Department of Planning and Environment

Regional Water Strategies
Public Exhibition 1

Submission Questionnaire

Murrumbidgee Regional Water Strategy

The NSW Government is taking action to improve long-term water security, reliability, quality, and resilience of the state's water resources. The Murrumbidgee Regional Water Strategy will help deliver healthy and resilient water resources for a liveable and prosperous regional NSW.

This draft Murrumbidgee Regional Water Strategy is being developed by the Department of Planning and Environment and provides an opportunity to re-shape what we are doing in regional water management and chart a path forward.

We have been working with local water utilities, councils, communities, Aboriginal people and other stakeholders to ensure local and traditional knowledge informs the draft Murrumbidgee Regional Water Strategy and that it serves the regional community, including First Nations, the environment and industry.

Your voice is important

We have prepared this draft strategy to continue our discussions with you. We would like to hear your views on the draft strategy, including the process we used to develop the strategy and the evidence that supports it. We are also seeking your feedback on the options presented in the draft strategy and whether you have any further information that could help us assess the benefits and disadvantages of any of the options.

Please provide your feedback in the submission questionnaire below and either;

- email your completed submission to regionalwater.strategies@dpie.nsw.gov.au or
- post to Regional Water Strategies, Department of Planning and Environment, Locked Bag 5022, Parramatta NSW 2124 by Sunday 22 May 2022, 11.59pm.

The submission questionnaire includes general questions about the draft Murrumbidgee Regional Water Strategy including objectives, challenges, opportunities and options. It also includes questions regarding the draft options along with personal information questions.

The questionnaire will take approximately 15 minutes to complete, and your response can remain anonymous if you wish (see questions 1 and 2).

Questions marked with an asterisk (*) require an answer.

If you have any questions about the questionnaire, please email:
regionalwater.strategies@dpie.nsw.gov.au

Making your submission public

We collect information about you, which may include personal information, to assess submissions in response to the department's dealings and activities, and perform other functions required to complete the project. The information collected will be shared with the stated third-party contractors for the purpose for which is has been collected. This information must be supplied. If you choose not to provide the requested information, we may not be able to assess your submission.

To promote transparency and open government, we intend to make all submissions publicly available on our website, or in reports. Your name or your organisation's name may appear in these reports with your feedback attributed.

If you would like your submission and/or feedback to be kept confidential, please let us know when making your submission. You will be asked for your confidentiality preference at question 1.

If you request that your submission is to be kept confidential, it will not be published on our website or included in any relevant reports; however, it will still be subject to the *Government Information Public Access Act 2009.*

Your submission will be stored securely, consistent with the department's Records Management Policy and you have the right to request access to, and correction of, your personal information held by the department.

Further details can be found in our privacy statement available on our website.

1. Information on confidentiality and privacy *

I give my permission for my submission to be publicly available on the NSW Department of Planning and Environment website.

☐ Yes ☐ No

I would like my personal details to be kept confidential.

☐ Yes ☐ No

2. Your details

* Email address: [redacted]

* Name:

* Address:

* Contact phone number:

*** Do you identify as an Aboriginal person?** (select one)

☐ Yes ● No ☐ Choose not to answer

*** Are you making this submission as an individual or as a representative of an organisation?** (select one)

◉ Individual ○ Organisation

3. Organisation or business details

If making this submission as a representative of an organisation, who do you represent? (select one)

Government (select one)

☐ Commonwealth ☐ New South Wales ☐ State other ☐ Local

☐ Local Water Utility

Peak representative organisation (select one)

☐ Environment ☐ Industry ☐ Business group or business chamber ☐ Community

☐ **Other** (select and provide details) _____

● **N/A**

4. Draft regional water strategy objectives and vision

The draft Murrumbidgee Regional Water Strategy is one of 14 strategies (12 regional water strategies and two metropolitan water strategies) being developed by the department. All regional water strategies are being developed in line with the following objectives:

Deliver and manage water for local communities

Improve water security, water quality and flood management for regional towns and communities.

Enable economic prosperity

Improve water access reliability for regional industries.

Recognise and protect Aboriginal water rights, interests and access to water

Including Aboriginal heritage assets.

Protect and enhance the environment

Improve the health and integrity of environmental systems and assets, including by improving water quality.

Affordability

Identify least cost policy and infrastructure options.

All draft regional water strategy options need to address at least one of the above objectives.

Our vision for this strategy is to support the delivery of healthy and resilient water resources for a liveable and prosperous Murrumbidgee region. To achieve this, we need to position the region so there is the right amount of water of the right quality delivered in the right way for people, Aboriginal communities, towns, industries and the environment.

To what extent do you feel the draft strategy and long list of options establishes the foundation for working towards the objectives and vision?

☐ Strongly agree ☐ Agree ☐ Neutral ● Disagree ☐ Strongly disagree

Why?

I disagree because measuring water at any given point only accounts for the water at that point, at that time, rather than what should be there given rainfall in the entire upper catchment and expectant flows.

Pine plantations owners have, for many years, claimed that pine plantations only "use" 1 Meg/hectare to grow pine.

In 2003, the Bago Creek stopped flowing for the first time in over 100 years. Yes, it was a heavy drought year. Yes, the headwater was covered in pine plantation.
The Bago Creek is the boundary to our family property, at Lower Bago.

So, I decided to research why. What I found disturbed me. Pine uses much more than 1 Meg/hectare, it costs them nothing, and the consequence is reduced flows into the waterways.

I will include the paper I wrote in my e-mail.

After I tried to spread my paper around, much of the plantation on the Bago creek was clear felled and flows quickly resumed.

5. Information used to develop the Murrumbidgee Regional Water Strategy

The draft Murrumbidgee Regional Water Strategy brings together the most up to date information and evidence with all the tools we have – policy, planning, behavioural, regulatory, technology and infrastructure solutions – to plan and manage the water needs in the NSW Murrumbidgee region over the next 20 to 40 years.

We have used the following information to develop the draft Murrumbidgee Regional Water Strategy:

- New climate data
  - Observed historical climate data - recorded rainfall, temperature and evaporation data from the past 130 years.
  - Climate drivers – key drivers of wet and dry periods.
  - Climate change projections.
- Review of existing studies
  - To identify drivers and risks to water resources.
- Community engagement
  - Local councils and joint council organisations.
  - Aboriginal people and Aboriginal community groups.
  - Review of previous consultation processes.

Alongside the development of the draft Murrumbidgee Regional Water Strategy, we have been working on a new approach to climate modelling. The NSW Government has invested in new climate datasets and improved modelling to gain a more sophisticated understanding of the region's natural climate variability and risks of climate change over the next 40+ years.

In addition to the recorded data, the new method has been informed by:

- Climate drivers
- Paleoclimate data
- Climate change projections

The new climate datasets that we have generated through this process will be used in our hydrological models. This hydrological modelling work is still in progress and results from the hydrological modelling will be incorporated into the final Murrumbidgee Regional Water Strategy.

Do you have any questions or comments about the new climate datasets and our modelling used to develop this draft strategy?

No

Is there any additional information that you believe should be used in preparing the draft strategy?

Yes.
Many people will try to discredit what I found. It hurts their business.

I showed my paper to the water specialists at Charles Sturt University, and urge you to ask them if what I wrote was accurate at that time.

