



Private Submission to the Murray Darling Water Inquiry

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Thank you for giving me the opportunity to make a submission to the Standing Committee on Regional Australia on *the Impact of the Murray-Darling Basin Plan in Regional Australia*.

I make my submission as a private citizen. I am not a farmer, although family members have been; I am not an economist, although I have studied economics; I am not an agricultural scientist, although I did study a number of disciplines during my tertiary education. I have worked as a project manager, a business analyst, and a strategic planner. Some aspects of this crisis seem straightforward and obvious to me, so I hope that you will indulge me for saying them if they are obvious to you also.

Firstly, in water we are talking about a scarce resource, where there is contention about how much it should cost, who should get to have how much of it, and for what purpose they can use it.

Water as a Limited Resource

Australia's use of irrigation water has been about expanding food and fibre production in areas of water shortage and about drought-proofing agricultural land, where the annual or seasonal rainfall is variable. No resource is unlimited, whether it is productive land, water, fuel, or labour, but for years we have carried on as if all of these things are; if we need more, then we can get it. In considering our water future, we need to identify where there are limits and what ill-effects occur as we reach them.

Our use of water is not just that which falls on the land as rain, some of which flows down creeks and rivers, but also the 'fossil water' drawn from artesian sources. It is obvious that we are using more than we used to of each source of water. Rivers are running dry during periods of drought and aquifer levels are getting lower. With climate change looking like cutting rainfall in the South East of Australia, we certainly need to look at making the best of what we have.

The Commonwealth Water Act describes how environmentally sustainable levels of water extraction should be determined. It states that this analysis and decisions must be based on scientific analysis - not based on how much water is needed to perpetuate business-as-usual activities in the Basin.

Social and economic considerations are an integral part of deciding *how* to deliver the scientifically determined environmentally sustainable level of extraction. They are also paramount in working out the nature and scope of transitional assistance for irrigation communities that will be necessary to achieve the optimal outcomes for all – consumptive users and environment alike.

Crop Choice and Production Methods

In the industrial sector, increased water prices can lead to investment in water recycling and conservation technology. That is, making efficient use of the scarce resource. In looking at agriculture, how do we measure efficiency? Is it measured in quantity of crop or dollar value and is it quantified as:

- Output per hectare
- Output per animal (eg milk production)
- Output per cost (all costs of all inputs- water, fertilizer, herbicides, pesticides, etc - Sustainable?)
- Output per quantity of water used?

Farmers might need to change crops to get better value from the scarce water that is available. Similarly, they might have to look to changing production methods and techniques to get better results.

Perhaps we should look at how much 'embedded water' there is in certain products (eg high levels of water are needed to produce cotton and rice). This might give us some idea of what crops we should be growing, if the price of water were to be raised to:

- control its rate of use;
- restore the river environment; and to
- encourage more efficient and added-value water use.

The Concept of Prioritising Use by Value-added

I would contend that in using a scarce resource, we should take into account the 'value-add' of its proposed use. I would suggest that for too long water has been too cheap. In the major cities we are now prepared to pay \$3.00 per 1,000 litres to desalinate water from the sea. This is because, at this price, we can continue to operate our industry and provide domestic water for the people working in the service industries.

In looking at agricultural production, a focus on value-add would suggest that fruit and vegetables are a better return on the 'embedded' water than cotton, rice, or grass for dairy cattle. Likewise, the practice of feeding grain to cattle, to put on the last bit of 'condition' to ready them for market, is wasteful of the embodied water in the grain.

I would like to draw your attention to an article on the cost and value of irrigated agriculture in Pakistan by Muhammad Ashfaq, Saima Jabeen, and Irfan Ahmad Baig (entitled "Estimation of the Economic Value of Irrigation Water"). Reference - http://www.fspublishers.org/jass/past-issues/JASSVOL_1_NO_3/16.pdf, accessed 18 Nov 2010. The authors reported on a study on the economic returns from irrigating different crops in Pakistan. They concluded that vegetables, specifically potatoes and onions, could deliver 10-20x the economic value per acre for the irrigation water used than if it was to grow rice or sunflowers.

