

# CHAPTER FIVE

## MAXIMISING THE POTENTIAL FOR FOREST PLANTATIONS' FUTURE CONTRIBUTION TO ENVIRONMENTAL BENEFITS

### Introduction

5.1 The third question considered by the Committee is posed by paragraph (c) of the terms of reference:

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,
- (ii) optimise the environmental benefits of plantations in low rainfall areas, and
- (iii) address the provision of public good services (environmental benefits) at the cost of private plantation growers;

5.2 General comments made to the Committee on this issue highlight the emphasis that the revised *2020 Vision* gives to strategies aimed at achieving the goals inherent in this term of reference. For instance, DAFF told the Committee that the *2020 Vision* recognises the role that can be played in the possible amelioration of land and water degradation and the delivery of environmental services for private and public good.<sup>1</sup> However, comments made in other submissions queried whether any such benefits have been realised, or whether in fact plantation forests have contributed to further environmental degradation.

### Plantations and Water Quality as an Environmental Benefit

5.3 The matters that the Committee addresses in this Chapter in relation water quality are:

- salinity and water quality objectives and targets; and
- environmental benefits of plantations in low rainfall areas.

5.4 These issues are addressed together in the following section for two reasons. Firstly, most submissions made to the Committee on the matter addressed them together (though not as single issue); and, secondly, the Committee has been able to

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1 *Submission 29*, Department of Agriculture, Fisheries and Forestry, p. 3.

consider and use the major study, published in April 2004, of the issues raised by this question.

5.5 That study was prepared and published by the Forest and Wood Products Research and Development Corporation (FWPRDC) and is entitled *Water Use by Australian Forest Plantations*.<sup>2</sup> For ease of reference, the Committee will refer to the study as 'the FWPRDC Water Study'.

### ***Water Use by Australian Forest Plantations – Water Quantity***

5.6 In its executive summary, the study notes that the water use issues it addresses have arisen as a forestry-related matter principally as a result of the rapid rate of plantation expansion on agricultural land that followed the setting up of *2020 Vision*. The rapid expansion rates have in some plantation regions given rise to increasing concern:

One area of concern is water. Recent government initiatives to reform water allocation arrangements and increase environmental flows in regulated river systems have highlighted the potential for conflict between the benefits of plantations and their potential to reduce streamflow and groundwater.

The quality and quantity of streamflow is the result of a complex interaction between rainfall, climate, soils, geology and land cover. All those factors must be considered in order to assess the hydrological effects of plantation development in a particular location. It is also important that social and economic implications are considered so that impacts, if any, on other water resource users can be weighed against the socio-economic benefits of increased timber production.<sup>3</sup>

5.7 The relationship between the increasing conversion of agricultural land to forest plantation is taken up by the study so as to define the research needed to better understand this process:

This review revealed that there were relatively few studies comparing water use, run-off and streamflow by different types of agricultural vegetation cover. Studies of water use by agricultural plants generally aimed to explore water use efficiency in relation to crop or pasture yield. Forest hydrology studies have generally investigated impacts on erosion, streamflow and water quality.<sup>4</sup>

5.8 Clearly, without such studies it is difficult to make an assessment of any environmental benefits that may be gained from plantation forests. During the course of the inquiry the Committee sought to establish what, if any, work was being

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2 *Water Use by Australian Forest Plantations: Pre-publication – Draft Final Report*, prepared for the Forest and Wood Products Research and Development Corporation by the Bureau of Rural Sciences, 2004 (FWPRDC Water Study).

3 *FWPRDC Water Study*, p. 3.

4 *FWPRDC Water Study*, pp. 4-5.

