SUBMISSION

Murray Darling Basin Authority: Guide to the proposed Basin Plan

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Introduction

The National Association of Forest Industries (NAFI) welcomes the opportunity to comment on the Murray Darling Basin Authority *Guide to the proposed Basin Plan* (the Guide). NAFI is the peak representative body for Australia's forest industry, and represents the industry's interests in matters relating to the sustainable development and sustainable use of Australia's forest and wood product industries.

In broad terms, NAFI supports the proposals of the Guide and the need for the water resources of the Murray-Darling Basin to be managed on a more inclusive and equitable basis taking a whole-of-basin perspective, to provide the foundation for their management in an enduring and sustainable way.

NAFI fully supports the need for a rigorous triple bottom line approach to development of the Basin Plan that optimizes economic, social, and environmental outcomes.

Against this background NAFI is a keen supporter in processes to achieve development and implementation of an equitable and sustainable Basin Plan.

Notwithstanding this support NAFI has significant concerns regarding the proposed consideration of forestry by the Guide. These concerns essentially relate to:

- the definition of forestry plantations as an "interception activity", given that in many areas eucalypt woodland/forest was the original vegetation cover and inherant to the natural hydrological cycle and maintenance of environmental values (e.g. regulation of groundwater and salinity);
- the basis for forestry's characterisation as a "significant interception" activity when compared to other dryland cropping activities;
- the exclusion of all other dryland crops from the definition of "interception activity"; and
- not taking the above factors into consideration threatens to create the potential for very real pitfalls for policy makers that, in all likelihood, will result in perverse outcomes.

Definition as an "interception activity" and of "significance"

It is important to note that a large proportion of the plantation estate in the Murray-Darling Basin has been established on ex-native forest sites and not on land previously cleared for

agricultural use. As such plantations represent a land use that is consistent with the former vegetation type and impact on catchment hydrology.

The *Water Act 2007* defines an interception activity as follows:

interception activity means the interception of surface water or ground water that would otherwise flow, directly or indirectly, into a watercourse, lake, wetland, aquifer, dam or reservoir that is a Basin water resource.

This definition does not restrict the definition of an interception activity to forestry, nor does it deny the inclusion of other activities, such as dryland crops, that also intercept the flow of surface or ground water to a Basin water resource. Dryland crops such as deep-rooted perennial pasture can be significant interceptors of water, both in the scale of plantings and in the degree of water usage.

Much of the data gained on the estimates on the impact of run-off (and thereby of 'significance') in the Guide (refer page 51 of the Overview) is based on work done for the National Water Commission by SKM, CSIRO & BRS (2001)[1].

Importantly, Table 1 of this report lists ***both*** "Afforestation-commercial plantations (both native and exotic)" ***and*** "Farming land use change to high water use vegetation (transition from pasture to horticulture, planting deep-rooted crops for grazing, and moving to perennial cropping)" as intercepting activities that meet the definition criteria and both are ranked as "high" under the "Potential impact on water balance". Yet ***only*** "Afforestation-commercial plantations" is included in the list of interception activities considered as having a significant impact on surface-water yield or run-off.

Perhaps the fact that plantations can use more water that other dryland crops on a per hectare basis was of significance here. This raises another issue of significance for NAFI. That of scale and intensity in determining whether an activity is capable of having a 'high' or 'significant' impact on water balance.

