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Submission to the Productivity Commission's review of:

Market Mechanisms for Recovering Water in the Murray-Darling Basin

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Summary

"The issue of market-based mechanisms can only be answered by first looking at reasons why the Australian Government is purchasing water."(Productivity Commission 2009)

- The current "no regrets" policy of the Restoring the Balance (RTB) water buy-back program runs the risk of being ineffective by spreading resources too thinly across the Basin.
- We agree that government intervention to improve the overall health of the Murray-Darling Basin is necessary. However the scarcity of water resources demands an element of environmental triage. The environmental demand should be well defined, and based on socio-economic values.
- The apparent emphasis on aggregating entitlements according to their expected annual volumes of water over the entire basin may underestimate the risks involved. This submission argues that the water purchasing decisions to meet specific environmental purposes best be made following careful consideration of three factors:
    - the availability of water (natural rainfall and runoff);
    - the security of the entitlement (as indicated by the distribution of entitlements); and
    - the location of the source of water relative to the targeted environmental use.
- Market mechanisms should be used as a tool to target water rights that will meet the requirements of the defined environmental demand.
- To be effective, a more discriminatory approach that focuses on the heterogeneity of basin's environmental and economic attributes and their implications on achieving the net social benefit from the intervention is necessary.
- Variability and the hydrological and capacity constraints in the water delivery system must bear a greater influence in purchasing decisions.
- The potential for greater scarcity under climate change, through increased dry states and changes in policy (Snowy River diversions, and forestry plantations) needs to be taken into account.

Defining Environmental Objectives

Water allocated to the environment is not an economic loss. It recharges ground water, it helps mitigate salinity levels and maintain stream-flow integrity. There is a need to understand the social benefits of maintaining these services. Scarcity of water resources and the continued threat of reduced water availability from climate change means that there needs to be an element of triage when deciding where to direct environmental water. Environmental water could be used to:

- Maintain wetlands, floodplains and related fauna and flora:
    - high biodiversity
    - flood and flow control
    - water quality regulation
- Sustain minimum flows
    - to facilitate water delivery and fish migration
- Regulate the quality of water
    - avoid algal blooms
    - reduce salinity build up

- Recharge ground water sources

Work done by David Pannell suggests ways in which to identify and rank environmental services, which would assist in the definition of environmental demand (Park et al. 2009). The Living Murray Program made a start by identifying "Icon Sites" of ecological and hydrological importance along the Basin. For each site "ecological objectives" were outlined, for example:

- The Coorong: "an open Murray Mouth at all times",
- Barmah Millewa: healthy vegetation in at least 55 percent of the area of the forest (including virtually all of the Giant Rush, Moira Grass, and River Red Gum forest)

Each Living Murray Icon Site has produced a Management Plan outlining the watering requirements to meet specific ecological objectives (The Living Murray 2006). These requirements are based on the volume, timing, duration and frequency of flooding events that happened under natural, that is pre-regulation conditions (McCosker 1998).

In the case of keeping the Murray Mouth open, and providing minimum flows for fish migration and water quality, there is a need for consistent water delivery. However some wetland environments require natural wetting and drying regimes to be allowed. In these cases large quantities of water are required during natural flooding events to "piggyback" high flows to achieve maximum benefits. Multiple benefits can be achieved through coordination to allow gains in economies of scale and economies of scope. For example, the maintenance of Redgum woodlands in the Barmah-Millewa wetland requires approximately 555 gigalitres (GL) per month for 1-2 months, generally 3 years out of ten (The Living Murray 2006). To achieve such large quantities, water should be made available locally and released to run off the back of natural flooding events. However, infrastructure may also be in place to pump water to environmental assets in most need in the absence of flooding events.

Recommendation: The 'restoring the balance' approach must identify and rank environmental services to obtain clear objectives for the water buy back.

What is the goal of the Program

The Australian Government operates a number of programs with the goal of restoring water for the environment. The Living Murray environmental flows aims to maintain or improve "river health". By 2011 a Basin Plan will outline the sustainable diversion limits of each catchment, to ensure the maintenance of river health. The RTB buyback scheme is designed to reduce the gap between current levels of water use and sustainable diversion limits (Department of the Environment 2008). This supports the "no regrets" assumption where the risk of purchasing "wrong" water could be low. Together with the other programs designed to help irrigators adapt to a changing climate, if well directed, the RTB has the potential to achieve stated environmental objectives.