6. Key challenges and opportunities for water management in the Murrumbidgee region

The draft Murrumbidgee Regional Water Strategy includes a list of key challenges and opportunities that we are seeking your feedback on:

Challenges

- Inadequate water management framework to meet the needs and aspiration of Aboriginal people, which also prevents Aboriginal people from fulfilling their rights and obligations to care for Country under their law and customs.
- Current water sharing arrangements based on only 125 years of recorded data, which limits our understanding of how vulnerable the region could be to future extreme events.
- Insufficiently integrated land and water planning and management, which can lead to population and industry growth occurring in areas that have pre-existing water availability constraints.
- Vulnerability of town water supplies and amenity, which are key factors in fostering liveable and vibrant regional towns and maintaining the wellbeing of communities.
- Degradation of riverine and floodplain ecosystems, which has led to a loss of native vegetation and wetlands and a decline in the conditions of fish communities and waterbird habitat.
- Limits to water availability in times of a changing climate, which increases competition for water and could hinder growth and prosperity of the region's industries.

Opportunities

- New climate datasets and updated integrated modelling – to test the appropriateness of existing rules, regulations and policies, including the existing water allocation and accounting framework and additional opportunities to support existing reviews already underway.
- Improve resilience – potential options to improve water security/reliability, quality and delivery efficiency; increasing participation of Aboriginal people in water-related economic and cultural opportunities; better integration of land and water management and improvements for environmental management.
- Improve our understanding of trends in water use in the regions – draft option being developed to investigate regulatory, policy, operational and infrastructure solutions to enhance water security for regional communities and support the productive capacity of the regions' industries.
- Improve the understanding of groundwater in the region – draft options being developed to improve the understanding of groundwater processes, groundwater usage and risks to existing groundwater sources.

To what extent do you feel we have captured the key water related challenges in the region?

☐ Strongly agree ☐ Agree ● Neutral ☐ Disagree ☐ Strongly disagree

To what extent do you feel we have captured the key water related opportunities in the region?

☐ Strongly agree ☐ Agree ● Neutral ☐ Disagree ☐ Strongly disagree

Do you have any comments on the key water related challenges and opportunities identified?

No

Are there any additional key water related challenges and opportunities that we should consider and what options could address these?

No

7. Draft Murrumbidgee Regional Water Strategy options

We have developed a long list of options that could be included in the Murrumbidgee Regional Water Strategy. The options consider the opportunities and challenges facing the region and meet at least one regional water strategy objective.

The 53 options are grouped into the following categories:

- Inadequate water management framework to meet the needs and aspirations of Aboriginal people
- Current water sharing arrangements based on 120 years of data
- Insufficiently integrated land and water planning and management
- Vulnerability of town water supplies and amenity
- Degradation of riverine and floodplain ecosystems
- Limits to water availability in times of a changing climate
- Limitations of existing water infrastructure, delivery and operations

Long List of options

Option number	Option title	Description
Inadequate water management framework to meet the needs and aspiration of Aboriginal people Opportunities to protect and strengthen cultural landscapes, practices, knowledge and traditions. Supporting empowerment, self-determination and economic advancement of Aboriginal people, as well as strengthening community wellbeing.		
1	Improve access to culturally significant areas and waterways for Aboriginal people	This option would investigate the benefits and constraints of developing formal access arrangements between Aboriginal people and landholders in the Murrumbidgee region.
2	Review Aboriginal Cultural Water Access Licence framework	This option would undertake a review of water access licences for Aboriginal cultural uses to determine their effectiveness and identify opportunities for improvement
3	Assess access arrangements for Murrumbidgee Cultural Water Access Licence	This option would consider opportunities to expand the use of the Murrumbidgee Cultural Water Access licence.
4	Fund water entitlements for Aboriginal communities	This option would provide funding to support Aboriginal people to purchase water entitlements and water infrastructure—such as pumps—that can be used to improve economic and cultural outcomes across the southern connected basin.
5	Secure flows for water-dependent cultural sites	This option would investigate opportunities to improve the timing, rate and consistency of flows to places of cultural significance. The places would be identified by Aboriginal community members.
6	Shared benefit project (environment and cultural outcomes)	This option would investigate opportunities to work more closely with environmental water holders for shared benefits from using water for the environment that would also achieve cultural environmental outcomes, recognising it does not replace the provision of cultural flows.

Option number	Option title	Description
7	Support long-term participation of local Aboriginal people in water-related matters	This option would provide support for local Aboriginal groups to be actively involved in consultation and decision-making processes around water management in the Murrumbidgee.
8	Incorporate Aboriginal history of water and culture in the Southern Basin into water data	This option would aim to document and integrate Aboriginal science and culture into government processes to help better manage the river systems.
Current water sharing arrangements based on 120 years of data Opportunities to consider the adequacies of existing water sharing and management arrangements in the region under a more variable and changing climate.		
9	Review drought rules for the Murrumbidgee region	This option would review the adequacy and effectiveness of the Incident Response Guides applicable to the Murrumbidgee region by testing them against the new climate data and updated modelling being developed for the Murrumbidgee Regional Water Strategy.
10	Review the allocation and accounting framework in the Murrumbidgee (surface water)	This option would review several settings of the current water accounting and allocation process in the Murrumbidgee regulated river system and consider whether and how the new climate data should be used when making allocation decisions.
11	Review groundwater extraction limits	This option would review the existing groundwater extraction limits to incorporate up-to-date information, including scientific studies that incorporate new climate change datasets to give an improved understanding of groundwater processes.
12	Provide increased clarity about sustainable groundwater management	This option would review, revise and develop policies to give water users greater clarity and certainty in how groundwater is managed in NSW.
13	Investigate Water Access Licence conversion	This option would test the potential risks and benefits of allowing voluntary conversion from general security to high security and high security to town water supply water access licences in the Murrumbidgee Regulated River Water Source.
Insufficiently integrated land and water planning and management Opportunities to better integrate water resource management into other processes, including assessing current land uses and land-use trends in the Murrumbidgee to better understand spatial changes in the region's water uses and emerging pollution and flooding risks.		
14	Investigate land use change and population growth impacts on water resources	This option would investigate opportunities to better integrate the NSW land use planning and water resource management frameworks.
15	Strengthen inter-jurisdictional water management	This option would investigate improvements to the inter-jurisdictional water management arrangements in the upper Murrumbidgee region in consultation with the Australian Capital Territory Government and the Australian Government.

Option number	Option title	Description
16	Develop climate risk evidence base to inform the next Snowy Water Licence Review	This option would seek to gather information and evidence to inform the next Snowy Water Licence Review in 2027.
17	Enhance southern inland floodplain management plans	This option would develop valley-wide, connected floodplain management plans using the northern NSW Murray–Darling Basin floodplain management plan (NSW Healthy Floodplains Project) template.
Vulnerability of town water supplies and amenity Opportunities to improve policy and planning around water re-use and recycling, and strengthen water security for local communities and important water related amenity in the region.		
18	Review impediments to water recycling projects	This option would review impediments (such as cost, pricing, regulatory or engineering constraints, or community acceptance) to water recycling projects in the Murrumbidgee region.
19	Assess potable re-use for towns	This option would assess the benefits and costs of potable re-use in the Murrumbidgee region and investigate potential locations for new and expanded re-use schemes from sewage treatment plants.
20	Managed aquifer recharge investigations and policy	This option would investigate opportunities to undertake managed aquifer recharge in the Murrumbidgee region, including investigating the recharge capacity of sites for temporary storage of stormwater, river flow or purified recycled water in aquifers
21	Secure and reliable access to groundwater for towns	This option would undertake a strategic review of groundwater use by towns across the region to improve understanding of the regional need, challenges and opportunities for towns to access groundwater.
22	Maintain water-related amenity in the Murrumbidgee during droughts	This option would investigate opportunities to maintain water related amenity, including town water lakes, local parks and recreational areas, in and around towns in the Murrumbidgee region during droughts or extended dry periods.
23	Improve protection of groundwater dependent ecosystems	This option would advance our knowledge and management of groundwater dependent ecosystems in the Murrumbidgee region, such as the mid-Murrumbidgee wetlands, Lowbidgee wetlands, and Great Cumbung Swamp.
Degradation of riverine and floodplain ecosystems Opportunities to address the risk to the environment, the ecology and groundwater dependent ecosystems and improve the health of the region's rivers and groundwater sources.		
24	Address cold water pollution	This option would build on and address gaps within the 2004 NSW Cold Water Pollution Strategy and associated updates (2011 and 2012).
25	Improve flows to important ecological sites	This option would consist of several projects that aim to restore important ecological flows and connectivity between the river and floodplains in the mid-Murrumbidgee region and Lowbidgee.

