

# **Water markets and the evolution of irrigation in the Murray Darling Basin**

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## **Introduction**

Water is a valuable and scarce resource requiring governments to limit diversions, such as, through imposing the Murray-Darling Basin Cap on Surface water Diversion (the Cap) in 1995.

Since then, irrigation water supplies have been severely reduced below the expected levels and long term averages, due to the decade long “drought”.

These “drought” conditions are broadly consistent with predicted climate change and are placing significant constraints on irrigated agriculture.

As the Murray-Darling Basin has 70% of Australia’s irrigated agriculture, these highly developed irrigation systems are particularly sensitive to climate change, being vulnerable to reduction in stream flows. As an adjustment and adaptation measure water markets are proving significant.

The development of water markets which allow water users to trade their entitlements and allocations are central to Australian water reform.

Since entitlements to water have been separated from land titles, irrigators can trade their water rights, either as permanent trades or as temporary allocation trades. The trade of the water entitlements (or water right) is referred to as a permanent trade, while the trade of an annual water allocation is referred to as a temporary trade.

Since the introduction of water trade, irrigators have had to consider whether to buy additional water or sell “surplus” water, within the wider context of their crop and business planning. Growers are making business decisions regarding the abundance and availability of water to meet the demands of their crop, as well as determining the relative value of their water to their prospective crop.

Within the Murray Basin, water trade is facilitating the major reallocation and assignment of water between irrigators helping to optimize irrigation decisions. Inter-sectoral trades – rural to urban - are also emerging.

In the 2007-08 growing season approximately 40% of all water used was transferred between irrigators, within and between irrigation regions in SA, Victoria and NSW. Based on an assessment of prices paid and gross margins of crops, it is assumed that the majority of traded water moved from annual crops and pasture to permanent horticultural and viticultural plantings. This demonstrates that the water market has contributed to achieving more economically efficient use of water, and to the production and survival of valuable, permanent plantings.

## **The Murray Darling Basin**

The Murray-Darling Basin covers approximately 15 per cent of Australia’s total land area. The Basin extends about 1250 kilometres from east to west and about 1360 kilometres north to south. Over two million people live in the Murray-Darling Basin, and a further million outside the Basin rely on its water resources.

The Murray-Darling Basin contains about six per cent of Australia's water resources, produces approximately two-thirds of the value of irrigated agriculture, and approximately 40 per cent of Australia's total gross value of agricultural production.

*The Murray-Darling Basin Agreement* binds the jurisdictions of Queensland, New South Wales, South Australia, Victoria, Australian Capital Territory and the Commonwealth. The purpose of the Agreement is 'to promote and coordinate effective planning and management for equitable, efficient and sustainable use of land, water and other environmental resources.' The *Murray-Darling Basin Agreement* forms the basis of the inter-state water sharing rules, joint works and funding arrangements for the Basin, and builds upon the historical 1914 River Murray Agreement

The southern connected Murray-Darling Basin contains the majority of irrigated agriculture in Australia. Large government owned storages supply irrigation water, generally by gravity, to many irrigation districts. The introduction of water trading has allowed for water to be transferred within and between districts, as well as within and between states.

Figure 1, Map of the Murray Darling Basin



## **A brief history of interstate water trade**

Australian governments committed to separating water entitlement from land titles as part of the water policy reforms of the 1990s. At the time there was wide spread support from industry, government and environmental organisations as water trade was seen as a way of moving scarce and valuable water from land degraded by salinity and water logging, and to allow for greater adjustment in the irrigation industry. Alexandra (p 95, 1993) clearly acknowledged this stating that “transferable water rights are commonly considered to be an important element in improving water use efficiency as they encourage water to be put to its most valuable use...water rights can be moved from degraded land to where water can be better used.”

Since the initial commitment to the water policy reform there has been gradual and consistent implementation of policies to support and enable trade within functioning water markets. A challenge to the implementation has been the development of a capacity to trade water between the three southern Murray-Darling Basin States – New South Wales, Victoria and South Australia. This has been relatively complex due to each State having separate and different systems of water law and water administration.

Schedule E of the Murray-Darling Basin Agreement enables the Murray-Darling Basin Commission (MDBC) to coordinate water transfers between States and between valleys within the southern connected Murray-Darling Basin, in a way which minimises any detrimental effects upon the environment and upon other water users. This includes the power to develop protocols under Schedule E to supplement its provisions.

A tri-state pilot project (Pilot Project) in the southern connected Murray-Darling Basin was run from July 1998 to May 2006 in which “exchange rate” trading was used to transfer water from one State to another.

Based on the success of this pilot, expanded interstate water trade has been permitted since July 1 2006.

The importance of developing barrier free water markets was reaffirmed in the National Water Initiative.

### ***The National Water Initiative***

The Council of Australian Governments (COAG) agreed that there is a pressing need to refresh its 1994 water reform agenda to increase the productivity and efficiency of water use, sustain rural and urban communities, and to ensure the health of river and groundwater systems (COAG, 2005). As a result the National Water Initiative was developed to:

- improve the security of water access entitlements for consumptive and environmental users, including by clear assignment of risks of reductions in future water availability and by returning over-allocated systems to sustainable allocation levels;
- ensure ecosystem health by implementing regimes to protect environmental assets at a whole-of-basin, aquifer or catchment scale;
- ensure water is put to best use by encouraging the expansion of water markets and trading across and between districts and States (where water systems are physically shared), involving clear rules for trading, robust water accounting arrangements and pricing based on full cost recovery principles; and
- encourage water conservation in our cities, including better use of stormwater and recycled water.