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conducted by state governments on these issues. While supportive of such research, responses did not generally provide examples of work being undertaken. However, the Committee notes and commends the work being undertaken in Western Australia by its Department of Environment.<sup>5</sup>

5.9 The limitations of current research into the effect of forest conversion studies on all types of plantation development, including native forest conversion, has also been noted in the FWPRDC Water Study:

A deficiency in most forest conversion studies is that results describe changes in streamflow rather than changes in evapotranspiration. Streamflow is the residual of rainfall minus evapotranspiration and can vary widely year to year. Evapotranspiration is less variable and more directly related to the vegetation changes because it is driven by solar radiation and vegetation attributes.

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Models developed to analyse impacts of plantations on stream flow are based on studies of catchments with relatively stable vegetation cover. They may not accurately reflect 'transitional' effects, where a proportion of the forest area is in younger age classes. They also assume a relatively simple break up into forest or non-forest vegetation cover. Forest structure can vary greatly between catchments and regions. Thus, models may not represent actual impacts on water use accurately in catchments where the forest structure differs significantly from the average of the studies used to develop the model.

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Many research results are based on studies in small catchments. Extrapolating results from these small research catchments to larger-scale catchments may introduce bias. In larger catchments there are areas that do not contribute to streamflow. Catchments with different size, topography or geology will have differing proportions of these areas. Afforestation impacts derived from small experimental catchments may therefore overestimate impacts at larger scales.<sup>6</sup>

5.10 The central relevance of water studies and hydrological studies in relation to plantation forestry are, as the study explains, as follows:

The hydrological effects .....mean that, as well as potentially reducing streamflow, reforestation has the potential to help control erosion, reduce salinity and improve water quality. For example, reforestation of catchments with blue gum plantations is reducing salinity in the Collie and Denmark Rivers, Western Australia. Initial analysis indicates that there may be 1.38 million hectares of agricultural land in the Murray-Darling Basin

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5 Correspondence from the Western Australian Minister for the Environment, regarding current hydrology monitoring and research programs, 16 March 2004.

6 *FWPRDC Water Study*, p. 6.

with moderate or high salinity hazard and suitable for commercial plantation development.

The available data shows that the forestry and forest products industries contribute substantially to regional economies and communities. Estimated direct employment in the five regions studied ranges from over 1 700 to nearly 3 800 and averages more than 2 800 people per region. There is also considerable indirect employment. Estimated gross value of production ranges from \$300 million to \$1.5 billion and is increasing as plantations mature and production increases. These benefits must be considered in context with any affects of plantations on other land uses and water resources.<sup>7</sup>

5.11 These views describe a potential problem which a number of submissions raised with the Committee. In addition to indicating the water use issue as a possible problem which may result from large-scale plantation development, these submissions also stressed that there is a need to initiate research.

5.12 The FWPRDC Water Study suggests a number of areas where research might initially be warranted by currently available data:

- long-term monitoring of water and salt balance at catchment and regional scales;
- comparative water use by different agricultural and forest vegetation types;
- catchment modelling and analysis;
- effects of plantation management practices, such as thinning, on water use;
- socio-economic and institutional analysis; and
- environmental benefits and impacts of plantations.<sup>8</sup>

5.13 The Committee recognises that further research is required before plantation development can be appropriately targeted to achieve environmental benefits in water usage. The Committee notes that the Commonwealth government currently funds the National Land and Water Resources Audit. Phase 2 of the audit, which includes the collection of comparable data from all States and Territories, is underway. This phase will provide information about the natural resource condition (the state of native flora and fauna and water and soil quality) for catchments and regions. While the Committee welcomes the audit, it believes that there is a need to ensure that the terms of reference are sufficiently broad so that the impact of plantation forests on water catchments can be ascertained.<sup>9</sup>

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7 *FWPRDC Water Study*, p. 7.

8 *FWPRDC Water Study*, p. 7.

9 Joint Media Release, Minister for the Environment and Heritage and Minister for Agriculture, Fisheries and Forestry, 22 October 2003.