Option number	Option title	Description
26	Develop a river and catchment recovery program for the Murrumbidgee region	This option would consist of a program aimed at better managing catchment hydrology, addressing erosion issues and restoring riparian and river habitats at priority locations within the catchment. This program would also include a component that undertakes long-term analysis of the impact of climate variability and climate change on future water availability for the catchment with focus on floodplains and river environments.
27	Investigate water quality improvement measures	This option would involve conducting a gap analysis of water quality information to identify opportunities to support surface and groundwater water quality management in the Murrumbidgee region.
28	Manage groundwater salinity	This option would conduct a range of reviews, investigations and collaborations to address groundwater salinity challenges in the Murrumbidgee region.
29	Assess pollution from disused mines and mineral occurrences	This option would investigate the need to understand and mitigate pollution from disused mines and quarries in addition to the work undertaken by the Legacy Mines Program.
30	Review environmental water arrangements	This option would use the new climate datasets and updated hydrological models (once completed) to review the effectiveness of existing NSW water sharing plan rules to meet the environmental watering requirements as outlined in the Murrumbidgee Long-Term Water Plan under long-term climate change projections.
31	Re-establish threatened fish species through habitat restoration and conservation re-stocking	This option would aim to improve the condition, connectivity, and resilience of native fish by restoring habitat through protection and rehabilitation of priority areas using best practice management, while building the skills and sharing the knowledge of local landholders, community groups, and Aboriginal people.
32	Monitor sediment compaction over the long term	This option would develop a long-term monitoring program for the Murrumbidgee region to ensure sediment compaction does not occur in the future, reducing risks to groundwater storage and long-term bore yields.
Limitations of existing water infrastructure, delivery and operations Opportunities to improve system efficiencies (infrastructure and delivery) and enhance river operations.		
33	Investigate alternatives for increased storage capacity	This option would investigate alternative infrastructure projects to increase the storage capacity in the Murrumbidgee region downstream of Blowering and Burrinjuck Dams.
34	Investigate new storage at Lake Mejum–Coolah	This option would review previous investigations into additional storage capacity in the mid-Murrumbidgee to address deliverability issues and to improve the system efficiency.

Option number	Option title	Description
35	Install gravity pipeline along Tumut River	This option would investigate the feasibility of installing a gravity pipeline along the Tumut River to address the channel capacity constraint by enabling release of higher flows downstream of Blowering Dam.
36	Raise Blowering Dam	This option would investigate the feasibility of increasing the active storage of Blowering Dam. Alternatives to be considered include raising the dam by 4 m to increase active storage in the Murrumbidgee region by 200 GL, with a corresponding increase in the dam capacity of 12%, and additional downstream or adjacent off-stream storage.
37	Enlarge Burrinjuck Storage Reservoir	This option would investigate the feasibility of increasing the storage capacity of Burrinjuck Dam, increasing the region's active storage.
38	Expand Bundidgerry off-river storage and a new transfer canal	This option would investigate augmenting the existing Bundidgerry storage in the mid-Murrumbidgee region to address deliverability issues in the summer months, such as supply shortfalls, and to improve efficiency.
39	Augment Tombullen Storage and modify operational changes	This option would investigate the feasibility of two options to improve the efficiency of Tombullen storage, including augmenting the storage capacity to increase the re-regulating storage in the mid-Murrumbidgee region and investigating potential operational changes for Tombullen Storage to mitigate water quality issues.
40	Investigate inter-regional connections	This option would investigate the construction of inter-regional town water supply pipeline connections between the Murrumbidgee region and neighbouring regions.
41	Change environmental releases from Murrumbidgee storages	This option would investigate changes to operations related to the release of discretionary environmental water. The suggested change would be to release more from Blowering Dam and less from Burrinjuck Dam during winter.
42	Review flood management and airspace operation	This option would review existing operations and rules governing flood operation of Blowering and Burrinjuck dams and the interaction with airspace rules and relevant Snowy Water Licence rules. It would also investigate potential operational or rule changes to improve the storages flood mitigation function.
43	Investigate groundwater desalination for industry and towns	This option would investigate the opportunities associated with desalination of groundwater to make it suitable for industrial and town uses.
Limits to water availability in times of a changing climate Opportunities to better understand water use behaviour, identify the information needs of water users, and improve resilience within the region		
44	Better understand water use with data collection and analytics	This option would undertake a research project to better understand water use and water user behaviour in the Murrumbidgee region.

Option number	Option title	Description
45	Improve the understanding of groundwater sources and processes, risks and impacts	This option will combine desktop studies, field studies and numerical models—delivered in collaboration with consultancies and research centres—to give water users and towns access to data and information about groundwater resources.
46	Undertake a water-dependent industry resilience study	This option would include a comprehensive long-term study on the impacts of climate variability and climate change on future water availability to determine the impacts on water dependent industries in the Murrumbidgee region including those reliant on town water supply systems.
47	Develop targeted education and capacity building programs	This option would develop targeted education and capacity building programs to build community confidence in water management, with a focus on the Murrumbidgee region, and help communities, industries and the environment to better manage their water needs and water-related risks.
48	Investigate water availability in the Murrumbidgee region	This option would consider whether there is systemic reduction in available water in the Murrumbidgee region and investigate possible causes and potential responses.
49	Investigate non-residential water efficiency (towns and industries)	This option would investigate opportunities to improve the efficiency of non-residential water use of both raw and town water supplies such as by agriculture, schools, hospitals, industrial uses (e.g. food processing) and recreational and amenity uses (water parks, sports ovals, town water lakes).
50	Investigate expansion of cloud seeding in key water supply catchments	This option would investigate potential additional benefits from expanding current cloud seeding activities in the mountainous areas surrounding Snowy Hydro Limited catchment area.
51	Undertake joint exploration for groundwater with the NSW Geological Survey	This option would use regional and locally targeted geophysics to identify potential resources (fractured and porous rock systems like the Lachlan Fold Belt and Western Murray Porous Rock) followed by drilling, testing and water quality analysis to assess the resource's suitability for supply.
52	Review water markets and trade	This option would progress the implementation of water market reforms, based on the recommendations of the Australian Competition and Consumer Commission's Murray Darling Basin NSW water markets inquiry.
53	Consider hydrological processes in bushfire management	This option would investigate how bushfire management could be strengthened in priority watersheds by including protection of rainfall-run-off processes as a key bushfire management priority in national parks and reserves.

What are your thoughts on the following groups of options?

Options 1 to 7 relating to "inadequate water management framework to meet the needs and aspirations of Aboriginal people?"(Please provide reasoning for your response)

Nil of note.

Option 8 to 13 relating to "current water sharing arrangements based on 120 years of data?" (Please provide reasoning for your response)

Nile of note.