Extent and impact of plantations in the Murray-Darling Basin

The Australian Bureau of Agricultural and Resource Economics estimate the total area of forest plantations in the Murray-Darling Basin to be around 292,000 hectares, or approximately 0.03% of the total Basin area. Moreover, for the sub-catchments where most of the plantations are located (Murrumbidgee River, Upper Murray River and Lachlan-Macquarie rivers) plantations account for only about 4, 2.5 and 1.5 per cent respectively of the catchment area.[2]

These figures can be contrasted with the figures of 66.7% and 10.5% of total Basin land use by dryland pasture and dryland cropping respectively, or figures of 69% and 56% for annual crops and highly modified pasture for the Murray and Murrumbidgee catchments respectively.[3]

Importantly, the former Cooperative Research Centre for Catchment Hydrology has indicated that plantations established over less than 20% of the catchment area have little measured effect on water yield. Moreover, much of the plantation development within the Murray-Darling Basin is located in the upper catchments of tributaries to the major rivers. Where plantations are located in the upper 30% of catchments, their impact on water yield

[1] *Surface and/or groundwater interception activities – Initial estimates*, Sinclair Knight Mertz, CSIRO and Bureau of Rural Sciences, Waterlines Report Series No 30, June 2010, National Water Commission
[2] *Australian forest and wood products statistics*, March and June quarters 2010, ABARE November 2010
[3] ABARE Vegetation Extent – Integrated Vegetation Online at http://adl.brs.gov.au/intveg/

is significantly less that in the lower 30%, as the lower areas are the main run-off areas for catchments. In the 700mm rainfall zone, planting less than 10% of the local land area of a catchment from the upper slopes down would reduce runoff by less that 10mm per annum, or 0.1 megalitre per annum.[4]

These findings are also supported by the ENSIS report[5] prepared for the Victorian Department of Primary Industries on tree water use in forestry compared to other dryland agricultural crops, in a collaboration by the CSIRO and SCION. This report notes that while, in general, trees use more water than grasses and other agricultural crops, planting less than 20% of a catchment to forest "may have no measurable impact on water yield (stream flow)".

As no catchment in the Murray-Darling Basin has (or is planned to have) more than 5% coverage by forestry plantations it is difficult, therefore, to agree with the conclusion presented in the Overview report that plantation forestry is, or threatens to be, a "significant" interception activity.

Inteception – the significance of scale and intensity

As can be seen from above forestry is a relatively minor land use in comparison with dryland cropping: 290,000 hectares (or 0.03% of land use) for forestry compared to 80,922,607 hectares (or 77.2% of land use) for dryland crops (10.5%) and dryland pasture (66.7%).

Importantly, unregulated intercepting activities such as the spread of deep-rooted perennial pastures may intercept as much water as trees. The Commonwealth funded *EverGraze* project seeks to reduce groundwater recharge rates by as much as 50% through the use of these pasture species. As such *EverGraze* seeks to harvest as much run-off water as possible.

This goes to the heart of the 'scale versus intensity' issue. While plantations may use more water than most dryland crops (i.e. possibly more intense water use), this use is on a ***significantly smaller scale***.

It is, therefore, inequitable for plantation forestry to be singled out for attention as a 'significant interceptor', when it represents only 0.03% of land use in the Murray-Darling Basin compared with 66.7% for dryland pasture. Put another way, dryland pasture which uses 2,223 times more land than plantation forestry and potentially a roughly equivalent amount of water per unit of land used, is NOT considered an activity worthy of attention as a "significant interceptor'. This is neither rational nor equitable, and actively discriminates against a legitimate dryland crop.

Moreover, dryland pasture is invariably located in the mid-lower catchment where interception has a greater impact on water yield (run-off) *vis-à-vis* plantations which are usually located in the upper catchment which potentially significantly lessens their impact on catchment hydrology.

As such, this issue is of considerable importance to the forestry industry, as it creates an inequitable situation for forestry *vis-à-vis* other dryland crops, much of which has the potential (due to their much greater scale) to greatly exceed the interceptive capacity of forestry.

[4] Plantations, river flows and river salinity, Rob Vertseey, L. Zhang and W.R. Dawes, CRC for Catchment Hydrology, 2003

[5] *Tree water use in forestry compared to other dry-land agricultural crops in the Victorian context*, ENSIS Technical Report No 159, January 2007

These points are further reinforced by the CSIRO report into the impacts of plantations on water security[6] where it is noted that while plantations have been the focus of most jurisdictions other forms of dryland agriculture may be of interest for two reasons:

(i) The extent to which plantations intercept water depends on the base case, that is, the form of agriculture prior to plantation establishment and the amount of water it used.