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### ***Water Use by Australian Forest Plantations – Salinity and Water Quality***

5.14 The major focus of studies on reforestation is to determine its potential for helping to control land and water salinity. The FWPRC Water Study addresses this issue in the context of:

... studies that indicate that about 1.38 Mha of the Murray-Darling basin has high, medium or moderate potential for commercial plantations and medium or high salinity hazard.<sup>10</sup>

5.15 The Murray-Darling Basin was used as the example of how and/or whether forest plantations would be suitable for the purpose of reducing the effects of salinity. The FWPRDC Water Study, using material generated from studies in New South Wales and north-east Victoria, aimed at an evaluation of the following factors:

The potential for developing plantations in New South Wales was assessed in three stages: land capability assessment, land suitability assessment and economic assessment. The plantation capability assessment mapped growth for softwood (based on radiata pine) and hardwoods.

North-east Victoria - aimed to evaluate the socioeconomic suitability of new plantations in areas assessed as capable of growing commercial plantations and to evaluate the opportunities for expanding the region's plantation resources and associated industries. *Eucalyptus globulus* (Tasmanian blue gum) and *Pinus radiata* (radiata pine) were considered.<sup>11</sup>

5.16 The following climatic rules were employed in the FWPRDC Water Study to identify areas of commercial plantation land capability study:

- Exclusion of areas with 6 or more consecutive months with rainfall less than 40 mm.
- Exclusion of areas with average annual rainfall less than 600 mm.
- Commercial plantation capability is high if average rainfall is greater than 1 000 mm, moderate if rainfall is 800 to 1 000 mm and low if average annual rainfall is 600 to 800 mm.<sup>12</sup>

5.17 The net result of research to date on the potential for plantation development as a means to reduce salinity effects has highlighted the current low potential of plantations to fulfil this aim. When using data defining salinity hazard and plantation suitability, the total area of land in the Murray-Darling Basin with high, medium and moderate potential for commercial plantations and medium or high salinity hazard is estimated to be about 1.38 Mha.

5.18 The FWPRDC Water Study concludes that:

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10 *FWPRDC Water Study*, p. 45.

11 *FWPRDC Water Study*, p. 45.

12 *FWPRDC Water Study*, p. 45.

The majority of the Murray-Darling Basin is capable of low or very low growth rates and is not suitable for conventional commercial plantations. Suitable areas are concentrated in the higher rainfall areas in the Monaro region south of Canberra, around the existing plantation estate in Bathurst-Oberon and in the headwaters of the Namoi, Gwydir and Border Rivers catchment areas in the northern tablelands of New South Wales. Further analysis is required to identify specific locations within these broad areas that will contribute to salinity mitigation.<sup>13</sup>

5.19 In Albany, the Committee heard evidence from Mr Bartle, Manager, Farm Forestry Unit, Science Division in Western Australia's Department of Conservation and Land Management (CALM). Mr Bartle's work with CALM involves a joint project with the Oil Mallee Company on mallee as a new crop in Western Australia. The project combines work to address salinity issues with work to produce activated carbon.

5.20 Mr Bartle talked about the potential to use *Acacia saligna* in moist areas where CALM believe a four or five-year crop rotation would help to dewater salinity affected dry lands.

5.21 Mr Bartle indicated that as well as the potential for the crops to produce paper or panels boards and eucalyptus oil there was also the potential for "the waste, the leftover material, ... [to] go into electricity generation."<sup>14</sup> The potential had been identified but further work was required. He pointed out that the government's Mandatory Renewable Energy Target (MRET) legislation required clarification to facilitate greater public good from plantations.

5.22 Mr Bartle said:

There is a lack of clarity in the renewable energy act. There is lack of clarity about what qualifies, but I believe that any cultivated crop that is obviously quite renewable and replantable and can be done over and over again should qualify and there should be no lack of clarity on that score.<sup>15</sup>

5.23 Further, he identified the need for a strategic plan:

The key points I would like to make are that we need something like a woody crops 2050 vision and one that embraces woody crops as part of agriculture and sustainability as part of the culture of agriculture. I think the culture of the 2020 vision is too forestry oriented, too narrow and too wet in terms of rainfall. We need a radical advance on that sort of culture to fit into this new location if we are to pick up big public interest matters. We need many new species and many new products to build the woody crop industries with the capacity to control salinity. There is a bundle of work to be done there over the next 50 years. There is a very big body of work that

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13 *FWPRDC Water Study*, p. 48.