Option 14 to 19 relating to "insufficiently integrated land and water planning and management?" (Please provide reasoning for your response)

None other than my earlier points.

Options 20 to 25 relating to "vulnerability of town water supplies and amenity?" (Please provide reasoning for your response)

Higher waterway flows will lead to higher amounts of accessable water for all.

If water yields to waterways are as expected, higher volumes will be available downstream.

Options 26 to 34 relating to "degradation of riverine and floodplain ecosystems?" (Please provide reasoning for your response)

N/A

Options 35 to 43 relating to "limits to water availability in times of a changing climate?" (Please provide reasoning for your response)

More time needs to elapse before data becomes relevant.

Approximately 1/2 of the 120 year data term described was prior to the established acknowledgement of climate change (1960's), So data is roughly 50/50 for pre and post climate change at this time.

Options 44 to 53 relating to "limitations of existing water infrastructure delivery and operations, which hinder efficient water delivery"
(Please provide reasoning for your response)

Does the long list of options address the water challenges in the region?

☐ Strongly agree ☐ Agree ☉ Neutral ☐ Disagree ☐ Strongly disagree

When considering the long list of 53 options, what five (5) options do you think are the *most* important in order to address the challenges?

Option Number 48

Option Number 45

Option Number 12

Option Number 25

Option Number 15

Please comment on why you think these options are most important?

Because all the other options depend on these 5 being met.

Are there any additional options that we should consider?

No

8. Other comments

Does the draft Murrumbidgee Regional Water Strategy address your concerns for water resources in the region?

No

If the objectives of the draft Murrumbidgee Regional Water Strategy were met, what would be the outcome for you?

Realistically, little will have changed.
Water won't be accurately accounted for, therefor won't fllow into waterways, and no one will know, because it can't be measured when that occurs.

Do you have any other comments about the draft Murrumbidgee Regional Water Strategy?

No

9. How did you hear about the Public Exhibition of this strategy?

We are interested to know how you heard about the opportunity to make a submission. Please indicate the communication methods below:

- [ ] Newspaper
- [ ] Radio
- [ ] Department of Planning and Environment website
- [ ] Direct email
- [ ] Social media
- [ ] Have your say NSW Government website
- [ ] Communication from peak body
- [x] Word of mouth
- [ ] Other (select and provide details) _____

10. Additional Information

If you would like to provide any supporting documents to help us understand your feedback, please email these from the same email you provided in this form or attach supporting documents to this form if you are returning your submission by mail.

All submissions on the draft Murrumbidgee Regional Water Strategy will be reviewed following the public exhibition period.

Please email your completed submission and any supporting documents to:

regionalwater.strategies@dpie.nsw.gov.au

CLICK HERE TO EMAIL SUBMISSION

Or post to:

Regional Water Strategies
Department of Planning, Industry and Environment
Locked Bag 5022
Parramatta NSW 2124

Submissions close Sunday 22 May 2022, 11.59pm

Further details on all regional water strategies can be found on our website
www.dpie.nsw.gov.au/regional-water-strategies

Thank you for your submission.

NSW GOVERNMENT

The Murray Darling Basin's waterways.
Reduced inflows.
A review of water yields, Agriculture, Afforestation, and equity in water use.
[redacted]r. November 2009.

Executive Summary

Consecutive Australian Federal Governments have committed support to a multi Billion dollar project to rescue the failing waterways of the Murray Darling Basin (MDB). At the same time they are actively promoting growth in plantation timber within that same basin under the auspices of the 2020 Vision.
It is said that forests and plantations have economic and environmental benefits, but having now reviewed research, some of these claims can be refuted. Agriculture is currently targeted as a major user of water (irrigation and farm dams), but the Forestry Industry feels it would be being unfairly targeted if its water use were to be examined. Why is that the case?
Has poor plantation location lead to decreases in water yields to the detriment of flows in the MDB?

Is or was there a precipitating factor which raised questions for the author?
Yes. The Bago Creek, a high up tributary to the Tarcutta Creek (a major tributary of the Murrumbidgee River) stopped running for over three weeks from the 18th of January 2007, and has also stopped on two more occasions in 2009, each time for a week or more.
There is a significant part of the Bago Creek that has had pine planted on it since c.1976, which is now mature, and harvesting commenced in 2008.
Media coverage arising from the 2007 stoppage of the Bago Creek led to a published response from Richard Stanton, policy manager for Australian Plantation Products and Paper Association, who stated "the drought was to blame for the creek running dry and not the pine plantations."(24)
This response disturbed concerned local residents, as two other creeks in the local vicinity (the Yaven and School Masters Creeks) had been clear-felled of pine in the preceding twelve months and flowed continuously throughout the period the Bago stopped flowing. Anecdotally, these other two creeks are known to be historically much less reliable in terms of continuous flow patterns.
What followed the cessation of the Bago Creek in 2007 was an extensive search for research, information or governmental documentation into water, water yields and other factors, to see if there was existing, recent and relevant scientific evidence and discussion.
Ample research was found to already exist, much of it published during the new millennium, suggesting that the majority of existing large-scale afforestation is not located where it ought to be.

Using research findings also shows that the forestry industry is a much larger user of water than generally quoted (by the industry itself, and others), and that reduced yields are being readily demonstrated by reduced water flows.
The research is derived from such respected bodies as the CSIRO, yet the findings seem to be continually ignored.

It is fact that forestry industry in the form of plantation timber is being actively promoted for both business and climate change reasons. What is being ignored is that promotion of that industry is at the expense of some environmental considerations, and the MDB water flows, because the amounts of water used in growing plantation timber and the resultant water yield reductions appear to be inaccurately quoted on a continuing basis.
Although a complex interlacing of factors affects water yield itself, overall, the purpose of this review is to identify causes for reductions in water yield and water flow to waterways.
Why take such a relatively simple approach to what is obviously a very complex problem? Because rather than ensuring water continues to flow into the waterways of the MDB, the MDB Commission and various other Government Departments' current belief is that the solution to water in the waterways is to save water, somewhere. This, in part, is evidenced by the recent purchase of water allocations by the Federal Government.
The flaw in this thinking is that the water will be there (somewhere), available, to be saved. Water not being allocated is not water saved; it is just water not issued for purchase.
If there is no water, or a reduction in water flowing into the headwaters of the creeks and streams in the upper catchment areas of the Murray Darling Basin, no amount of strategic planning can allow water to be saved!

- **"The Murray-Darling Basin covers 1,061,469 square kilometres", but "almost 86% of the vast 'catchment' area contributes very little or no regular run-off to rivers."[(1)] So only a relatively small proportion of the basin is providing the entire regular basin water flow.**
  The Murray Darling Basin Commission website tells me that the Murrumbidgee and Upper Murray Catchments (13.4% of the basin total area) provide just over 52% of the entire basin flows.
  The significance of any land use change that leads to decreased water yields in this small area thus increases exponentially.
  Land use changes (in the form of conversion from pasture to afforestation) need only occur by around half in this 13.4% part of the entire MDB catchment, to lead to an overall decrease in water flow throughout the entire basin of 26%. A reduction in entire flow of 26% in the MDB cannot be considered insignificant.
  Many industry based and some scientific research or reviews side step yield reductions from sub catchments by describing afforestation on a "whole of catchment" approach, stating that if less

than 20% of the whole catchment is afforested, then water yield effects will be either minimal, or difficult to quantify.
We can now see that since only just over 14% (in area terms) of the MDB catchment provides the entire flows, if we applied the "20% of the whole of catchment" approach to those parts that do provide regular flows, there would be no water flows whatsoever. It would therefore seem inappropriate to apply the "20% of whole of catchment" approach to the MDB.

