Senate Inquiry: The management of the Murray-Darling Basin

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First we would like to congratulate the Australian government (past and present) and the Murray Darling Basin Authority with the recent Guide to the Murray Darling Basin plan, which is a bold move to manage a major resource from a triple bottom line perspective. This is a major step in natural resource management in Australia despite possible difficulties in deciding the right level of environmental flows in the Basin. It is very important that there is a overarching plan for the management of the MDB and that this plan is continually updated.

In relation to the management of the Murray Darling Basin and the currently released Guide to the Murray Darling Basin Plan, our submission wants to raise 3 main points. Given our background in Agriculture and Hydrology and Catchment Management, the main focus will be on Agriculture, the Environment and Water. The points we would like to raise are:

1. There is no clearly articulated long term vision on the Murray Darling Basin (MDB) within Australia. How do we, as a society, see its future role in a social, environmental, economical sense?
2. How do we balance variability versus reliability in relation to the environment and agricultural production?
3. How can we improve on the current best research possible in relation to the environment, agriculture and water in the Basin?

In November 2008, we made a submission to the Senate inquiry into the implications for long term sustainable management of the Murray Darling Basin (Senate, 2009). Some of the comments that we raised in that inquiry still apply, such as our focus on resilience and forecasting.

1. The need for a long term vision for the MDB

Apart from national park lands, we believe that there is no long term plan for the future of the MDB. Australia has not yet had a structured discussion on what the balance of nature and human activities should be in the MDB taking into account socio economic objectives for rural Australia. The guide to the MDB plan is approaching this from a water management perspective and maintaining long term health of the Basin, but this view is actually too narrow. This Senate inquiry is a start to developing such a vision. Several politicians have made statements about “maintaining the productive base”, but even this is too narrow as production could also be “fly in fly out” mining.

What is missing is a national vision for the next 50 – 100 years for the MDB that combines

- population strategies (where do we want people to live and how many of them);
- social (how large should towns be?) and economic objectives (how are people going to make a living);

- long term views of national productivity (where are our most important production areas); and
- the environment (how much environment do we want to sustain and how much are we willing to change or maintain for the above objectives).

Based on such a long-term plan, it will be easier to decide how much water has to be set aside for the environment and how much for human needs and how we compensate winners and losers. It means we can be proactive in our approach to managing the MDB. The current guide and government policy is reactive, rather than proactive. It responds to international requirements and internal demands. This has resulted in a plan that is not based on a developed and accepted long term vision and hence the plan will never achieve a majority agreement.

In summary, we recommend that a key outcome of the Murray Darling Basin Plan is clear land use zoning. This will be in-line with the environmental and social goals based on scientific, economic and social analysis.

2. Variability versus reliability

The Australian climate is characterised by very high variability. The Australian environment has evolved into highly specialised flora and fauna to cope with these conditions. In contrast, agriculture strives for reliability as consistency in food and fibre production is necessary for our survival and more recently for economic performance. A similar requirement is true for all human water management, whether managing for floods or for water supply for large population centres. Regrettably, the variability in the climate makes agriculture and water management in Australia extremely challenging which is highlighted by the extended droughts between 2000 and 2009, and the immediately following floods in Eastern Australia in 2010. This results in significant costs to society.

Irrigation and dams are the prime example of how humans have attempted to conquer the variability to achieve reliability. This however comes at a cost to the highly adapted environment. It requires variability to survive and suffers under the conditions that achieve reliability for humans. This appears an unsolvable puzzle as was highlighted in the recent article by Paul Myers in the Sydney Morning Herald (Myers, 2010): "As basic as it might seem, there isn't even consensus between the two sides of the water debate about how the basin's rivers actually work."

The recently released Guide again appears to adopt a paradigm of water security. However, it is this paradigm that has lead to over allocation in the past.