14 *Evidence*, Mr J Bartle, RRA & T, 11 October 2002, p. 83.

15 *Evidence*, Mr J Bartle, RRA & T, 11 October 2002, p. 87.

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needs to be done in what we call precommercial investment. This stuff is too complex for entrepreneurs and speculators. We need solid public investment for long period of time—perhaps a decade or two—to build the foundation of these industries so that commerce can take over and run them.

We will not be successful in large scale control of salinity without very large scale penetration of energy markets. That includes not only electricity generation but also transport fuels, liquid fuels.<sup>16</sup>

5.24 The FWPRDC Water study addresses in detail the matters canvassed in submissions to the Committee on the contribution that plantations might make to satisfy the requirements to reduce salinity and improve water quality. In considering how further research might be applied in answering the questions arising out of salinity and water improvement issues, the Committee notes that industry, environmental and research bodies put suggestions and recommendations to the Committee which rely substantially on the need for continuing and further research.<sup>17</sup>

5.25 Having considered the submissions, evidence taken during the Committee's inquiry and other research and background material, the Committee is satisfied that the material in the study provides a significant pointer to the issues requiring further examination. The Committee notes that, at this stage, the FWPRDC Water Study suggests research is needed to identify how specific locations might contribute to any level of salinity mitigation.

### ***Environmental Benefits of Plantations in Low Rainfall Areas***

5.26 Any assessment of the opportunities to maximise the environmental benefits of plantations in low rainfall areas also appear to require further research. The Committee notes that the FWPRDC Water Study applied climatic rules in identifying areas of commercial plantation land capability, effectively ruling out areas of low rainfall.

5.27 Further, NAFI stated in its submission that:

It has been crucial to ensure that the future competitiveness of the sector is improving and this has required the establishment of new plantations within discrete regions, where the regions may be defined as areas between 200 and 300 km across. So, in physical terms, it has been essential to have the emerging plantation resources concentrated in those areas, which also happen to be relatively productive farming land, with good soils and moderate to high rainfall.<sup>18</sup>

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16 *Evidence*, Mr J Bartle, RRA & T, 11 October 2002, p. 84.

17 *Submission 32*, National Association of Forest Industries, pp. 17-18.

18 *Submission 32*, National Association of Forest Industries, pp. 7-8.

5.28 Evidence provided to the Committee on the possible effects of plantations in low rainfall areas did not suggest that environmental benefits will be forthcoming:

With regard to the establishment of timber plantations in low rainfall areas, the DEC [Denmark Environmental Centre] notes that the harvesting of timber from low rainfall areas leads to a rapid depletion of soil fertility. In areas where rainfall is less than 800mm per annum, perennial vegetation is of high value.<sup>19</sup>

5.29 The Committee also queries the investment potential of plantation forests in areas where growth is likely to be less than optimal. Lower rainfall suggests lower growth rates resulting in extended periods prior to any return on investments.

5.30 Without further research work it is difficult to make confident assessments of the environmental benefits of plantations in low rainfall areas.

### **Provision of Public Good Services (Environmental Benefits) at the Cost of Private Plantation Growers**

5.31 The opportunities for the provision of public good services by private plantation forestry have several aspects. One view put to the Committee by ABARE is that:

It is important that economic policy instruments designed to enhance the environmental services provided by plantations, are targeted to provide well defined environmental outcomes. For some environmental services to be efficiently provided, such as salinity mitigation, plantation establishment must be targeted to very specific recharge areas of catchments. For biodiversity purposes, wider plantings of mixed species may be preferred over industrial monocultures.