- **Average reduction of water yield for each hectare of plantation timber is dependent upon Mean Average Rainfall for the area, soil types and other variables, but land covered by trees always has less water yield than would be expected if the same land had been pasture.**

- **It appears that there is a focus on saving water rather than ensuring it enters the waterways.**
  The costs involved in saving water have to be extraordinary to industry and the government, and those costs will inevitably have to be passed on.
  Water prices are presently increasing in dollar value from suppliers.
  A focus on saving water assumes water is in the waterways and can be saved.

Water needs to continue to enter the waterways at the headwaters before one can consider any strategies to "save" it further downstream.
If allowed, water will naturally flow into waterways, for free!
Surely that is a better and more attractive financial option.

Forests and plantations exponentially use more water than the pastures they replace so the higher the Mean Average Rainfall (MAR) area the plantation or forest is in, the greater the reduction in water yields to waterways. More than 50% of current plantations in the MDB are in a MAR region of more than 1000mls/ hectare /year.

- **Current research states dry land salinity control requires plantations in the 600-800mm MAR regions. Only 10% of all plantation timber in the MDB is in the 600-800mm MAR region. This suggests that, at this MAR region, growing commercial timber for environmental control considerations is unattractive. Obviously economic returns are more important than environmental concerns and presumably at this MAR region the time taken to maximise "crop" yields is either too long or perhaps economically unviable.**
  While it may be attractive for plantation growers to achieve better yields by planting in the higher MAR regions, the effect is a greater

reduction in water yields and no or minimal addressing of the existent dry land salinity and water table problems.

- **More recently it seems farm dams are now being considered as a major source of impediment to runoff to waterways.**
  In NSW farmers are currently restricted to a 10% Natural Harvest right.
  A simple analysis by the author of water yields under pasture and an allowance of 10% harvestable right (in NSW) for farm dams shows that farms under pasture still produce higher water yields than plantation forestry in the same region.
  The author has read that the Forestry industry feels it would be being targeted unfairly if certain restrictions were placed on them, or that they pay for water or purchase allocations.

- **At present one major investment engine for timber plantation growth is the Managed Investment Schemes (MIS) (planned to be the only remaining MIS, but recently thwarted in court). "(MIS schemes were introduced by) the Howard Government, in the face of heavy lobbying by the major MIS companies- (the government choosing) to forgo billions of dollars in tax revenues by supporting the extraordinarily generous tax breaks for the MIS industry."[(2)]**
  This being the case, one can surmise that investment in private plantation forestry may be significantly limited if the tax incentives derived under the scheme did not exist.
  In current economic times, the withdrawal of investment dollars in MIS is becoming more evident. The recent collapse of Timber Corp and Great Southern going into the hands of an administrator show that MIS schemes are in trouble, even though the remaining MIS schemes are pushing to distance themselves from being seen to be in the same financial position as these two companies.
  Regardless, the main issue isn't the resultant loss of revenue to the government by tax offsetting and the additional tax burden placed on the rest of the tax paying population. It is instead the fact that the existence of MIS is a promoter of increased reductions in water yields. The retention of water by MIS presently comes at no cost at all to the MIS or investors, but does have a cost to the environment and all other end users. This presents scenarios where certain water users are charged for allocations (eg irrigators and, with the focus on farm dams, perhaps farmers), but others are not. While loopholes such as this exist, those that can usually ensure that they will maximise the reductions in water yields at the expense of all others. That is understandable, from a business sense, as everyone wants to maximise crop yields.
  Put simply, there is no level playing field for all water users.

Can these themes be patched together?
Forests, Pastures, Water Yields, Climate Change, Salinity, Managed Investment Schemes and the Environment.

The author makes no claim to be a scientist, an expert in hydrology, the environment or economics. There is ample research that has been produced in Australia and world wide, that enables some conclusions to be reached about the one issue that seems neglected in some land use changes, that of water. This research is not just a handful of documents, but there are literally hundreds of papers, reports and discussions being had about these topics. Many of the conclusions reached are remarkably similar. There are certainly benefits to be had from planting trees in the correct locations, but it seems some significant warnings being given by many experts about plantings in the wrong location in regards to reduced water yields are ignored at large. Now that fact is showing in the waterways of the MDB.

Background:

Historical clearing of land across Australia is reported to have lead to environmental problems, such as increases in erosion, dry land salinity and loss of habitat for bio diversity.
"Approximately 50 million hectares of woody vegetation have been cleared from the Australian continent since the arrival of Europeans in the late 1700s" (3)
In 2006 it was calculated, that since European settlement, "13% of Australia no longer has any native species and that forests and woodlands have decreased by 8%."(4)

The 2020 Vision:

"The overarching principle of the 'Plantations 2020 Vision' strategy is to enhance regional wealth creation and international competitiveness through a sustainable increase in Australia's plantation resources, based on a notional target of trebling the area of commercial tree crops by 2020." (5)

The 2020 Vision was launched in 1997 after it was recognised in 1992 (due largely to a multi-billion dollar deficit in Australia for timber products) that there might be global market opportunities for the timber industry due to rapidly decreasing timber stocks in the international arena.
Other benefits could be derived from increasing timber plantation stocks. These other benefits were a bonus for justifying the 2020 Vision.
The 2020 Vision has always been about business, "The significant expansion of Australia's plantation estate since 1997 has brought to the forefront a number of matters for the Vision partners to address, including: Social and environmental changes being experienced by communities in areas where plantations have developed rapidly; Maximising the potential economic and environmental benefits of plantations through market development" (5)
This shows that these "benefits" were not initial considerations, but only factors that arose for consideration after the creation of the 2020 Vision.

At a Catchment and Plantation Forum, held by the Murrumbidgee Catchment Management Authority in Wagga Wagga in 2008, Mr David Thompson, National Coordinator for the 2020 Vision, showed a PowerPoint® presentation slide stating "assume plantations intercept 1 ML per hectare."
Is 1ML/hectare a figure quoted as a result of research?
We will revisit 1ML/hectare in context later.

Forestry Coverage and Agricultural Land Coverage:

"Australian native forests are an important component of the Australian landscape, comprising 164 million ha or around 21 per cent of the continent landmass." (6)

"The 2007 update shows that the total area of Australia's plantation estate increased to 1,817,837 hectares in 2006, including 807,437 hectares (44%) of hardwood species and 1,001,147 hectares (55%) of softwood species.
An area of 78,391 hectares of new plantations was reported established in 2006. That area comprised 67,277 hectares of hardwoods and 11,114 hectares of softwoods." (7)

"Plantations have been a part of the landscape in Australia for at least 130 years. The total plantation area reached about 1 million hectares in 1995 and nearly 1.82 million hectares in 2006." (8)

From the above figures, total afforestation coverage by 2006 neared 166 million hectares. This figure equates to 25% (in round figures) of all land in Australia used for either agriculture or forestry.

"Agriculture dominates Australian land use, with approximately 485 million hectares (63%) of Australia under some form of agricultural use. The vast majority (91%) of agricultural land is minimally modified native pasture and a further 8% is improved pastures and cropland. About 2 million hectares is irrigated". (9)

Water Yields, Pastures and Afforestation:

As stated in the executive summary, water yields are reduced per hectare of forest or plantation, when compared to the pastured lands they replace.
Also mentioned in the executive summary is the "20% of the whole of basin" approach in regards to catchment.

What is a catchment?
The CRC for Catchment Hydrology defines a catchment; "A catchment is the area of land 'upslope' of a point on a waterway or stream". Based on this definition the Bago Creek is a catchment in total, but only considered a sub catchment of the MDB. The fact that the Bago Creek has greater than 20% plantation coverage is most likely wholly ignored because of the "20% whole of catchment" approach, as is also likely to be the case for many other headwater creeks and streams.