(ii) Some jurisdictions are paying attention to changes in land use other than to plantations and which also intercept water (that is, increase water use). For example, some parts of Australian agriculture have undergone significant transformation in the past 10 years or so. In south-west Victoria over the past 10 years or so the area of dairying has increased by about 1 million hectares, much of it involving a move to improved, but not irrigated, (perennial) pasture.

From the same report the following table is presented which shows a comparison of estimates of mean annual water excess (calculated as rainfall minus total evapo-transpiration) and the reduction in run-off after land use changed from either wheat to lucerne, or grass to forest.

Mean Annual Rainfall	**600mm**	**800mm**
Crop	**Mean annual water excess, or run-off reduction (mm)**	
Keating *et al* (2002)	Mean water excess	Mean water excess
Lucerne	25	50
Wheat	100	300
(Lucerne-wheat) run-off reduction:	**75**	**250**
Zhang *et al* (2001)		
Forest	42	89
Grass	133	241
(Forest-grass) run-off reduction:	**91**	**152**

Based on Keating *et al.* (2002)[7] this table compares lucerne (perennial pasture) with wheat (annual crop) for two rainfall zones and shows that lucerne can use substantially more water than a wheat crop. For comparison, the reduction in run-off between generic forest and grassland is shown for the same rainfall as calculated from the generalized equations of Zhang *et al.* (2001)[8]. Indeed, lucerne in this example is shown to use more water than generic forest.

These results effectively highlight ***the need for plantations to be considered in context***, taking scale and intensity of water use fully into consideration when developing policy responses in relation to assessing the significance or not of interception activities.

[6] The Impacts of Plantations on Water Security: Review and Scientific Assessment of Regional Issues and Research Needs, Phil Polglase and Richard Benyon, CSIRO National Research Flagships

[7] *Use of modelling to explore the water balance of dryland farming systems in the Murray-Darling Basin, Australia*, by Keating, B.A., Gaydon, D., Huth, N.I., Probert, M.E., Verburg., Smith, C.J. and Bond, W. (2002) European Journal of Agronomy 18, 159-196.

[8] *Response of mean annual evapotranspiration to vegetation changes at catchment scale*, Zhang, L. Dawes, W.R., and Walker, G.R. (2001) Water Resources Research 37, 701-708.

Policy considerations

Forestry is, or should be considered as, an 'as-of-right crop' raising activity that must be considered equitably along with other agricultural crops. Moreover, as noted, in assessing whether dryland crops (such as forestry) represent a threat to surface flows as "significant interception activities" it is essential that the related issues of scale and intensity are taken into account.

Otherwise the needed efforts to develop a sustainable, triple bottom line plan for the use of the Basin's water resources may lead to perverse or unintended outcomes. For instance, forestry which has a range of positive environmental effects may be actively discriminated against.

The ENSIS study[9] (at page two) reinforces this point in noting that "**despite sometimes impacting on water yields, reforestation/revegetation can offer other net benefits** such as salinity mitigation, erosion control, carbon sequestration, biodiversity enhancement and diversification of rural economies. **Thus good public policy should be based on multiple rather than single criteria**." (emphasis added)

The ENSIS study goes on to note that in evaluating the implications of various land uses, or land use changes, it is "essential to account for all of the likely benefits and costs associated with change. Often … only single issues, such as water yield, have been considered in isolation. (Once again) good policy should be based on multiple rather than single criteria".

