Environment Australia

Department of the Environment and Heritage

Senate Rural and Regional Affairs and Transport References Committee

Inquiry into Plantation Forestry

Submission by Environment Australia (including the Australian Greenhouse Office)

Environment Australia (the Department of Environment and Heritage) welcomes the opportunity to make a submission to the Senate Rural and Regional Affairs and Transport References Committee Inquiry into Plantation Forestry.

Environment Australia supports multiple benefit outcomes in plantation development, particularly environmental benefits. Environment Australia notes that plantation forestry established on previously cleared land has potential benefits for the environment, including salinity abatement, carbon sequestration and biomass for renewable energy, water quality and biodiversity conservation.

The Australian Greenhouse Office (AGO) notes that plantation forestry represents an important component of Australia's domestic greenhouse response. Annual plantation expansion is rising and currently Australia has more than 1.6 million hectares of established plantations. The AGO notes that the Plantations 2020 Vision, to treble Australia's plantation estate by the year 2020, directly contributes to Australia's greenhouse abatement action.

Each term of reference is addressed in sequence below.

(a) whether there are impediments to the achievement of the aims of 'Plantations for Australia: The 2020 Vision' strategy

Altering surface and ground water availability and flows

Environment Australia notes that long rotation plantations can, depending on location and management, help to significantly improve water quality. At the same time, water availability could be a potential impediment to achieving the Plantations 2020 Vision where there is competition for the resource from downstream users, including the environment.

Plantations established on previously cleared agricultural land are likely to have some impact on surface and groundwater resources and their dependent ecosystems, depending on where they are established.

In many situations, groundwater and surface water are interconnected systems. Where groundwater discharges to streams, afforestation will affect base-flow volumes as well as seasonal flow volumes of the interconnected surface water system, due to the reduced availability of the groundwater resource. The impacts of plantations on water resources will vary according to ecosystems and depend on a number of factors. These include the physical location of the plantations, the plantation size, density of the planting and species in relation to available water resources, the regional climate and plantation management and rotation length.

In relation to seasonal or temporal variability, afforestation leads to a decrease in flows of all magnitude with greatest impact on the magnitude and persistence of low (or dry period) flows[1]. Low flows are particularly important for sustaining aquatic ecosystems. In some small catchments, the number of zero-flow days could be expected to increase after plantations are established. Peak flows from runoff decrease significantly after grassland or pasture is converted to forest. During periods of minor flows, changes in water regimes brought about by afforestation could put some pressure on downstream water needs, (e.g., environmental flows to sustain aquatic ecosystems, river flushing and maintenance of water entitlements for consumptive purposes).

In relation to regional or geographical variability, the impact of plantations on water flows is primarily dependent on the level of rainfall. In areas of moderate rainfall (600-850 mm), the typical reduction in the usable water resources (stream-flow and recharge) from establishing plantations on previously cleared land is about 100 mm per year – equivalent to one megalitre per hectare per year. Plantings in higher rainfall areas would result in greater reductions.

Change in land use that significantly reduces the volume of surface flow or groundwater recharge will alter the volume available for extraction and could make it more difficult for jurisdictions to comply with caps on extraction and meet other commitments under the Council of Australian Governments (CoAG) Strategic Framework for Water Reform. It should also be noted that where the total water

[1] Vertessy R, Zhang L, Dawes, W '*Plantations, River Flows and River Salinity*', paper prepared for *Prospects for Australian Forest Plantations 2002*, Canberra, August 2002.

available for extraction is already fully allocated, any change in land use that significantly reduces flow or recharge can lead to a reduction in allocations that have already been granted and, in some cases, purchased.

Clearing of native vegetation for plantation establishment

The draft 2002 revision of the Plantations 2020 Vision [2] has renewed emphasis on the environmental and social dividends from plantation forestry (see, for example, *Strategic Element 4 'Social and Environmental Factors'* and associated Action 14, *'Review and promote opportunities for environmental services to enhance plantation forestry'*).