The fact that the reductions that have been announce are single values rather than a distribution of values for different climatic conditions highlights this variability is still not acknowledged. What is needed is a system that adjust the flow allocation for the environment in the system in response to the overall water in the system (Figure 1). The current licence allocation system already includes an adjustment for dry and wet years and allocates less water to licence holders depending on the year. Rather than developing the environment as a licence holder, why can the allocation per licence system not be used to allocate water to the environment?

In the end, it seems that there is also a real issue with communication. Creating an environmental licence with 3000 GL brings a message that this will be extracted every year.

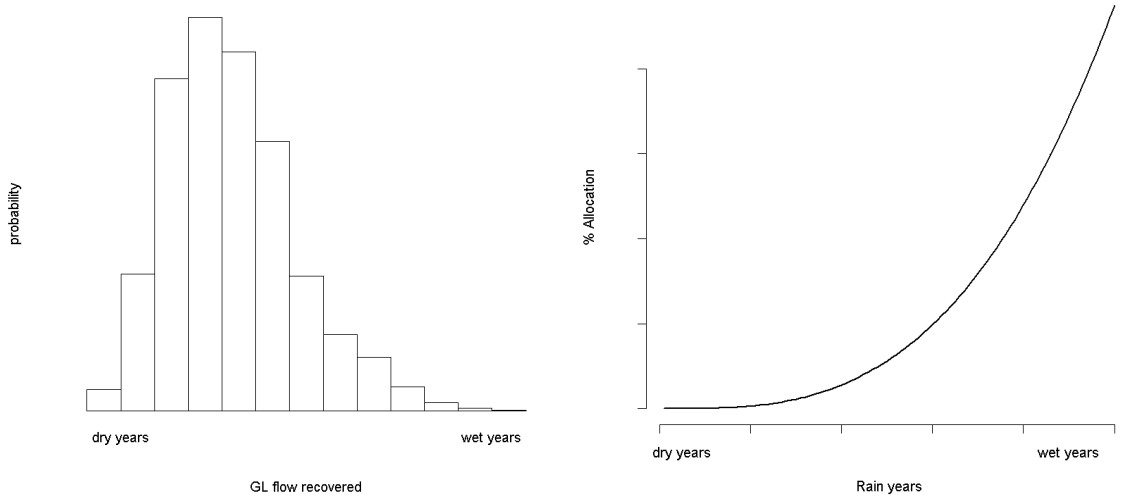

Figure 1 Example plots of the probability of recovered flows in the Basin relative to dry and wet years with an approximate 3000 GL median (left hand plot). Development of the % allocation of environmental flow in dry and wet years (right hand plot).

Including an adjustable environmental allocation within each of the extraction licences might be a better way of dealing with environmental water than developing an "environmental licence holder". This does mean there is less direct compensation to the licence holders, but it is better in terms of equity. Tradeable licences will still achieve a shift towards more efficient production systems.

If the majority of society wishes to preserve the environment, the challenge for agriculture and water management is to develop systems that can deal with variability without requiring reliability. We have argued before (Senate, 2009) that a key element for this is reliable forecasting systems from climate to crop emergence and pest pressure and everything in between. Resilient systems are adaptive and can cope with a wide range of conditions. However, resilient systems in productive agriculture can only exist with sufficient forward knowledge and sufficient elasticity. Elasticity is currently limited by the lack of profitable cropping options. Widening the crop portfolio can be guided with government policy. The recent stimulus for biofuels is an example of this.

Current forecasting systems mainly focus on weather and climate and have been fairly rigid for the last 20 years. Only recently, with the introduction of sufficient computing power has there been new development at the Bureau of Meteorology in this area (the POAMA model).

In summary, we recommend that an outcome of the basin plan be that we do not refer to a specific volume of flow being returned to the MDB, but rather we are going to increase the probability of certain flow events occurring and this can be achieved via an variable environmental allocation in each licence. Furthermore, we recommend that an outcome of the plan should be increased investment in the improvement long term forecasts of rainfall and streamflow and developing flexibility in agricultural systems through more cropping options.

