Submission to a Senate inquiry into the implications for the long-term sustainable management of the Murray Darling Basin system

Dr. Willem Vervoort and Mr. Floris van Ogtrop
Hydrology Research Laboratory,
Faculty of Agriculture, Food and Natural Resources, University of Sydney

We are best informed about (b) – (d) and (g) in the terms of reference, and this submission will mainly address those points.

Summary

- The focus of water management in the MDB should be: *Living with variability: adopting a resilient approach*;
- *Forecasting* of water resources will be the key to better future management.;.
- *Water reform* needs to be accompanied by *socio economic reform*;
- Climate change and variability is not the only impact to consider on future water resources. Changes in *farm management* and *climatic feedback* will also impact water resources;
- There is no free water: *all water extraction will impact* the environment; and
- Nature conservation should take into account the *natural direction of change*.

Production, Environment or both?

Future sustainable management of the Murray Darling Basin is about balancing environment and agricultural production. From the past and the continuing emerging evidence, there are some clear choices that have to be made. Agricultural production (including irrigation) is essential for food security, can be profitable, has great export potential and has many beneficial socio-economic flow-on effects in rural communities. However, current scientific evidence suggests that the resulting impact on the environment can be negative and severe. Regrettably all human activities and use of water will have some impact on the environment. Some of these impacts are small, but in total they can be large. The question about the future management of the Murray Darling Basin therefore really is: *How much environment are we willing to change for the benefits of Agricultural production* or *How much rural socio-economic development and national income are we willing to forego in order to sustain natural ecosystems*? These are society decisions, for which we as scientists can only calculate both sides of the coin. The current market based system of water management addresses this issue of choice between environment and production, but does not address the issue of flow-on effects in rural Australia. While capital is mobile, human capital in many rural towns is less so. Simply “buying up water” will therefore have devastating socio-economic effects and these need to be accounted for by government.

Management of the basin

Both State governments and Federal government are equally equipped to make management decisions in the Basin. We firmly believe in a holistic management

approach that eliminates State borders but maintains local knowledge and management input. A continuum of management decisions from the federal to the local level, supported by University and government research, is the only solution. Furthermore, removing Universities from the research (i.e. utilising only CSIRO and the Bureau of Meteorology) will stifle risk taking in research and therefore invention.

Because society chooses between environment and human uses, a key recognition has to be that the Murray Darling Basin (MDB) is a human managed system. All water flows within the MDB are in some way impacted by extraction and regulation to benefit human uses. Therefore the Basin could never return to a "natural state" unless we remove all humans. All we can do is minimise the overall impacts to make sure that regions were we consent to change can sustain and maintain human activities long into the future.

What is the current direction of natural environmental change?

Management of iconic sites and RAMSAR wetlands requires understanding of the changes that are occurring at those sites. Because the Basin, its natural stocks and the environment are influenced by long term variations in climate, it is not a static system. The Basin is therefore slowly evolving in its own direction as a consequence of past wet and dry periods and changes in the global climate (i.e. Jolly et al. 2001). There have been few attempts to recognise these dynamics and to be able to separate this natural change from the impact of humans. Decisions about RAMSAR wetlands, and their environmental water needs, need to recognise both the *natural change* and the *human impact*. Otherwise we might try to maintain a wetland in a state that is impossible due to climate variation and change. In addition, we may actually wish to artificially develop a wetland to compensate for others that were lost due to land use changes, but this would then have to be able to follow natural change.

Long term impacts of humans and climate

There are several contrasting human activities that affect the flow volumes in the Basin. Land clearing has been shown to reduce precipitation and increase temperature (and thus evaporation) and this would reduce flow volumes (McAlpine et al. 2007). This is called atmospheric feedback. Better farm management leading to an increase in carbon, organic matter and soil cover will also reduce future runoff (see the comments from NSW farmer of the year Mr Nigel Kerin on ABC's Landline program). In contrast, a decrease in soil carbon and cover over the last 100 years of farming has probably increased runoff and flow volumes from "natural levels". Increased tree plantations and planting to combat salinity could also decrease flow volumes (Herron et al. 2002), but the other side of the McAlpine study is that this increase in vegetation would also increase precipitation and decrease evaporation through atmospheric feedback, and thus increase flow volumes. Climate variability and possible change might add to further uncertainty about future flows. Current CSIRO predictions indicate an increase in the variability of the rainfall and reduction in flows. However these predictions of future flows in the MDB do not take into account improvements in *farm management* and *atmospheric feedback*.

Managing for resilience and the value of predictions

In the past the answer to variability in climate has come from the engineering field. Dam building and water storage is seen as a way to smooth out the extremes in the Australian climate. This approach is sometimes called the robust approach. It appears to offer security, but the problem is that, if the system fails (such as in a prolonged drought), it fails spectacularly. It therefore offers only a false sense of security to investors and hence an unnatural development of access to water. For the future of Murray Darling Basin and Australian water management this is not the best approach. In contrast, what we should strive for is a *resilient* approach to management. Resilient management hinges on adapting to the variation rather than fighting it. Such adaption will of course give more opportunities for nature development as dams will play a lesser role in a resilient management approach.

Resilient management requires a stronger focus on two aspects: *adaptability* of the farming systems and *forecasting* of water resources.

More adaptable farming systems should be focussed on annual plantings rather than perennial planting. Perennial planting can remain, but only those plantings that can survive without irrigation, and subsequently prosper with irrigation. Further recognition of efficient farming practices which utilise resilient approaches is needed. And it is essential to further extend this knowledge. This also requires the encouragement of a mobile rural workforce and a distribution of private and public funds which supports and maintains rural centres in less than optimal times.

The other major component of resilient management is better forecasts of water resources and weather. Currently, seasonal forecasts from the Bureau of Meteorology cover only rainfall and temperature and are a maximum of 3 months ahead. Agricultural and environmental management needs at least 6 month (growing season) and preferably 12 month forecasts and for a range of variables: rainfall and temperature (both maximum and minimum) stream flow, humidity, soil moisture etc. These forecasts don't need to be perfect and can be updated along the way. However, forecasts are the key to making management decisions and to plan for the future.

Willem Vervoort and Floris van Ogtrop

18 November 2008

References

Herron N, Davis R, Jones R (2002) The effects of large-scale afforestation and climate change on water allocation in the Macquarie River catchment, NSW, Australia. *Journal of Environmental Management* **65**, 369-381.

Jolly ID, Williamson DR, *et al.* (2001) Historical stream salinity trends and catchment salt balances in the Murray-Darling Basin, Australia. *Marine and Freshwater Research* **52**, 53-63.

McAlpine CA, Syktus J, Deo RC, Lawrence PJ, McGowan HA, Watterson IG, Phinn SR (2007) Modelling the impact of historical land cover change on Australia's regional climate. *Geophysical Research Letters* **34**, L22711.