Clearing, particularly broad-scale clearing, of native vegetation for plantation establishment could impede achievement of net environmental gain from the Plantations 2020 Vision, and is inconsistent with Commonwealth and State commitments to reverse the decline in the quality and extent of Australia's native vegetation cover[3].

Environment Australia acknowledges that most, but not all, jurisdictions now discourage or prohibit broad-scale clearance of native vegetation for plantation development on public and private land, while encouraging their establishment on previously cleared agricultural land. Environment Australia strongly supports this trend.

Broad-scale clearing is not, however, the only native vegetation issue to consider in plantation establishment. It is also important that plantation developers strive to conserve remnant patches of native vegetation to maximize the environmental benefits from the Plantations 2020 Vision. Retention and sensitive management of native vegetation remnants, including riparian strips on previously cleared agricultural land designated for plantation development, is very important for biodiversity conservation and stream water quality. Environment Australia would, therefore, recommend that retention of remnant patches and riparian strips of native vegetation are an integral part of plantation landscape design.

There is compelling evidence, in the NSW context, that native vegetation remnants within softwood plantations as small as 0.5 hectares can have considerable benefit for biodiversity. In his work in the Tumut area of NSW (*the Tumut Fragmentation Experiment, 2000*), Lindenmayer strongly recommends that remnants of 0.5 hectares or more, in area, should not be cleared.[4]

Plantations can provide good biodiversity conservation outcomes where they are designed as a mosaic consisting of plantation stands and remnant native vegetation. This can avoid monocultures of lower biodiversity value. Importantly, links between

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[2] Dept of Agriculture Fisheries and Forestry (AFFA) *Draft 2002 Revision, Plantations for Australia: The 2020 Vision*

[3] Commonwealth of Australia (2001) National Framework for the Management and Monitoring of Australia's Native Vegetation. Department of the Environment and Heritage. Canberra.

[4] Lindenmayer D, 2000, *Islands of bush in a sea of pines, A summary of studies from the Tumut Fragmentation Experiment (August 2000), National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation, Research Report 6/00*

native vegetation remnants along vegetated gullies and streamlines appear to be critically important for many native species surviving in a plantation modified agricultural environment, and these remnants should be a priority for conservation. Away from streams, the plantations matrix could provide vital cover for the movement of native species across the landscape, providing the native vegetation remnant patches remain intact. Evidence from *the Tumut Fragmentation Experiment* certainly suggests that this is the case in the softwood pine matrix [5].

It is increasingly clear that, for biodiversity conservation, remnants of native vegetation, even single or small numbers of paddock trees in highly modified landscapes, should not be viewed in isolation but, rather, as part of a larger bioregion. Based on the *Tumut Fragmentation Experiment*, Lindemnayer concludes that, while, "eucalypt vegetation at Tumut is unlikely to ever be part of a reserve system, it will nevertheless make an important contribution to biodiversity conservation in the region"[6]. Much of the new information generated by *the Tumut Fragmentation Experiment* has, importantly, been used to inform the 'Draft code of practice for plantation design in NSW'. The work has also been disseminated through seminars and workshops in Western Australia, Tasmania and Victoria, where there are significant issues related to the design of an expanding plantations estate and impacts on native vegetation conservation.[7]

Environment Australia notes that policy and practice relating to management of native vegetation remnants in plantation landscapes varies across States, and that State codes of forestry practice are a mix of mandatory obligations and voluntary arrangements between the industry and government. Environment Australia supports efforts by state and local administrations to ensure appropriate and consistent protection of remnant vegetation, as adequate protection of such areas is consistent with the aims of the Plantations 2020 Vision.

(b) whether there are elements of the strategy which should be altered in light of any impediments identified

Environment Australia would not support alteration of the strategy where such alterations might have adverse implications for the environment.

However, there might be a need for some adjustment in light of new environmental challenges and opportunities facing the plantations sector, particularly those related to greenhouse abatement action, such as through biomass development and the 2% renewables target, a potential market for carbon, water resource availability and biodiversity conservation management.