The RTB program makes water purchases from *willing sellers* that represent *value for money* (Department of the Environment 2008).From a public policy perspective the issue is how to maximise the expected value of benefits. In the absence of a clearly specified environmental demand profile or a benefit function, the popular choice is to maximise the expected returns in

terms of units of water made available per dollar invested over the entire Basin. This is problematic for two reasons:

1. The highly variable rainfall-runoff patterns in the Basin are considered by calculating the "long term cap equivalent" or the expected average annual volume of water from purchases
    a. This ignores the potential volumes that will be available in wet, normal, and dry years, the frequency of which are not normally distributed. This is important because the environmental needs have associated thresholds that vary between states of nature.
2. The expected volumes of water purchased throughout the entire Basin are aggregated.
    a. This ignores the hydrological and infrastructure constraints for water delivery over long distances (conveyance losses) and the economies of scale necessary to achieve location specific environmental objectives.

Sufficiently reliable estimates of this information are available to governments but not necessarily to individual water entitlement holders. A failure to make use of this information in the water program development may constitute government failure, a source of public externality.

The issue of opportunity cost, the value in forgone uses, was brought up during the recent debate over Cubbie Station in Southern Queensland. Purchasing the Cubbie water 'entitlement' would allow an annual average of 138 GL to flow back into the river system, mainly for the benefit of the lower Balonne floodplain. However media and public response indicate that the Coorong should be given priority. If water diverted from Cubbie were to flow to the Coorong, it would receive less than 0.28 per cent (Kingsford 2009), because of conveyance losses along the Darling. If an objective of the RTB was to ensure a regular supply of water for the Coorong, then water should be sourced from areas where there are low conveyance losses and high reliability of supply to achieve the least cost option.

Recommendation: The program should define performance indicators that take into account the ability of purchased water rights to meet environmental objectives based on their spatial, and security attributes

Targeting and identification of water supplies for the environment

Once the key environmental needs are identified, the watering requirements to maintain or improve those environmental services should be estimated, including the timing, frequency, volume and duration of watering events. Once these requirements are identified, with due regard to the likely climate variability, market based mechanisms could be used to obtain water rights that correspond to these requirements.

For example, the minimum thresholds for fish and water quality needs will warrant consistent access to minimum water flows. This will require high security water entitlements from areas capable of delivering sufficient water, with minimum conveyance loss.

However, flooding events in wetlands require large quantities of water to "piggyback" natural flooding events. In other words they need secure access to water only when specific conditions are met, and that may most likely be in a 'wet' or a 'normal' season. When choosing water rights it is important to consider which options are likely to give the greatest amount of certainty to environmental managers in gaining access to environmental water when it is required. That will also maximise the expected value of the benefit in choosing amongst available options, including:

- General security licences
- Purchase of seasonal allocations (possible but may involve administrative delays)
- Option contracts
- Leasing entitlements

Because the spatial distribution of the water infrastructure, rainfall and runoff, economic uses of water, salinity and water flows and related externality impacts vary across the Basin and over time, the economic-environmental trade-offs will also vary substantially across space and over time. This means when individual water users are bidding to sell their water to the government their collective contribution to Basin externalities may exceed the benefits achieved from the buy-back. That result, if achieved, will only make the situation worse.

- **Recommendation:** All water purchased for the environment must be identifiable as it travels down the system.

- **Recommendation:** Water for critical environmental assets needs to be separated from the water required to maintain minimum stream flows where required.

- **Recommendation:** To avoid misallocation of resources, careful analysis should inform water requirements for specified critical environmental assets, along with the frequency and timing.

- **Recommendation:** Purchase decisions need to optimise spatial and temporal availabilities through an *a priori* assessment of when and where water will be available to better meet the environmental needs profile of the Basin under different states of nature.