"Trees use more water than annual crops and intercept more water than pastures "(10)

Research proves that pastures yield more water than eucalypts, and eucalypts yield more water than pine.

Research shows that yield reductions of water under trees compared to pastures can be stated specifically in quantifiable amounts rather than generalisations;
"In an 800 mm rainfall zone conversion from annual pastures to trees results in an average water yield reduction of about 1.5 ML for each hectare planted." (11)

Here we see a figure that is (roughly) equal to the 1ML/hectare quoted from Mr Thompson earlier, however, a further reduction in water yield of 1.5ML/hectare is not the same as assuming plantation intercepts 1 ML/hectare. This finding leads the author to another question: Just how much water does pine plantation actually use to grow?

Most research concentrating on yield reductions caused by timber only state water yields reduced in comparison to pasture, and not the amounts of water also drawn from the water table by timber. This is perhaps one factor that has lead to inaccuracies in calculations about the water used to grow a pine crop, and consequently the figures quoted.
Unlike timber, pastures do not draw water from the water table.

Despite extensive historical land clearing having had other (negative) effects, waterways flows have certainly benefited: "The increased water yields from the Murrumbidgee are almost certainly due to the extensive clearing which has taken place during this century." (12)
If extensive clearing had not historically taken place then it is likely that decreasing flows in the MDB waterways would have become a recognisable issue much earlier. Whilst some of the environmental effects of land clearing have been un-desirable, at least flows of water have been increased due to the practise of land clearing. The flow volumes of these post clearing historical flows also became the basis, in part, for the Allocation Cap.

It is noted that, in a study on mountain ash, there seems to be a time period where water yields from afforestation return to equilibrium, but under modelling did not reach total equilibrium until a period of 100 years elapsed. This period of equilibrium is never going to be reached with plantation pine, as the rotation cycle is between 35 and 40 years.

The Credits and Debits of Afforestation:

Peter Hairsine, of CSIRO Land and Water 2005, states some of the "credits" of afforestation:

- Enhancement of rural economies
- Carbon Sequestration
- Reductions in moderate floods
- Recharge reductions
- Salt load reductions

The "debits" are described as:

- Water Yield reductions (already covered above)
- Low flow reductions
- Stream salinity increases.

An examination of the remaining credits and debits:

Enhancement of rural economies:

Some papers discuss increases in growth, job creation, and population expansion, increases in "farm gate" values and other factors, which might be associated as markers for increasing rural economies. Some papers also suggest that agriculture cannot compete with afforestation in dollar terms, or that in order to do so Agriculture needs to radically rethink management and business strategies.
"According to the National Forestry Inventory (2003) the value of timber in plantation and native forests was $10.6 billion" (13)

However, "The Murray Darling Basin in 2004 produced $10B from agriculture, $3B of which came from irrigation" and "Although irrigated agriculture covers only about 1.4% of the total land area of the Murray Darling Basin, it accounts for around 36% of the total profit generated from agriculture" (14)
These figures show that the financial contribution from agriculture in the MDB alone is roughly on a par with the dollar value of the entire national afforestation assets.
Whilst Irrigators are one group targeted as large volume water users, they do pay for the water they use and make equally important economic contributions to the MDB and Australia as a whole.

Across Australia, "Agriculture was worth $28 billion with $11.9 billion from livestock industries, $11.6 billion from cropping, and $4.1 billion from horticulture (Australian Bureau of Statistics 1999)."(15)

In 2004 the Forest and Wood products Research Development Corporation stated, "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 effects of plantations on other land uses and water resources." (16)

Population increases have already been indicated as one marker of increasing local rural economy. Information from the NSW Premiers Department 2007 shows that Tumut and Tumbarumba, both recognised now as timber towns, have actually decreased their populations in-between 1996 and 2006. This decrease continues: the ABS 2008 figures show "Tumbarumba and Tumut have recorded a decline in population on previous figures."(23)
There certainly has been no population growth. Not even natural increase, despite both these towns being in the midst of 110 000 hectares of the softwood plantations of the South West Slopes region of NSW.

Not everyone agrees that afforestation increases rural economies either, "In addition, this conversion results in the removal of money from local economies. For instance, a study has shown that for every 10 000 ha of dairy farms that were converted to plantations under managed investment schemes, $361 million was removed from local economies over a period of 11 years. (17)

We need to remember that land available for land change uses is a finite resource. Certainly more so since the introduction of the Native Vegetation Act, this has banned wholesale land clearing. Now the only available real estate for plantation purposes is previously cleared land, i.e. farms.
The consequence of a land use change from pasture to afforestation means an increase in asset value for timber, a decreased water yield from that land and also a resultant loss in production values from agriculture. The loss of agriculture in this fashion also often equates to the loss of whole families from local economies.

It seems there is solid argument to suggest that afforestation on some grounds does not enhance any given rural economy to the degree that it is purported. Quite the opposite, some rural economies are obviously declining in the presence of plantation timber. According to statistics, agriculture nationally is worth almost three times as much as the national value of timber.

Carbon sequestration:

It is a given that growing trees act as carbon sinks. Over its life a tree will absorb and retain tonnes of carbon dioxide. Most Australians (sceptic's aside) are now aware that carbon dioxide is a major greenhouse gas, which has contributed significantly to climate change.
So, do the trees and plantations already existing (or proposed to exist under the 2020 Vision) make any impacts on carbon dioxide emissions in Australia?
The "Communiqué from the 2005 Annual Science Meeting" (18) states that, by 2002 "<u>any benefit gained by the plantation of trees and other revisions in land based activities had already been outstripped by the increase in emissions</u> of carbon dioxide from stationary energy (eg electricity production), transport and industry."
This fact clearly shows that the planting of trees as a single method of absorbing carbon dioxide emissions and hence combating climate change simply does not work. This does not mean however that the author wishes to see a landscape devoid of trees, as trees planted in the right locations certainly have other benefits, including aesthetics.

Further reading from the same CRC for Greenhouse Accounting paper leads the author to believe that, according to the CRC, the only acceptable method of dealing with greenhouse emissions in order to reverse climate change effects is that of reducing emissions. This is totally in line with the current Government view on this matter.

It should be remembered that the goal of sustainable timber growth is to provide raw materials for building, paper, wood chips and export. Softwood plantations are planned rotations of (say) 35 years, and portions of the carbon sequestered in the growing period

have to be released when the timber is harvested and processed. The Forestry Industry argues they are carbon neutral when the sum of production and processing versus the carbon released by harvest and processing is considered.
This does not mean that harvesting plantation timber does not release significant portions of the carbon it is supposedly retaining.
It only means that the industry may be carbon neutral.
The author cannot find any information regarding released sequestered carbon during wholesale burning of post harvest refuse prior to replanting preparations. This must be a deficit not shown in the carbon accounting ledger for Forestry industry.
So, we can see that trees are sequestering carbon while growing, but not to the point of combating greenhouse gas emissions, and releasing portions of the sequestered carbon when harvested and processed.

Reductions in moderate floods:

Reductions in moderate floods are seen to be environmental pluses, due to decreased erosion and overall increase in water quality due to lack of nutrient loads "polluting" waterways.
While this may be true, any form of flooding, be it moderate to major, historically would have been, and, sometime in the near future, will hopefully continue to be, naturally occurring, cyclic, seasonal events which provided the lifeblood of the MDB.
At present there is a significant reduction in available water in the MDB waterways, due to short-term decreases in inflows due to drought, increases in afforestation, and the diversion of water for rural and domestic purposes, the balance being required to maintain environmental flows.