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[5] Lindenmayer D, *Opcit*, page 33
[6] *Ibid*
[7] *Ibid*, page 38

2% Renewables Target and Biomass energy

The AGO notes that there are opportunities for plantations to directly contribute to reducing greenhouse gas emissions through the generation of electricity, as this displaces fossil fuels. The Commonwealth's Mandatory Renewable Energy Target (MRET) is designed to assist in meeting this objective by creating a guaranteed market for the generation of an additional 9,500GWh of renewable energy.

Plantation 'wood waste' is one of the eligible renewable energy sources under MRET and tradeable renewable energy certificates may be created for each megawatt-hour of eligible electricity. The inclusion of wood waste as an eligible renewable energy source provides an opportunity for the plantation sector to access an additional revenue stream from forestry projects. The *Renewable Energy (Electricity) Regulations 2001* set out criteria that must be met. These ensure that only wood products that are sustainably produced, and are genuine wastes, can be eligible for renewable energy certificates.

Potential market for carbon sequestration rights

The AGO has played a leadership role in seeking to develop nationally compatible carbon sequestration rights legislation and the supporting framework for trading in sequestered carbon, i.e. project scale carbon accounting, risk management and carbon pooling.

There is significant investment interest in carbon sequestration projects within Australia. Investments are currently focused on hedging the planting of trees for possible *carbon credits* against a multitude of revenue streams, including commercial harvesting, and enabling "learning by doing" benefits. Taking advantage of any potential carbon market will also be particularly important in expanding the plantations sector into lower rainfall areas, as it is likely that low rainfall activities will only become commercially viable if some value is attributed to natural resource management (NRM) and/or greenhouse benefits.

Carbon sequestration rights have, to date, built upon the forestry and property legislation under different State jurisdictions to provide and define ownership rights over sequestered carbon. The current and reviewed Plantations 2020 Vision notes there is a high priority to address forest property rights. Given the close connection between forest property and carbon sequestration rights the AGO would also note that an awareness and understanding of carbon sequestration rights would be beneficial for the plantations industry, particularly noting Action 14 of the reviewed Plantations 2020 Vision, which seeks greater involvement in developing and promoting environmental services markets.

Similarly an awareness of related issues in developing a carbon sequestration market would also provide a greater ability for the plantations industry to access new greenhouse market opportunities, for example carbon accounting methodologies, and carbon pooling opportunities.

Current investment in carbon sequestration rights is speculative and generally based on the assumption that carbon sequestration rights will be converted into tradeable *carbon credits* under any future emissions trading system. Consideration of market

mechanisms and the role carbon sequestration activities will play, is to be part of the broader consideration of the forward greenhouse strategy currently being developed in consultation with industry and State and Territory governments. The plantation forest industry has the opportunity to be involved in its development.

Impacts on water resources

Water, its allocation and consumption for human and environmental purposes, has, over the past few years, emerged as a major natural resource management issue. Appropriately managed plantation forestry can improve water quality and can, as a consequence, deliver an important environmental service. Plantation forestry is, nevertheless, a competitor for water resources but a balanced approach to the management of water, vis-à-vis plantation forestry could deliver good outcomes for the industry, the environment and downstream users.

Australian tree plantations currently consume approximately 13.5 million mega litres of water per year, worth $6.75 billion per year (based on a price of water of $500 per mega litre). Trebling of Australia's plantation estate could see that figure increase to 45 million mega litres per year, (about $20 billion per year), with potentially significant impacts upon downstream users (Australian Financial Review 9/11/2002)[8].

There needs to be a transparent and consistent approach to assessing the likely impacts of proposed plantations on water availability, which takes into account impacts on downstream users. Finding this balance will not be easy, and will require assessment of the environmental and economic benefits of plantation establishment and comparison with the dis-benefits of decreased water yield and consequential impacts on in-stream environments and downstream irrigators and town water supplies.

Currently there are no mechanisms in place to help make meaningful decisions about the costs and benefits of plantation establishment and possible impacts on water yield, and how to ensure that the costs and benefits are distributed equitably.

The Council of Australian Governments (CoAG) Strategic Framework for Water Reform, agreed in 1994, has guided governments in moving towards more sustainable water allocation regimes, including the need for formal allocation of water for the environment. A consequence of the CoAG water reforms is that water is increasingly priced at its market value. At present, water use by plantations is uncosted.

