.

Regulations affecting forestry are often more specific and comprehensive than they are for farming. For example, forestry has accepted Codes of Practice and Certified Sustainable Forest Management and Environmental Management Systems as best practice.¹⁷

Opportunities for farm forestry

There is a need for much wider understanding of the potential of farm forestry to enhance farming enterprises and communities. Agriculture and forestry come under the same agency in the Commonwealth government and a number of States. However, there appears to be limited integration of the agencies' approaches to agriculture and forestry.

The development of farm forestry continues to be dependent upon education of land managers in the skills of forestry. Professional forestry education is being severely challenged at present with pressures on universities to deliver shorter undergraduate

¹⁷ Global environmental forest policies an international comparison Constance L. McDermott, Benjamin Cashore, and Peter Kanowski. 2010. Gives an overview of the various Codes and legislation across the states and territories of Australia. The authors recognize there is variability in the quality of regulation, but it rates well with other developed economies.

degrees than is required for comprehensive forestry training. The Institute believes it is essential that there be ongoing dedicated university-based forestry education in the core skills of Australian forestry.

The Master Tree Growers programme has been successful training for farmers but limited in extent. Support of expansion and acceleration of the Master Tree Growing programme potentially in collaboration with Universities should be encouraged. In the absence of owner up-skilling, business models should include initial and ongoing maintenance advice from accredited forestry practitioners to ensure successful long-term outcomes.

Farm forestry is likely to be successful when supported at both the local and regional levels with the appropriate technical and professional skills.

When reviewing land use planning legislation, local and state government instrumentalities must be cognisant of the long-term investment commitment which is involved in forestry.

Recommendations

The Institute:

1. Encourages government to deem forestry as an acceptable land use, except those specifically identified in state or local government planning schemes as being incompatible with other land use activities.
2. Recommends that plantation development should seek to complement other land uses.
3. Calls on Government to promote farm forestry as a useful contribution in the production of wood products, carbon sequestration and biomass energy.
4. Calls on Government to recognise there are synergies between farm forestry and other agricultural pursuits in terms of providing off seasonal employment, shelter for stock and a financial return from those parts of the farm which are less suited to agriculture.
5. Encourages the professional training of foresters with an emphasis on farm forestry is an essential component in achieving the optimum relationship between agriculture and forestry.



APPENDIX 1

Institute Policy Position 1.4: Timber Production and Biological Diversity



The Institute of Foresters of Australia (Institute) maintains that biological diversity can be effectively conserved in native forests and plantations managed for timber production through scientifically-based management planning, and highly regulated forestry practices conducted in accordance with appropriate operational standards outlined in Codes of Practice and enforceable site-specific coupe plans.

Government and private sector forest managers have policies and practices for managing native forests and timber plantations that aim to preserve biological diversity and landscape values. Using internationally recognised practices can reduce the impact of timber production on biological diversity. However, unplanned short-term impacts may demand remedial action.

Background

Conservation of biological diversity is an important goal of managing forests in an ecologically sustainable way. Australia is a signatory of the Convention on Biological Diversity (CBD), which aims to conserve biological diversity, use its resources sustainably and share the benefits of use (commercial and other) of genetic resources. Australian States have legislation and policies providing for biodiversity conservation that can be independently audited for environmental, social and economic management.

Forest biological diversity is defined as the variability that occurs among forest-living organisms and the ecological processes they are part of; this includes diversity in forests within species, between species and of ecosystems and landscapes. Forest diversity plays important economic, social and cultural roles, providing a range of goods and services (such as timber and clean water), as well as providing jobs and livelihoods. Timber production can be based on plantations or native forests (or a combination of both). Short term impacts include aesthetic, environmental, water values, fauna habitat, potentially flora species and off-forest impacts.

Policy

The Institute supports and encourages:

- Sustainable management of native forests and plantations through relevant principles of the CBD and relevant objectives under the National Strategy for the Conservation of Australia's Biodiversity
- Establishment and management of a Comprehensive, Adequate and Representative (CAR) conservation reserve network, along with the management of biodiversity outside forest reserves
- Using scientifically based management systems to protect biodiversity values, including threatened species
- Consideration of the ecosystem and landscape approaches for maintaining biodiversity in large areas of native forest

- Development, implementation and monitoring of Codes of Practice for timber production and associated harvesting plans that recognise and protect biological diversity
- Mitigation of unplanned short-term impacts and rehabilitation of degraded ecosystems (including off-forest) where long-term impacts are identified in native forest harvesting
- Ongoing research and development on adaptive management to protect biological diversity.

The Institute considers that:

- Timber production is a renewable, low energy use industry that need not threaten biological diversity
- Excluding timber production from native forests does not guarantee protection of biological diversity
- Native forest ecosystems can recover from disturbance caused by timber harvesting and fire.



APPENDIX 2

Institute Position Paper: Sustainable Timber Harvesting in Native Forests



The universal management of native forests for their full range of values, including timber, has been brought into question in Australia. Entities that oppose native forest harvesting have mounted concerted, yet often misinformed, public campaigning. These entities have advocated for preservation as the sole objective of native forest management, ignoring evidence that forests can be sustainably managed to deliver multiple environmental social and economic benefits.

There is now a pressing need to consider how the management of Australia's native forests can provide a full range of values, including high-quality timber and associated products. The Institute/AFG advocates for active forest management that addresses the following key considerations.

Socio-economic values

Australia has large areas of native forests that can produce, from a very small portion of the total estate in each state and territory, high quality hardwood timbers to meet domestic demand. Many of these products cannot yet be produced in plantations.