Further the ENSIS study in comparing water use by forestry and other dry-land crops notes that while, in general, trees use more water than grasses or agricultural crops the impact of forests on water yield depend upon water use by the forest ***relative to*** the baseline grass or agricultural condition. It is essential to recognize that agricultural condition and management (such as intensity of cropping or grazing, species of pasture) can have a profound influence on run off. Moreover, it is cited that if plantations cover less than 20% of a catchment they may have no measurable impact on water yield (stream flow).

While this does not mean that trees are using the same or less water than the previous use, it does mean that ***when plantations are kept below a certain threshold*** in catchments, the impact is difficult to detect against the amount of base flow in the stream. The issue for policy makers then becomes ***at what threshold*** do plantations, or other land uses for that matter, threaten to become a significant interception activity, rather than the simple presence of that activity *per se*?

As discussed above, scale and intensity are vital factors influencing the impact of land use and land use change on water yield. As scale increases, changes or impacts occur over a smaller percentage of the total catchment area, and are spread over longer periods of time. ***Scale when combined with intensity of water use must be essential components of any further work in assessing interception activities by <u>all</u> dryland crops in development of the Basin Plan***.

A related equity consideration is that that the replanting of a forest plantation does not constitute a change of land use. It is a continuation of an existing and prior land use.

[9] *Tree water use in forestry compared to other dry-land agricultural crops in the Victorian context*, ENSIS Technical Report No 159, January 2007

Policy Pitfalls and Perverse Outcomes

Finally, there is the very real concern (as alluded to at the beginning of this submission) that not taking the above factors into consideration threatens to create the potential for very real pitfalls for policy makers that, in all likelihood, will result in perverse outcomes. For instance, the third paragraph of page 39 of Chapter 2, in Part 1 to the Technical Background, is a case in point.

The third paragraph on page 39 notes that:

Existing commercial forestry plantations in the Basin cover about 290,000 ha (CSIRO 2008). These plantations are estimated to reduce run-off by 341 GL/y (SKM, CSIRO & BRS 2010[10]*). The assessment of run-off impacts considered only forestry plantations, mainly for timber production, not the impacts on catchment water yields where plantations had replaced native forest or where plantations had been established on land that previously had a plantation (e.g. second rotation planting).*

A number of points can be made in relation to this paragraph:

1. This is the key paragraph in the Guide as it attempts to make the case that plantation forestry is a "significant interception activity". Page 51 of the 'Overview' to the Guide notes that "the estimates of the impact on run-off of forestry plantations are based on the work done for the National Water Commission" (i.e by SKM *et al* 2010 referenced at page 39 above). Though, as already noted, the logic of the SKM *et al* report is not consistent in that at Table 1 it **ignores** the impact of "Farming land use change to high water use vegetation", which is significant in its effect on water yield **both** in terms of scale and intensity of water use, and **includes** "Afforestation", which is possibly significant in terms of the intensity of water use **only if** the scale is significant as well.

   As noted there is only 290,000 hectares (or 0.03%) of land use for plantation forestry compared to 80,922,607 hectares (or 77.2%) of land use for dryland crops (10.5%) and dryland pasture (66.7%). If these other crops are not considered the resulting policy will be **neither rational nor coherent** and, in all likelihood, will result in inequitable and perverse outcomes. Once again ALL dryland cropping activities must be rigorously and accurately assessed and compared.

2. Moreover, a careful reading of this paragraph highlights that it does not make sense as it is currently structured. In particular, the second sentence is not clear in its intent. The only way that it can make sense in for the words "*on previously cleared land*" to be inserted at the end of the first clause; thus "The assessment of run-off impacts considered only forestry plantations *on previously cleared land*, … not the impacts on catchment water yields where plantations had replaced native forest or where plantations had been established on land that previously had a plantation".