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[8] In northeast Victoria, for example, some 400 000 – 450 000 hectares of cleared private land has been identified as suitable for the establishment of commercial plantations. This region contributes approximately 38% of the total water for the Murray Darling Basin System. A scenario establishing 10 000 hectares of plantation forestry in northeast Victoria could lead to an estimated annual water reduction of some 20 000 megalitres to downstream users and the environment (Riddiford J. in Water and Salinity Issues in Agroforestry RIRDC P No 01/20). The establishment of 200 000 hectares of plantation forest in this region could reduce surface water runoff into the Murray River tributaries of approximately 400 000 megalitres per annum.

Water managers are considering mechanisms, such as trade, to enable water to move to its highest value end use. Leaving aside issues such as salinity mitigation, the economic value of commercial tree production cannot be gauged against other end uses, such as irrigation agriculture, unless the water used by plantations is given some economic value or cost. As a result it is not possible to systematically determine whether proposals for commercial tree production will provide the highest economic return for the water used or, conversely, whether sub-economic outcomes can be expected.

Other policies and initiatives complementing the CoAG water reforms include the Murray-Darling Basin Cap on water diversions (limiting diversions to 1994 levels) and the introduction of farm dam legislation in some jurisdictions. Vertessy has observed that the overall impact of plantations on water yield for downstream uses might be similar to that of farm dams[9].

The then Agricultural and Resource Management Council of Australian and New Zealand (ARMCANZ) considered the issue of the Impact of Land Use Change on Water Resources Management in March 2001. Resolution 1E (*Impact of Land Use Change on Water Resources Management*) provides a good outline of the implications on water yield of land use change to forestry[10].

Water is not specifically addressed in the original Plantation Strategy (1997) or the 2002 Review. However, there is potential to do so under, for example *"Strategic Imperative 1 - Boost the Availability of Suitable Land"*, and in the actions listed thereunder (1997), and in "*Strategic Element 4*" - *Social and Environmental Factors*, "*Action 14 - Review and promote opportunities for environmental services to enhance plantation forestry* (2002). The development of guidelines and codes of practice under Strategic Imperative 1, Action 1 (*"promulgate guidelines and codes of practice consistent with other land uses"*) (1997) should at least be in consultation with water resource managers.

Biodiversity and remnant vegetation conservation

In comparison to *Strategic Imperative 1: Action 2* of the original 1997 Strategy document, Environment Australia is of the view that revised Strategy's *Strategic Element 2* (*The Regulatory Framework*), *Action 3* (*State native vegetation legislation that complements plantation establishment*) significantly improves recognition by the plantation industry of the importance of native vegetation retention and accompanying state legislation. Environment Australia would strongly support the call, in *Action 3*, to "ensure plantation expansion policies are consistent with policies on biodiversity and native vegetation management."

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[9] Vertessy *et al* estimate that a 100 hectare pine plantation in a high rainfall area (1000mm) would have an impact equivalent to 100 small, average volume, farm dams.
Vertessy R, Zhang L, Dawes, W, *Opcit*

[10] Agricultural and Resource Management Council of Australian and New Zealand (ARMCANZ) Resolution 1E (*Impact of Land Use Change on Water Resources Management*) Meeting No. 19, 9 March 2001, http://www.affa.gov.au/docs/operating_environment/armcanz/resolutions/armcanz19/1e.h

Noting that retention of native vegetation remnants in previously cleared landscapes has been shown to be important as refugia for biodiversity, Environment Australia would recommend that, in addition, the revised Strategy explicitly acknowledge the need to retain remnant patches on previously cleared land acquired for plantation establishment.