3. **How can we improve on the current best research possible in relation to the environment, agriculture and water in the Basin?**

There has been a real attempt to include the best possible current research in the Guide to the Murray Darling Basin Plan and this will likely be the same for the actual plan. However, this also highlights the glaring lack of detailed and good research in the MDB that could support such a plan. The plan and the Guide are plagued by high uncertainties, lack of data and simplistic methodologies leading to questions about the validity of the plan.

There are several problems with research in the MDB and lack of long term funding for monitoring and data collection is only one of these problems.

Lack of innovation in soil physics and irrigation engineering technology.
Within the area of monitoring soil water and precision irrigation there are currently very few real new technological solutions. While there is renewal in the application of existing technologies, the fundamental underlying technology has not really changed since about 1990 with the introduction of time domain reflectometry. The phasing out of neutron probe technology due to the very stringent OH&S requirements has in fact decreased the number of options available. As a result monitoring water use efficiency is costly and difficult especially on large broad acre fields.

This is further exacerbated by the limited possibilities for irrigating large areas. Most irrigation technology and new technology is developed for the small scale high value end of the irrigation market (horticulture) with only limited options for broad acre agriculture. Most water saving technologies are therefore too expensive or too impractical to implement and as a result there are limited options for increased water use efficiency in this area.

As a result, increased water use efficiency can be best achieved with careful management of existing technology, but this hinges on good forward knowledge of climate and crop production.

Too much focus on describing the current state
Much of the past and current ecological research in the MDB focuses on description of the current state, often highlighting the deteriorating or degraded state these ecological assets (which in itself is a valuable research contribution). However, in terms of managing the MDB into the future a key need is research focussed on how the agricultural and ecological assets will develop into the future and how they interact. For this we need to be able to disentangle human impacts from other impacts on the river system (comparable to the IPCC climate research), and be able to understand the true dynamics in the system in relation to the variability. So far there has been few attempts to do this.

A key concern is that while there has been sufficient research about the current state of the Basin, there has been little research in whether we can actually move the system to a different (presumably healthier) state. We do not know if the current trend can be reversed. Maybe we are fighting a losing battle with the Basin already in a different stable state.

This means that in the research, again, there is not enough focus on what we want the MDB to look like in the future and how we will interact with it. This requires more than research, this requires the

philosophical debate that we have eluded too above. Rather than circumnavigate we need to tackle issues directly and transparently.

Our Vision for the Basin

Finally we would like to offer our vision for the Basin. We acknowledge that this is not the only vision and that the final vision will be the outcome of a national debate.

The future of the Basin needs to combine resilient agricultural landscapes combined with ecological assets. The steps to a future sustainable Basin need to be (in order):

- Identify areas of national and prime ecological significance and zone these areas to be "Natural landscapes". Within these areas ecological assets are the priority and we should limit or phase out agricultural activities that are detrimental. Integrated agricultural activities that also focus on environmental services could still play a role in these areas. Irrigation would be rare as all water is needed to maintain the natural environment.

- Identify prime (good) farming locations and zone these areas to be "Managed agricultural landscapes". Within these landscapes we should still strive for sustainable agriculture and intersperse agriculture and environmental assets. However we acknowledge that these areas provide important agricultural productivity and have national importance. These areas should be supported with irrigation water where needed.

- Identify urban, industrial and rural centres and zone these areas to be urban landscape. Within these landscapes maintenance of ecological assets will be the most difficult but not impossible. Urban and industrial water needs will have to be balanced against agricultural water needs in the earlier point.

Note that all three areas are integrated with natural assets but within the bottom two, nature is strictly managed, while in the top category nature is not managed beyond what the National Parks do today.

References

Myers, P. (2010) War over water will produce no winners. Sydney Morning Herald. 4 December 2010.

Senate (2009) Implications for the long-term sustainable management of the Murray Darling Basin system. Rural and Regional Affairs and Transport Reference committee. June 2009.