I read a similar article written some years ago, now lost to the Internet, by a Turkish economist who was explaining that Turkish people thought they were exporting fruit and vegetables to the Gulf States. In fact, he asserted, they are exporting the embodied water that those states could not afford to produce from their scarce resources and expensive desalination plants to grow the crops themselves.

Likewise, Daniel Zimmer and Daniel Renault wrote about "Virtual Water In Food Production And Global Trade - Review Of Methodological Issues And Preliminary Results" Reference http://www.fao.org/nr/water/docs/VirtualWater_article_DZDR.pdf, accessed 18 Nov 2010. They considered that food exports were really the export of the water embodied in that food. They concluded that (in 2000) virtual water "accounts for one fourth of the global water budget for food, and it is likely that this ratio will increase in the future". They identified that meat and animal products account for about half of the virtual traded water in the world.

I would suggest that in a drought-prone country, such as Australia, it is strange that we aspire to export so much of our water to other countries. This water, which was mostly embodied in meat and dairy products, was not so much used in Australia as water for animals to drink, but in the food that they ate and in the later processing of the products.

Value-add and the Price of Water

The belief that water is owned by the first person who sees it allows it to be captured as it flows down the rivers. Those upstream have first call on it and those downstream get whatever is left over and in the quality that the upstream users have left it. This also means that water is cheapest upstream, free in some cases, and more scarce and dearer lower down. This can mean that there is low value-add upstream (eg cotton or rice) and higher value-add downstream. I know that it irks some in the country to hear this, but some downstream users would have a better use for the water and some of these are not agricultural uses, eg industry or even residential use for those working in service industries.

If we said that the nation ‘owns’ the water, then a better return on investment overall could be made. The approach then is that those who can afford to pay a higher price are they whose value-add is higher.

I am pleased to see that the price of water has risen in recent years to be consistent with its scarcity. It was only \$1.40 a ML in parts of Victoria just 8 years ago (Reference: a conversation I had with John Lovering of Southern Rural Water at the conference on ‘Who Protects our Rivers’ in Melbourne on 6 December 2002).

I believe that the debate about the right price for agricultural water is now largely over. Some users can add better value through specific products and others are prepared to sell rights that are not of sufficient value to them. Some argue that, as agriculture is an export industry, then we must subsidise it by charging an artificially low price for irrigation water, or in some other way. They also say that we would have to pay more for food, if water costs more. This argument ignores that ‘subsidies’ (in cash or in a degraded environment) have to be ‘paid for’ by someone.

The other argument says that such low rural prices for water encourage a higher use of water for irrigated agriculture. This is at a time when water has been scarce through the long drought and likely to remain scarce permanently, through climate change. A scarce resource needs good management that allocates to its competing uses fairly and sustainably. It should not base its allocation on an approach that has not worked in the past.

Over-exploited Rivers and Algal Blooms

Can one person’s use of a resource be allowed to harm another’s use ? This happens in any economic system and we say that the market sets prices to match supply and demand for the resource and if one person’s use cannot be justified due to the high price of inputs, then that use should not continue. In the case of algal blooms, a excessive use upstream can cause not just economic harm (by denying the access to water downstream), but can be life threatening and have an impact beyond the immediate in terms of towns downstream unable to exist.

River managers (eg Murray Darling Basin Commission and Murray Darling Basin Authority) have accepted this as a “natural phenomenon”, but one which they can seek to control:

“During very low flow periods, blooms are probably getting more intense and possibly becoming more frequent. The regulation of the River Murray system ensures that the river continues to flow through most summers when blooms would have been most likely. However during severe droughts, the reduction or cessation of river flow, combined with the additional nutrients now present from eroded soils and waste discharges, means intense blooms are more likely.” Ref Murray Darling Basin Commission.” (Ref - http://www2.mdbc.gov.au/nrm/water_issues/water_quality/blue-green_algae_in_the_river_murray.html , Referenced 18 Nov 2010)

“During very low flow periods, blooms are probably getting more intense and possibly becoming more frequent. The regulation of the River Murray system ensures that the river continues to flow through most summers when blooms would have been most likely. However prolonged dry periods with reduced flows, combined with the additional nutrients now present from eroded soils and waste discharges, means intense blooms are more likely.” (Ref - <http://www.mdba.gov.au/water/blue-green-algae> , Referenced 18 Nov 2010.