Page 20 of "The Business of Saving Water" [16] discusses the present method of Murrumbidgee Basin flow control via dams above the Tumut River and the consequent environmental and ecological effects. In short, the removal of traditional seasonal flows have lead to environmental destruction, that ecological exchange is diminished, and that there is significant stress on billabongs and the habitats they support. Page 22 goes on further to say that extended dry periods in billabongs are leading to red rivergum destruction and water bird population decreases due to loss of breeding sites.
It is quite clear then that moderate flooding is of major environmental and ecological importance to the waterways of the Murrumbidgee River, and hence the entire MDB.
It is also equally clear that the assertion that the controlling of moderate floods by afforestation as a benefit is, in some regards, suspect. We need to allow occasional flooding to preserve the MDB waterways, both ecologically and environmentally.

Recharge reductions:

Page 19 of "The Business of Saving Water" [19] says, "The deficit between groundwater usage and annual recharge has widened during the last decade. This imbalance has resulted in a decline of groundwater pressures by 10-20 metres over large areas between Darlington Point and Hay."

Controlling water tables can lead to dry land salinity problem solutions; however, the water table still needs to exist. Once again, timber may assist in addressing the salinity problem, if suitably located.
Drought and current afforestation are reducing recharge now. Unfortunately it may take 30 to 40 years for problems generated by altering water table heights to appear.
Current research suggests that while the amount of recharge reduction that occurs under forests is thought to be not quantifiable, it is thought that groundwater recharge under trees does not occur until above 1100mm MAR regions.
What is not widely discussed is that not only do trees reduce groundwater recharge, but they also extract water from the table:
"Estimates of annual groundwater extractions by tree plantations could be as much as 500 mm/year +/-10%"(which equates to 5 megalitres per hectare per year), while "ground water use by pastures was zero". (16)

It cannot be a benefit of afforestation if afforestation is not only preventing groundwater recharge but also extracting up to 5 megalitres of groundwater per hectare per year (for free), on top of the decreases in water yield, in a proportion of the basin's catchment.
Lack of water table control at the appropriate scientifically derived location dictates that salinity issues will still occur, just at another location, up to three of four decades later.
Groundwater extractions that occur by growing commercial timber are also presently not allocated, nor incur a cost.

Salt load reductions and stream salinity increases:

Mr Peter Hairsine, CSIRO Land and Water 2005 has exhibited results from a study that prove conversion from pastures to plantations will reduce salt loads, but that those same plantations also reduce water yields. The net effect will therefore to be an increase in stream salinity. As one of the indicators for water quality is waterways salt loading, this increase in stream salinity would indicate a decline in water quality, rather than an improvement.
Further, the increased stream salinity would be noticeable 50 years after afforestation, and approximately 25% of the MDB would be worse off.

According to Forsci 2004, salinity control by trees is best managed in MAR regions of less than 700mm, and not in areas above that.
As stated in the Executive Summary, 90% of plantation timber in the MDB is planted above 800mm MAR areas, and 50% above 1000mm MAR.

Consequently, it can now be shown that afforestation is making waterways salinity worse, indicating decreasing water quality, and the lack of afforestation at the correct MAR location means that dry land salinity is not being combated.

Low flow reductions:
After pasture is converted to forest there is a measurable increase in the amount of days a given waterway will stop flowing due to the water being consumed by the afforestation and the resultant reduction in water yield.

"Days with zero flows increased from nil to over 150 days/year during an average year in four cases out of five."
This figure equates to an increase from 0% to over 40% of no flow days in any given year.
It isn't just low flows that are affected:
"Reductions are typically 50% for high flows and 100% for low flows". (16)
So, are the claims by Mr Stanton that the Bago cessation was solely due to drought well founded?
It seems not, as according to research it is quite possible that the cessation was totally attributable to plantation pine, and that drought may not have been a factor at all.

Water for all, with the same rights?

Australia's Forestry industries appear to be sensitive to what it assumes is criticism when it comes to discussing water use and a user pays system for water consumption. They do not wish to be treated unfairly. This is understandable if water use is identical to another industry, or an industry that Forestry may be replacing.

A simple scenario was developed by the author to compare water yield and quantify water consumption.
As stated previously in the Executive Summary, NSW Farmers are limited to a natural harvestable water right of 10%.

So, as an example, we will set up a very simple scenario in a 1000mm MAR region of two properties side by side in southern NSW. Property 1 is a farm of natural pasture of 400 hectares that was cleared and has no trees, which has a natural harvestable right value of 40 megalitres for farm dams for stock and domestic purposes.
Property 2 is identical in size and land type and was also previously cleared. It can by and large be wholly planted, and is purchased by a managed investment scheme (MIS), which proceeds to plant out the entire property with pinus radiata. We will also assume that this property will not have any dams before or after the land use change.

"No jurisdiction in Australia currently requires a license for land use change that would increase use of water". (20)

Based on the scenario above, please see the following table:

	Property 1	Property 2
MAR	1000mm or 10 megalitres/hectare	1000mm or 10 megalitres/hectare
Access to groundwater without licence or fee	Nil and Pastures will not extract ground water.	Nil, but the trees will extract estimated 5 megalitres/hectare from groundwater = -2000 megalitres for 400 hectares at no cost.

Water Yield to local waterways	350mm or 3.5 megalitres/hectare = +1400 megalitres for 400 hectares	65mm or 0.65 megalitres/hectare = +260 megalitres for 400 hectares
Water in Dams by harvestable right	= -40 megalitres for 400 hectares	Nil
Ground water recharge	250mm or 2.5 megalitres/ hectare = +1000 megalitres for 400 hectares	Nil
Cost	Nil	Nil
Total contribution to waterways in terms of yield and groundwater	+2360 megalitres for 400 hectares	Deficit of 1740 megalitres for 400 hectares
Total Water used in production activity	1640 megalitres for 400 hectares (4.1 Meg/hectare)	5740 megalitres for 400 hectares (14.35 Meg/hectare) = 3.5 times property 1

From this scenario:
Property 1 is a farm that makes a contribution to waterways and groundwater at no cost, despite the water it uses for production and habitation purposes and dams.
Property 2 is an afforestation project which makes a significantly smaller contribution to waterways in terms of run off water yield, but an overall deficit, and despite using 3.5 times more water than property 1, at no cost, requires no license under current land use change legislation. 14.35Meg/hectare (from the table above) is a vastly different figure to the "interception of 1 Meg/hectare" assumed by the 2020 Vision.
Property 2 is also reliant on receiving the MAR every year, or its contribution to waterways in terms of yield will disappear entirely, but annual rainfall would need to drop to around 600mm for yield to decrease to nil for Property 1.

Based on the simple scenario above, it is hard to understand that Forestry industries maintain that they would be being treated unfairly if they were charged for (some) water when they use 3.5 times much water as pastured land for nothing. Perhaps the real issue is that the industry would become economically unviable if water had to be paid for, or that allocations would not be available for purchase to cover these amounts of water.
There are some that believe that Forestry industries should pay as water users:
"He (Federal Agriculture Minister Peter McGauran) wants to see plantation owner's charged for the water they use" [(19)] and "it is surprising that no regulatory framework exists to control the water resource pressures that are exerted by plantation forestry (as there is for farm dams in some States)." [(20)]

The inequity in terms of water use and a user pays system becomes more apparent if property 2 was instead not purchased for plantation purposes, but instead by a person who set out to have an irrigated venture (say, horticulture). That person would be required to license water retention structures (i.e. dams) that stored (i.e. use) 3.5 times as

much water as the pastured property next door, and that license would have a cost attached to it.
Similarly, if a farmer was to sink a bore to extract groundwater to the value of 2000 megalitres, the application may not be granted, or granted on the grounds that he/she purchased 2000 ML of entitlements from other persons. It certainly wouldn't be free.