Failure to produce these timbers in Australia will lead to increased imports, often from developing countries whose forests are not managed to the same high environmental standard as in Australia. Importing more wood rather than harvesting in native forest is morally questionable given that Australia is amongst the world's top five in per capita consumption of wood products.

Currently Australia has a \$2 billion trade deficit in forest products. This is in large part due to imports of paper and packaging products sourced from other countries; as well as imports of wooden doors, mouldings and sawn timber, all sourced from overseas rather than our own native forests.

The sustainable management of native forests for timber production provides a broad suite of socio-economic benefits, including road access for recreation, fire control, ecotourism and production of non-timber products like honey.

Biodiversity

In Australia, management of public and most private native forests is conducted in accordance with principles from the Convention on Biological Diversity and objectives under the National Forest Policy Statement and National Strategy for the Conservation of Australia's Biodiversity. Sustainable management is underpinned by a Comprehensive, Adequate and Representative (CAR) conservation reserve network, complemented by active management of biodiversity outside of formal parks and reserves.

Excluding timber production from native forests does not guarantee protection of biodiversity, particularly from the broader threats of wildfires, invasive species and climate change. The CAR reserve system also requires a level of active forest management to maintain structural diversity and resilience to this range of threats.

While timber harvesting can have a localised impact in time and space on plant and animal species, modern forest management systems and practices are supported by

a scientific approach. They take a whole-of-landscape view to protect biodiversity values, including threatened species and habitats.

Climate change

Forests clearly play an important role in mitigating the concentration of greenhouse gases in the atmosphere, by removing (sequestering) carbon dioxide through photosynthesis, particularly in actively growing regrowth forests, and storing carbon in 'forest carbon stocks'. Sustainable forest management incorporates the maintenance or enhancement of carbon stocks over the long term. Sustainable timber harvesting then enables society to obtain timber and other wood products from a renewable, carbon neutral source, rather than relying entirely on fossil fuel intensive alternatives such as aluminium, concrete and steel, and coal or petroleum-based fuels.

The Intergovernmental Panel on Climate Change (IPCC) has recognised that a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained climate change mitigation benefit.

Water

High quality drinking water is often associated with undisturbed native forest catchments. However, high quality drinking water can be obtained from catchments that have been disturbed by fire events, and manageable levels of agriculture and timber harvesting.

Many years of scientific studies have resulted in harvesting prescriptions that maintain appropriate streamside reserves that consider the size of the stream, topography, soil type and adjacent land use, limit the area harvested in any one year and disperse harvested areas in space and time. In addition, management practices such as forest thinning, selective timber harvesting and prescribed burning can be used to maintain or enhance water yield in domestic water-supply catchments.

Rather than posing a threat, sustainable native forest management including some timber harvesting can maintain or enhance water quality and quantity.

Fire

The 2019/20 summer has highlighted the ever increasing threat of forest wildfires in Australia. Over the last 25 years, there has been a significant increase in the area of conservation parks and reserves that emphasise preservation, and a corresponding decrease in the area of State forest. This has led to reduced levels of active forest management across the public native forest estate. There are now fewer experienced forest managers and timber harvesting crews working in native forest with the skills and capacity to use the plant and equipment required to confidently mount rapid and aggressive first attack on any fire outbreaks.

This decline in land management skills and capacity has coincided with an observed shift from a land management approach to an emergency response approach to fire management with a conservative attitude to risk, which tends to avoid direct attack on fires and relies more on aircraft to suppress fires.

Maintaining a strong native forest timber industry is integral to maintaining effective fire management across forested landscapes and reducing the risks of catastrophic impacts on forest values and society.

Active management and silviculture

Active forest management comprises 'silviculture' - the art and science of sustainably managing the establishment, growth, quality, health, protection and use of forests, to meet the diverse needs and values of forest owners and society.

There is a broad range of silvicultural treatments available to forestry professionals, for use through forest management cycles. These treatments include clear-felling, variable retention, selection harvesting, and thinning for ecological and commercial benefits. Each of these treatments has merits applicable to specific situations, and they will vary due to species, structure and regeneration requirements of different forest types. Most importantly, appropriate silvicultural decisions require clear management objectives, as well as knowledge of the ecology and circumstances of each forest.

If these aspects are considered, silvicultural practices including timber harvesting can enhance forest health and productivity, water yield and biodiversity, as well as reduce the impact of wildfires and other risks to forests.

Plantations as the alternative

Plantations play a significant role in this country in supplying softwood timbers that are not available from our native forests. Australia also has fast-growing hardwood plantations that supply wood fibre for pulp and paper production, predominantly overseas. However, plantations cannot produce hardwood sawlogs in the quantity and quality that can be obtained from sustainably managed native forests, due to the time and costs involved in growing suitable plantation species to achieve comparable timber attributes.

Unlike plantations, native forests require no site establishment using herbicides, no fertilisers and no expensive appropriation of agricultural land that may be required for food production. Australia already has multi-aged native forests available to address much of our timber needs. Proposals to transition from native forests to plantations often fail to recognise the challenges and costs of obtaining a cleared farmland base of substantial scale, and the investment risks of waiting decades before plantations can provide a capital return.

Plantations have a vital role to play in meeting Australia's timber needs, complementing a sustainable supply from actively managed native forests.

Institute/AFG position statement

The Institute/AFG considers that active management, including timber production, is vital to the sustainability of native forests and provides many benefits to Australian society. The Institute/AFG advocates for ongoing research on timber harvesting in native forests to support this capability in Australia. The Institute/AFG represents forestry professionals that have the skills to develop management strategies to meet forest owner's objectives and community expectations regarding the production of wood products and conservation of other forest values.