I would contend that over-exploitation of water, compounded by droughts, risks more frequent and more devastating algal blooms. In such situations, towns downstream have no potable water for drinking and hygiene - this means the death of communities.

Beyond the Economists’ Value-add and Putting a Price on Externalities

If we look at value-add, rivers are not just open conduits for transporting irrigation water. They provide valuable environmental and community services (which are not always counted by economists, as they are externalities). The environment is often left out of considerations surrounding the allocation of water as its benefits are not quantified and its allocation is left to the last, with what is ‘left over’. I know that this is changing.

Much in life is only valued by economists if they can put a price on it. That is, if someone will pay in cash to have it. If a thing is an externality that no one *in the system* makes a direct payment for, then it is not valued, as there is not price/value on it. Some of the value in rivers and wetlands, not usually accounted for, include:

- Flood mitigation
- Erosion prevention
- Water storage and groundwater recharge
- Water quality – reduction in salinity, turbidity, algae, nutrients, removal of wastes and contaminants
- Carbon storage
- Biodiversity
- Refuge and breeding area for birds involved in ‘pest-control’ (think of the current locust plague)
- Firewood
- Honey production
- Recreation
- Cultural heritage
- Fishing - food harvesting

Some of this is mentioned in the National Water Commission’s page -

<http://www.nwc.gov.au/www/html/220-rivers--wetlands.asp>, accessed 18 Nov 2010

For some of these ‘services’, if nature did not provide them for free, then we would have to build the infrastructure and operate it ourselves. If we did not provide them, eg flood mitigation and control, then we would experience ‘natural’ disasters from time to time. Property owners, local government and insurance companies would pay for the consequences of them.

The Australian Conservation Foundation undertook a Study into the Economic Value of the Hattah Lakes. This study can be found at http://www.acfonline.org.au/uploads/res/Wetlands_economic_report_1-6-10.pdf , accessed 18 Nov 2010. This Report concluded that the Hattah Lakes provide an annual economic value of \$14.5 million dollars through tourism, water filtration, habitat, flood control, and water storage. Of this some \$10M was for tourism and recreation - a 'direct use'.

This might lead us towards tourism, farm stays, and the like as an alternative to some of the low value-add irrigated farming. The government needs to buy back the environmental water for the rivers and then let businesses reap the benefit. Perhaps a levy on towns is needed to pay for this investment of their future.

Legal and Treaty Obligations and Water Use

The State and Federal governments have made undertakings under various pieces of legislation and treaties to provide water for specific purposes. For example, under the RAMSAR Treaty, Australia has international obligations to support migrating birds, through maintaining the wetlands they visit each year.

Similarly, it has an obligation to provide local indigenous groups with water to support their cultural practices under the National Water Initiative. This is not seen by them as the same as providing 'environmental water'.

In signing the National Water Initiative, all state and territories have committed to:

- include Indigenous representation in water planning;
- incorporate Indigenous social, spiritual and customary objectives and strategies; and
- take account of the possible existence of native title rights to water.

"As a result, Australia's governments are reassessing the way they provide for Indigenous access to water through policy, legislation and programs." Reference - <http://www.nwc.gov.au/www/html/273-indigenous-water-issues.asp>, accessed 18 Nov 2010.

A Personal View

We have seen algal blooms already in our rivers, salinity in agricultural land from rising water tables, and aquifers drying up. We are already overusing the available supply of water. Do we think the ten year long drought was just something we had to get through and that things would go back to normal now? In Australia and this changing world, do we really know what is normal?

Look at the wheat and sheep stations established in the 1870s in the Northern Flinders ranges. Goyder warned against it, but a run of good seasons gave people confidence. People were optimistic, but normal weather returned and the farms failed.

With climate change, some areas will no longer be viable to continue the current form of agriculture, even with irrigation. Some crops will not suit the heat and the seasons and new techniques will need to be learned.