To be realistic, many plantation projects tend not to be as small as 400 hectares either, so a multiplier effect in any given region becomes applicable.

Farm Dams:

"The vast majority of farm dams are small dams (<5 ML) for watering stock and domestic purposes. Despite their large number, typically slightly more than two per km2, they account for only 40% of the total volume" [11] (of all dams).
In the report to the Murray Darling Basin Commission entitled "Risks to Shared Water Resources Overview of Statutory Frameworks", it is stated: "Only 'farm dams' have been nominated as a key process."
Further: "This report does not consider dams without a catchment (turkey nest dams), nor dams or other structures built for flood mitigation, nor dams for public water supply."
Also in this report it is stated that the National Water Initiative considers farm dams to be 'land use change activity'. As "No jurisdiction in Australia currently requires a license for land use change that would increase use of water" [20] farms dams should not be considered. If land use change and water use is an issue, the forestry industry should also be in-line to be thoroughly investigated as a major user of water. It has already been established that MIS plantations are presently exempt from water calculations based on land use change, so why not the same for farm dams?

60% of stored/captured water in the MDB is ignored in reporting or qualification, but it is (the minority 40%) farm dams that are considered major users of water. Based on this premise it appears farm dams have been singled out as users of water in terms of total dam storage.
In line with the Forestry industry argument, one asks why farmers and farm dams are being unfairly considered.
In some States in Australia, active frameworks already exist for controlling water resource pressures from farm dams (for example the 10% harvestable right in NSW).
Yet "it is surprising that no regulatory framework exists to control the water resource pressures that are exerted by plantation forestry (as there is for farm dams in some States)." [21]

There also seems to be some issue quantifying the volume of water stored in Farm dams across Australia, and that such analysis needs to be undertaken (presumably again at significant cost) before decisions can be made about the management of that water.
Yet captured water is already quantified: "The CRC for Irrigation Futures has estimated that there are 22,000 farms across Australia with dams of varying sizes. The surface area of the dams is around 278,000 hectares, holding some 12,500,000 megalitres of water when full. [22]

One has to say it has been quite some time since all those dams have been full!

It seems not too long ago that there was a seemingly mandatory goal for farms to become "drought proof". One of the requirements for a farm to become drought proof was the construction of farm dams to maintain self-reliance, rather than historical reliance on rainfall and in some cases, local waterways.
Never was this issue more prevalent than the last 8 odd years, yet despite continued drought farmers and farms now find themselves a targeted group for doing the very thing they were asked (and paid the cost) to do.

Another (largely neglected) consideration for the existence of farm dams is highlighted every bush fire season.
With diminishing waterway flows, it is often now only farm dams that become the source for one of the most valuable assets in fighting bush fires- water.
Fire fighting requires rapid regular draughting of quality water, preferably from larger dams for both tankers and aircraft, so a reasonable number of larger farm dams on every farm should be firstly encouraged to be built and also be ignored on the water "ledger".
No farmer should be penalised in any fashion for having such dams, as recent events over the past 12 months in Victoria have proved conclusively, and reminded us yet again, that fire will burn a lot of country and kill a lot of people in a very short period of time.

Conclusions:

- There is not as much water entering the MDB waterways as there could be. One reason includes afforestation in inappropriate locations.
- If the water isn't in the waterways, then any strategies to save water automatically become redundant.
- One current cause is drought. Drought is a common occurrence in Australia, but is generally a cyclic (multi) seasonal event that comes and goes. Drought effects are unlikely to always be a cause of reduced water yields to the MDB.
- Another cause is land use change that does not require any recognition of water use in terms of licensing. Land use changes are likely to be persistent in terms of yield reduction. Due to the 2020 Vision, it is likely that afforestation will continue to expand and water yields will be reduced further.
- Inequities for various water users and associated costs do exist.
- In terms of the problems generated by Australia's historical agricultural practices (mainly dry land salinity and rising water tables), plantations are not being planted in the places that they are best suited to control those problems. 90% of plantations in the MDB are above a MAR region that has been shown to be of benefit in reducing dry land salinity via management of water tables.
- When comparing the value of agriculture to afforestation it can be seen that agriculture is actually of almost equal value (in the MDB alone) to the entire national value of afforestation. Agriculture is about 3 times more valuable nationally than afforestation. Yet it is afforestation that is being promoted (at the expense of agriculture).
- Each of the 5 "benefits" of afforestation discussed appears arguable.

- The “debits” of afforestation, particularly in terms of reduced water yields, seem to be largely ignored, yet the Federal Government is now throwing billions of dollars to attempt to solve water issues in the MDB.
- Better, coordinated afforestation planning could put some water into the waterways for free. Then strategies to implement water saving could be assessed, planned and implemented.
- There is strong evidence that plantation location is poorly planned, as 90% of all plantations have been established in locations that contradict research.
- Farm Dams are a necessity for drought proofing, stock, and fire fighting purposes. The existence of, and on-going expansion of, large-scale afforestation projects also increases the risk of major fire and this cost has also been seemingly ignored.

“How much water does pine take to grow?” We can now say, that based on available research findings, at 1000 MAR, plantation pine uses 14.35 Meg/hectare to grow. This figure is vastly different to the assumption that pine intercepts 1 Meg/hectare. At areas above 1000mm MAR, the amount of yield reduction increases, as does the amount of water used.

Losing agricultural lands to increasing plantations has not only lead to yield reduction in the waterways of the MDB, it has also lead to decreases in the water available for allocation further downstream. This gives agriculture a “double whammy”, the loss of agricultural revenue at the plantation site and diminished revenue generation in the irrigation districts.

Given these findings, it appears from the outset that the issue of water yields and afforestation are mutually exclusive when it comes to the waterways of the Murray Darling Basin, at least in the current areas of planting.
In addressing the particular issues of dry-land salinity, water tables, and maintaining MDB waterway flows, a federally based ban should be imposed on the existence of new plantations in higher than 800mm MAR rainfall regions, and replanting of harvested plantations in the areas above 800mm MAR be prevented. Authorative planning also needs to be implemented to ensure plantations are located in the target MAR regions so that they can actually produce the desired benefits.

These factors suggest it is not community, environment or rural economy concerns that are really driving the plantation industry at all, but investment opportunities, taxation advantages, profit and business in general.
It certainly does not seem to be about water flows in the MDB.
Finally, the existence of farm dams is not the drain on water resources that some would make it out to be. A good proportion of the MDB is in NSW and with a 10% limit on water natural harvest right, there is still quite sufficient water yields being made to the MDB waterways from farms, as has been proven. Farm dams are also a necessity for bush fire fighting.
We need our State and Federal Governments to take this information on board, and run with it, with the same vigour that has been given to the climate change issue, the stolen generation and a myriad of other issues. The waterways of the MDB demand it, and

allowing water to enter for free is a much simpler, cost effective solution to the problem. Then, and only then, can strategies be developed to start saving water…
We need all those Departments, Catchment Management Authorities, Councils and anyone else who may have a more local say about factors solving ecological and environmental issues to step in and be proactive in implementing sound policy.
If we don't, then the MDB waterways will surely fail.
Already reduced water yields will be reduced further if new plantation timber is part of the plan for the proposed Carbon Emissions Trading Scheme.

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