In support of this recommendation, we note that loss of paddock trees and timbered patches in woodland landscapes can cause substantial reductions to some woodland flora and fauna communities and severely reduce connectivity across a landscape.[11] Because these patches represent a significant proportion of remnant vegetation in some woodland ecological communities (e.g. Blakely's red gum and Yellow-box dominant communities), they become important in achieving sound conservation outcomes in agricultural landscapes. Data produced by Gibbons and Boak indicates that the adequate protection of some vegetation communities, in a 'comprehensive, adequate and representative' context (see footnote[12]) relies on the protection and management of paddock tree patches [13]. Lindenmayer suggests that a hostile matrix frequently surrounds habitat remnants in purely agricultural landscapes. However, plantations can make previously cleared land rather less inhospitable for biodiversity if implementation includes suitable landscape design strategies to retain aquatic ecosystems and to protect native remnants within the matrix[14].

(c) whether there are further opportunities to maximise the benefits from plantations in respect of their potential to contribute environmental benefits, including whether there are opportunities to:

(i) better integrate plantations into achieving salinity and water quality objectives and targets

In order for plantations to positively influence achievement of salinity and water quality targets, they need to be strategically established in locations where their presence will have most effect, for example on recharge areas adjacent to salinity affected land. To optimise benefit, we recommend that the research and development arms of the plantation industry form early and close alliances with regional natural resource management (NRM) bodies, such as Catchment Management Authorities and associations of regional local governments.

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[11] Gibbons P and Boak M, (undated) *'The value of paddock trees for regional conservation in an agricultural landscape'* Citation: Ecological Management and Restoration, *in press*, Corresponding author c/- CSIRO Sustainable Ecosystems PO Box 284 Canberra ACT 2601.

[12] The principle of comprehensive, representative and adequate' (CRA) was developed to underpin assessments for forest conservation values, in respect of Regional Forest Agreements (RFAs), to ensure long term conservation and protection of the values defined by the JANIS Reserve Criteria, and the land (public and private) required to achieve this. The CRA assessment principle has relevance beyond strict RFA regions, through, for example the National Reserve System for assessing environmental values.

[13] *Ibid*, page 9

[14] Lindenmayer D, *Opcit*, page 34

Such alliances can help facilitate identification of prime plantation establishment localities for both environmental benefits and for the needs of plantation growers.

To support this process, research and development is required to provide suitable species, to find the best locations, and offer workable economic models.

Tree planting is widely regarded as an effective strategy for salinity abatement due to reduced groundwater recharge as well as actual use of groundwater. However, the effects of afforestation on river salinity are widely variable and may, in some instances, lead to an *increase* in salinity levels before improvements are achieved (reduced stream-flow leading to higher salinity concentrations). Furthermore, the use of tree plantations to tackle salinity problems should take into account the need to maintain river flows for both consumptive and environmental purposes. The nature, location and management of plantations will determine the extent to which impacts on stream-flow (i.e. reductions) can be minimised. Research and development should be undertaken to investigate the impacts of forestry plantations on environmental flows and consumptive uses, and identify ways to address these impacts.

(ii) optimise the environmental benefits of plantations in low rainfall areas

The use of tree crops in agricultural systems in the mid to low rainfall zone has the potential to benefit farm income and regional development, while simultaneously contributing to greenhouse and natural resource management (NRM) outcomes.

The AGO notes that the reviewed *Plantations 2020 Vision*, publicly released in late 2001, includes specific reference to investigating plantations and natural resource management outcomes and the potential for plantation activity in low rainfall areas. In its research and development (R&D) priorities under *Action 11* and *Action 15*, the reviewed Plantations 2020 Vision also provides a commitment to gather and promote information on the NRM benefits of commercial trees, particularly in marginal areas.

It is recognized, however, that commercial requirements of plantation forestry limits the practical opportunities for realising forestry and NRM synergies. Environment Australia notes a 1999 report concluding that commercial agro-forestry in the low rainfall region of Australia is unlikely to be as profitable as in the high rainfall zone due to lower growth rates, less established infrastructure and greater distance to markets. There might, therefore, be little commercial incentive for plantation establishment in the areas where salinity and water quality problems are most acute. Nevertheless, the report concluded that significant prospects do exist and benefits could be captured through further private and public R&D investment, together with encouragement of innovation and infrastructure support by government. Plantings for fodder crops and eucalyptus oil from suitable coppiced mallee species show some promise[15]. High yield commercial product, such as activated carbon or charcoal from oil mallee eucalypt species, might also have significant future economic potential.