   Though, even then this paragraph does not support the case to consider plantations as a significant interceptor of water due to essential 'baseline' considerations. As plantation forests are approximately 30% based on previously cleared agricultural/grazing land and 70% on previously forested land a number of problems emerge:

   i The guide by its own admission at page 39 states that "forestry plantations … cover about 290,000 ha", but only 30% of this ***potentially*** represents a change of land use. The other 70% should not be considered because the prior land use was native forest, which uses at least the same and possible

[10] *Surface and/or groundwater interception activities – Initial estimates*, Sinclair Knight Mertz, CSIRO and Bureau of Rural Sciences, Waterlines Report Series No 30, June 2010, National Water Commission

more water than plantation forestry does. Therefore, the potential for increased interception is more correctly 30% of 341GL or 102.3GL.

ii A related consideration is that plantation forestry on the 30% of previously cleared agricultural land only ***potentially*** represents a change of land use, because there is a need to take into consideration what was the vegetation cover ***prior*** to clearing for agricultural land use (i.e. if it was native forest or woodland, which it often was, then plantation forestry would not represent a use significantly different to the original vegetation cover).

iii Moreover, of this 30%, the prior land use (e.g. dryland crops through to improved pasture) uses on average somewhere between 50-90% of the water that plantation forestry does. **It is not a zero baseline as is implied or assumed by the Guide. Cleared land** (whether for pasture or dryland crops) **uses water**. Thus the now revised estimate of 102.3 GL/y is further reduced by at least a very conservative 50% giving a maximum possible reduction in run-off by plantation forestry of only ~50GL/y.

iv As is obvious from the above, baseline considerations are of fundamental importance and these are ***not*** adequately or appropriately addressed by the Guide.

v Thus plantation forestry, which possibly reduces run-off by only a very conservative 50GL/y (or 0.365%), of current diversion limits is somehow assessed as being a significant interceptor of run-off.

vi Importantly, none of the very significant social and economic impacts of forestry to local and regional (and state and national) economies are given any consideration at all. Indeed, in section 2.4 (The Economy of the Basin) beginning on page 19 of the Overview forestry is not mentioned at all. Even though there is considerable forestry and forestry processing activity in the Basin, particularly around the Tumut, Batlow, Tumbarumba, Albury, Bathurst and Oberon regions.

Thus our very real concern regarding the potential for perverse outcomes regarding a policy process that appears to harbor an inherent prejudice regarding the treatment of plantation forestry. The above are essential points that, for whatever reason, are not given any consideration in the Guide.

Conclusion

While NAFI is supportive of the need for, and the aims of, the Murray-Darling Basin Plan we believe that that implementation of any policies relating to the development of sustainable diversion limits (SDLs) must take into account:

1. **Equity among consumptive water uses**. The exclusion of other dryland crops, particularly deep-rooted perennials such as lucerne, from consideration as significant interception activities is neither justifiable in terms of sound science nor public policy.
2. **Plantations are an as-of-right crop raising activity and must be treated equitably along with other dryland crops**. This also highlights an important related equity consideration, that the replanting of a forest plantation does not constitute a change of land use. It is a continuation of an existing use.
3. **The scale and relative impact/intensity of various uses** are essential foundations in the assessment of any and all dryland crops as significant interception activities, or not.

4. **The need for sound science and evidence based approaches to assessing interception significance and thresholds**. For instance, there is already a substantial body of research which would support establishment of a very conservative threshold of 10% for plantations, below which depending on placement within a catchment would not represent any risk of significance as an interception activity.
5. The need to conduct economic and social assessments to assess the context in which SDLs are being developed, and **the likely costs and benefits of adopting alternative SDL approaches**.
6. **The very real need for the Basin Plan to consider multiple, not single, criteria in the consideration, assessment and development of policy options**. Water yield (or run-off) *per se* is not the prime factor in assessing whether a dryland cropping activity is a significant water interceptor. Factors such as scale and intensity of water use, the rigorous and accurate assessment and comparison of all dryland crops, and the use of appropriate baselines are essential.
7. That not taking the above factors into consideration threatens to create the potential for very real pitfalls for policy makers that, in all likelihood, will result in perverse outcomes.