My own family lived in Morton Plains (near Birchip) in the Mallee in the 1880s. At that time, there were about 300 families and a variety of shops and service industries in the town. Nowadays the trains no longer stop there, and businesses have left. Three wheat silos were all I could find some 30 years back. More efficient production, larger farms, and mechanisation had reduced the size of family farms from about three workers to one, on an acreage much larger. They did not make much money then and today things are not really any better. The area became depopulated, even though it still produced a lot of grain in good seasons: the schools closed, shops closed, and the service industries and their workers left for regional towns.

No farmer wants to accept that things are changing and that the farm that they fought to preserve through the many years of difficult seasons and natural pests is no longer viable. They would prefer to see cheaper inputs and tax relief or subsidies that will 'level the playing field' against foreign producers who are given greater assistance by their governments. Will this happen in Australia?

I would suggest that the enemy for Australian farmers is actually the higher Australian dollar and the desire of every country to be self-sufficient in food. Our produce will be too expensive to export and the supermarkets will be importing many foodstuffs in preference to locally grown products. All products in shops are labeled by country of origin, yet consumers often buy by price and not as a reflection of national pride.

For us to export our food, it will not be to a market that buys by price, but to one that is selective about quality. We need to identify the crops that are most suited to the new climates for our agricultural districts and find ways to boost quality (eg target GM-free, reduced pesticide approaches, or higher nutrition varieties). To get to this position we will need to expand our agricultural research to create new varieties of crops that are drought-tolerant, salt-tolerant, with higher yields, and of a higher nutritional basis (protein, vitamins, etc).

Research directed to these ends has been going on. For example, Richard Richards has reported on the prospect of improving water use efficiency in a cereal crop by two times. He estimated that half the water loss is from evaporation from the soil. Reference: “Towards Higher Yielding, More Water Efficient Crops – Elements of Success” by Richard Richards, CSIRO Plant Industry, Canberra.
http://www.ioa.uwa.edu.au/_data/assets/pdf_file/0010/1147717/Richards-elements-for-success.pdf, accessed 17 December 2010.

Australia’s population continues to grow at a fast pace. There is growing demand for so many things and this includes the demand for land. Already we are losing some of our most productive agricultural land to housing and the expansion of cities. Land has far more value in the city fringes for housing blocks than any potential income from farming. The added population will also claim much of the diminished water resource in South Eastern Australia. The cities, it is fair to say, can add much more value to the economy than farming.

Farmers need to look beyond irrigation, to what crops will grow in near desert conditions, as so much of the land in Southern Australia will be near desert soon. A related challenge, is that if the climate and rainfall is moved (say) 200 km South, then how do we manage the mass migration of economic refugees fleeing their farms to more suitable lands ? I suppose that it will not happen quickly, but we might see many farmers going broke through crop choices that are no longer relevant or lands that have become less productive.

Recycling of Water

People in the country know this scenario quite well: each community uses water, which it generally draws from a river or aquifer. It then treats its waste water and puts it back into the river, sending it on to the next community. Water can be used multiple times before the river reaches its destination. This is a well-known approach in other countries and people do not see a problem with this. However, in Australian cities, state governments are a bit squeamish about talking about the use of recycled water. Where they do use recycled water, eg in the upper reaches of the Yarra, they do not talk about it, and where they do not use it for domestic purposes, they try to find an industrial or agricultural use for the water.

The re-use of water gives us the opportunity to add value more than once. In certain locations there are opportunities to build new agricultural industries around the use of recycled water. I will not be the first to raise this, but sewage treatment plants near major cities often treat their waste water to irrigation standards, then discharge it into the sea. Likewise, coal-fired electricity plants use a lot of water that they then discharge. By siting greenhouse-based agricultural and horticulture next to a power station, there is the opportunity to reuse the emissions of water, heat and Carbon Dioxide to assist with high value crops. This approach has been used successfully overseas. Growers even pay to use the power station’s emissions – they do not see them as ‘waste’.

The City-based Water User

It is interesting that in Melbourne, through our recent period of drought, we were being asked to reduce our household water consumption to 155 litres per person per day. My household is frugal, and uses about 70 litres a day per person. I thought that this was a great result until I learned that most farmers require about 1,000 litres of water from rain or irrigation to produce one kilo of food. It is much more than this if they are growing cattle for meat or dairy. I eat food, thus I eat the embedded water that is in food. I also use electricity and so use the water used in those generators. I set out to quantify this.