Upgrading infrastructure

The upgrading of infrastructure does not in itself lead to a reduction in water use. The fixing of leaky pipes removes water that would otherwise have been returned to the environment, and unless the estimated water savings are indentified and diverted back into the river system they will continue to be used for irrigation. Another aspect of demand dynamics that is often ignored in infrastructure investment is the water efficiency impact that in turn reduces the effective cost of water use, allowing irrigators to demand more water, as water has become more productive. Everything else held constant, water prices are likely to rise.

There are numerous examples where water efficiency has either led to irrigators increasing the size of the area irrigated or the savings have been then sold back to other irrigators. For example the recent selling of Artesian Basin water recovered from the bore capping program by the NSW government is a case in point.

Increasing water use efficiency should not be considered a fool proof form of recovering water for the environment. It could amount to taking water from the environment (leaked water works its way back to the system), and reducing downstream availability, the trade-offs of which may circumvent the targeted environmental water benefits.

Recommendation: Any savings from infrastructure investments must be identified with its broader impacts and given due consideration in water purchasing decisions.

Climate Change, Climatic Variability and Influences on Water Price

CSIRO climate studies, research conducted by this Group and the experience over the past seven years clearly indicate that water scarcity in the Basin is increasing. A number of regions that have missed an irrigation allocation and therefore have been left stranded and unable to benefit from water trade highlight the nature of spatially-dependent risks in the Basin. The scarcity will mean that the number of dry states in the long term probability distribution of river flows will increase and those that are regarded as normal and wet will fall. The uneven distribution of these relative probabilities across the Basin and a more skewed distribution of water needs in the southern Basin mean that a market mechanism will grapple with increasing information problems in locating an efficient outcome. The recent experience does not warrant a planning regime that assumes return to normal conditions as experienced prior to 2000. This means some water needs will not be met and in the absence of government intervention, as the residual claimant, the environment will fail to receive an allocation. Thus, in choosing to intervene it is imperative that society understands where, when and how much water is required to meet the needs of critical environmental assets and the economic costs of meeting the water needs.

Water resources are already strained and the range of possible impacts on the Basin that were identified by Quiggin et al for the Garnaut Review, have implications for the Federal Government's water program (Quiggin 2008). With the development of the Basin Plan, that would take account of climate change, there likely to be further restrictions applied the conjunctive use of water resources in the Basin. If this contraction in supply is a measured approach then logically the shadow price for water will increase slowly. However, recent experience of water trade patterns and the price of water trades indicates that fluctuations in supply at critical times could lead to short run price spikes[1] (Mallawaarachchi & Foster 2009). The combination of both a highly variable and decreasing supply is likely to force water prices higher in the short to medium term up to a point where water could then be valued as a capital acquisition rather than a variable input in the decision making process. The price paid to environmental water purchases under these uncertain conditions needs to be carefully thought through, particularly where the supply restrictions are likely to be severe and the demands are likely to grow. The conditions in the Southern Basin could approximate this scenario.

Recommendation: The amount of water and targets for the water must be identified under Garnaut climate scenarios (450 & 550 ppm) for alternative states of nature (normal, drought and flood).

Policy Response to Climate Change

From the studies undertaken by this Group (Adamson, Mallawaarachchi & Quiggin 2009) it is clearly evident that the water transfers from the Snowy River system play a critical role in the quality and availability of water in the Southern Basin. The combined implications of the likely climate change impacts and the proposal to restore the Snowy to 21 per cent of its natural flows on the Government water purchasing plans could indicate the severity of existing knowledge gaps in policy coordination.

Recommendation: The impact of climate change on the Snowy River Catchment must be taken into consideration when setting environmental targets to help determine the reliability of entitlement supply.

[1] http://www.abareconomics.com/publications_html/landwater/landwater_09/IrrigationDrought.pdf

How Australia responds to climate change mitigation is fundamentally important in this discussion. If large scale tree planting within the Basin becomes a reality then this could again influence water supply and lead to an increase in water prices, especially if new forestry developments were not required to purchase water entitlements and thus operated outside the Cap regime (Schrobback, Adamson & Quiggin 2008).

Recommendation: The impact of large scale tree plantings must be understood in terms of water availability.

Recommendation: All future commercial plantations must operate under the existing Cap.

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