[15] RIRDC/Joint Venture Agroforestry Project 99/152, "Commercial Prospects for Low Rainfall Agroforestry"

Research into market-based instruments for environmental benefits in natural resources management (eg; by CSIRO and the Murray Darling Basin Commission) are in the development stage. Market based instruments might have application for the plantations sector, in terms of environmental benefits, should they be adopted by state and regional administrations.

Optimal benefit of plantings in lower rainfall areas could be achieved by using available scientific data and research to target suitable sites. Environment Australia suggests that, where possible, research data and results should be developed into a form that is accessible to growers and landholders alike.

(iii) address the provision of public good services (environmental benefits) at the cost of private plantation growers

Optimum siting of plantations can contribute to both public and private environmental and land management benefits. For example, appropriate site selection can optimise protection of erosion prone zones, and lead to improvements in water quality. Case studies have also demonstrated that maintenance of biological diversity through the retention of native vegetation remnants within plantations can "benefit stand productivity and the maintenance of key ecosystem processes like pest control" [16]. It has also been argued that "the maintenance (or loss) of biota in plantations is relevant for moves toward ecological standards and the certification of plantations in many parts of the world"[17].

While accepting that plantation growers will often be providing public good services, the location of plantations could also lead to negative environmental impacts. Such externalities are rarely, if ever, costed to growers.

Plantation growers are increasingly enjoined to meet and reflect societal expectations in establishing and managing their enterprises through, for instance, voluntary codes of practice, community consultative forums and auditable certification standards for forestry operations, such as the recently finalised Australian Forestry Standard[18]. Such expectations are not confined to plantations as, to one degree or another, all natural resource industries are expected to meet environmental standards that arguably contain an element of public good. This is commonly referred to as a duty of care.

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[16] Lindenmayer D.B., Hobbs R.J, Salt D, *Opcit*

[17] Lindenmayer D.B., Hobbs R.J, Salt D. *Plantation Forests and Biodiversity Conservation*, paper prepared for the conference *Prospects for Australian Forest Plantations 2002*, Canberra, August 2002)

[18] The Australian Forestry Standard states that "forest managers shall not carry out conversion of native vegetation which would result in that vegetation community or ecosystem becoming threatened or endangered in accordance with Commonwealth, State and Territory laws, regulations or species recovery plans" (Criterion 3, *Australian Forestry Standard, final draft*).

(d) ***whether there is the need for government action to encourage longer rotation plantations, particularly in order to supply sawlogs.***

Environment Australia has no view on the value of longer rotations for sawlog production. However, there are ancillary environmental benefits to longer rotations. For example, allowing the trees to reach maturity will increase flowering rates and consequently provide an additional foraging resource for species, potentially including *EPBC Act 1999* listed species such as the Swift Parrot, Grey Headed Flying Fox, etc.

Longer intervals between harvests can also have benefits for water quality and salinity mitigation objectives, and reduce the impacts on, water quantity. For example, the environmental service of water purification offered by forests can be enhanced by longer harvest intervals; the greater the length of rotation, the longer this service is available. Water quantity is also increased by longer rotations as the quantity of water used by trees on a per hectare basis diminishes with maturity of the forest, whether plantation or natural. While the daily water use of an individual mature tree is greater than that of an individual younger tree, the number of trees per hectare will be considerably lower for mature stands (natural or plantation) than it is for young stands.

The challenge of halting or ameliorating the effects of salinity is a long term one. This problem has been created by disruption of the hydrological cycle, particularly as a result of land clearance. Plantations are sometimes seen as a salinity remediation tool. While poorly located plantations can exacerbate stream and river salinity in the short term (see *(c) (i)* above), strategically located plantations can be used to halt rising groundwater and the mobilization of salt stored in the soil profile. Longer rotations complement this process. Short rotation harvests could counter gains in salinity reduction efforts.

(e) ***whether other action is desirable to maintain and expand a viable and sustainable plantation forest sector, including the expansion of processing industries to enhance the contribution to regional economic development***

Environment Australia does not have a view on this issue.