I found this table of water consumption by food type (in litres of water to produce one kilo of food):

Potato	500-1,500
Wheat	900-2,000
Alfalfa	900-2,000
Sorghum	1,100-1,800
Corn/Maize	1,000-1,800
Soybeans	1,100-2,000
Rice	1,900-5,000
Chicken	3,500-5,700
Beef	15,000-70,000

Reference: <http://wingolog.org/writings/water/html/node23.html>, accessed 17 December 2010 (figures from USDA). From previous research I have done, I recall that the CSIRO had figures from Northern Victoria of 36 Kg of butterfat per Megalitre of water (so about 20,000 litres of water is used to make one kilo of butter).

Dat Van Tran, in a discussion of rice crops around the world, said that “about 55% of the areas cultivated to rice are under irrigation. It is known that in irrigated systems more than 4-5,500 litres of water are used to produce one kilo of rice in many areas. Field level assessment suggests a water efficiency of 50% and may reach 80% if drained water could be recycled and reused”. Ref: “World Rice Production: Main Issues and Technical Possibilities”, by Dat Van Tran, International Rice Commission, FAO, Rome, page 60, Water Efficiency <http://ressources.ciheam.org/om/pdf/c24-2/CI011085.pdf>, accessed 17 December 2010.

So after looking at the totality of water in my city life, I have concluded that I am using thousands of litres of embodied water a week to eat, and some to produce my electricity, but not so much direct water in my house for hygiene purposes. Thus, if I and the rest of the population want to reduce our embedded water from food consumption, then we should go vegetarian.

Future Communities

There will be a great challenge in keeping some country communities viable if the water is not going to be there for irrigation. Individual farmers will need some assistance through structural adjustment programs to ease them into different crops or help with the investment costs for new methods and techniques. A transition into tourism-oriented developments (eg farm stays, river cruises, forest walks) might be a solution for some. However, others might need assistance to leave the industry if their land is no longer suitable for these alternatives. Overall, an expanded range of government services will need to be delivered to communities and regions, to ease the transition.

There is nothing new in this. Many rural communities, especially those based around mining, have gone through boom and bust cycles. I have visited the ghost towns of pioneering communities that were abandoned when their reason to exist had moved on (my great grandfather was a trooper in the goldfields of Grant in Eastern Victoria – now only daffodils to mark that Europeans had been there).

We need to accept that there will be change and that as a nation we can work through it and cushion the blow for the vulnerable.

Key Recommendations

This is a summary of the recommendations that I have made in the foregoing text.

- Identify what crops we should be growing if we are constrained by the availability of water, prioritise by the concept of ‘value-add’ and the amount of embedded water in specific crops.
- Consider growing less animal-based food and fibre for export.
- The river systems are a national resource and the price of water should not depend on where in the river catchment the farmer lives. The value they can add to the water should determine who gets to use the water.
- The environment is seen as an ‘externality’, yet it provides valuable services to communities. The government needs to assess its value and include it in water allocation under the concept of added-value.
- The government needs to buy back the environmental water for the rivers and then let businesses reap the benefit. Perhaps a levy on towns is needed to pay for this investment of their future.
- State and federal governments need to honour their treaty undertakings, eg RAMSAR and the National Water Initiative (cultural water for indigenous people).
- We need to identify the crops that are most suited to the new climates for our agricultural districts and find ways to boost quality (eg target GM-free, reduced pesticide approaches, or higher nutrition varieties).
- We need to expand our agricultural research to create new varieties of crops that are drought-tolerant, salt-tolerant, with higher yields, and of a higher nutritional basis (protein, vitamins, etc).
- The government needs to look opportunities to build new agricultural industries around the use of recycled water and carbon capture.
- To save water, the government should consider promoting vegetarian dining as a healthy and environmentally sound approach.
- The government should assist individual farmers with:
 - Structural adjustment programs to ease them into different crops or help with the investment costs for new methods and techniques.
 - A transition into tourism-oriented developments, if appropriate.
 - Aid to leave the industry if their land is no longer suitable for these alternatives.
- An expanded range of government services will need to be delivered to communities and regions, to ease the transition.
- We need to accept that there will be change and that as a nation we can work through it and cushion the blow for the vulnerable.