Policy initiatives to create markets for environmental services need to consider which investors can most efficiently provide the required environmental outcomes. Economies of scale in the forest industries mean that the most efficient structure of the wood products industry is one or two dominant growers and processors in each region. Policy initiatives designed to provide environmental services through small holder plantations or farm forestry may expend resources altering the structure of the industry by attempting to increase the economic viability of smallholder forestry versus large scale industrial forestry. Resources expended to alter the economic viability of smallholder forestry are not necessarily the most efficient method of purchasing environmental services.<sup>20</sup>

5.32 In its submission to the Committee, NAFI provided some concrete examples of how environmental services could be optimised within plantation forestry projects and investments. It indicated that the industry is interested in "supporting plantation

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19 *Submission 34*, Denmark Environmental Centre, p. 2.

20 *Submission 26*, Abareconomics, pp. 4-5.



forestry projects that can deliver environmental benefits".<sup>21</sup> NAFI believes that a co-operative approach is required to encourage tree crops where returns will not only include the sale of timber, but also returns providing a value on the environmental benefits:

For example, to off-set a reduced land rental payment, farm owners could receive carbon credits from the trees planted on their property under joint venture arrangements or the environmental rehabilitation of their land may be reflected in the land's value and the borrowing rates applied to any future loans obtained from lending institutions.<sup>22</sup>

5.33 NAFI also indicated that a wide group of stakeholders is required "to monitor the on-ground environmental outcomes derived from plantations as the means for supporting competitive markets for trading those services."<sup>23</sup> Such a group is currently being drawn together under the Environment Industry Action Agenda. It aims to provide "tangible values for what are currently intangible benefits."<sup>24</sup>

5.34 Ultimately, NAFI can see a shift to plantations where the dominant return is in environmental services and suggest that there:

... may be an increasing requirement for some form of government subsidisation to be incorporated into the investment structures. This requirement would become increasingly apparent where the environmental protection or rehabilitation benefits have a large public good component that can not be captured through competitive markets.<sup>25</sup>

5.35 The Commonwealth Government perspective on the opportunities for provision of environmental services through plantations was described by the DAFF submission to the Committee as:

The Commonwealth has and will continue to support extensive R&D into the delivery of environmental services through plantation and farm forestry activities and the establishment of a sustainable low-rainfall farm forestry industry, for example through the Joint Venture Agroforestry Program supported by the Rural Industries Research and Development Corporation, the Forest and Wood Products Research and Development Corporation, Land and Water Australia and the Murray-Darling Basin Commission, and the activities of AFFA's Bureau of Rural Sciences (BRS) and the Australian Bureau of Agricultural and Resource Economics (ABARE).<sup>26</sup>

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21 *Submission 32*, National Association of Forest Industries, p. 19.

22 *Submission 32*, National Association of Forest Industries, p. 19.

23 *Submission 32*, National Association of Forest Industries, p. 19.

24 *Submission 32*, National Association of Forest Industries, p. 19.

25 *Submission 32*, National Association of Forest Industries, p. 19.

26 *Submission 29*, Department of Agriculture, Fisheries and Forestry, p. 3.

5.36 The need for research in this area before any real assessment can be made is again evident to the Committee.

### **Conclusion**

5.37 The Committee has considered whether there are further opportunities to maximise the environmental benefits that may be delivered by plantation forests and has concluded that without further research any such opportunities are difficult to recognise.

### **Recommendation 8**

**5.38 The Committee therefore recommends that the plantation industry establishes joint ventures to encourage research to examine the environmental benefits that may be delivered by plantation forests, particularly in relation to the availability of water, salinity and water quality, and plantations in low rainfall areas.**

### **Recommendation 9**

**5.39 The Committee recommends that the Commonwealth urgently funds the conduct of a water audit in both the mainland and Tasmania, to assess the impact of plantation forests on both water quantity and quality.**

### **Recommendation 10**

**5.40 The Committee recommends that the government review the application of the Mandatory Renewable Energy Target (MRET) legislation as it applies to the plantation woody crop industry.**