Clause 23 of the National Water Initiative Agreement contains the overall objective.

“... to achieve a nationally compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimises economic, social and environmental outcomes. At the highest level, implementation of the NWI will achieve:

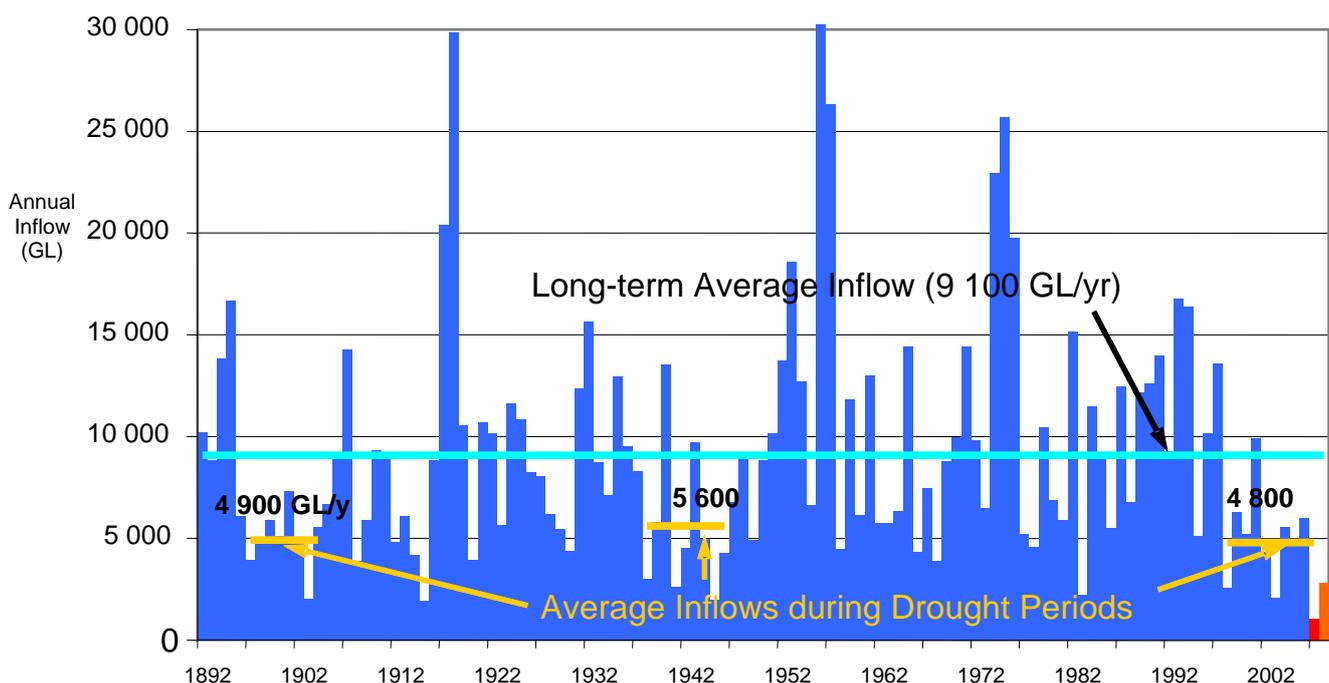
- i. clear and nationally-compatible characteristics for secure *water access entitlements*;
- ii. transparent, statutory-based water planning;
- iii. statutory provision for *environmental and other public benefit outcomes*, and improved environmental management practices;
- iv. complete the return of all currently over-allocated or overused systems to *environmentally-sustainable levels of extraction*;
- v. progressive removal of barriers to trade in water and meeting other requirements to facilitate the broadening and deepening of the water market, with an open trading market to be in place;
- vi. clarity around the assignment of risk arising from future changes in the availability of water for the *consumptive pool*;
- vii. water accounting which is able to meet the information needs of different water systems in respect to planning, monitoring, trading, environmental management and on-farm management;
- viii. policy settings which facilitate water use efficiency and innovation in urban and rural areas;
- ix. addressing future adjustment issues that may impact on water users and communities; and
- x. recognition of the connectivity between surface and groundwater resources and connected systems managed as a single resource.”

## Recent trends in the MDBC

The 2006/07 and 2007/08 water seasons were drought years (see figure 2) and saw the highest ever volume and numbers of interstate entitlement and allocation transfers from the smallest allocation pool recorded in recent years (see figure 3). While much of the transfers would be due to the drought, a number of policy and administrative mechanisms may have also had some influence on trade. For example, direct trade from Victorian areas other than the Mallee to South Australia has been allowed for the first time.

**Figure 2 - Total River Murray System Inflows (excluding Darling River)**

Modelled Annual Inflows - current conditions



Since the introduction of trade the amount of water traded has been rising steadily. The extremely dry conditions of 2006, 2007 and 2008 have seen unprecedented levels of trade. Figure 3 demonstrates the level of interstate trade compared with New South Wales general security water. Note that in 2006-07 and 2007-08 that there was zero allocation provided for general security water entitlement holders in New South Wales.

Figure 3: level of interstate trade compared with New South Wales general security water

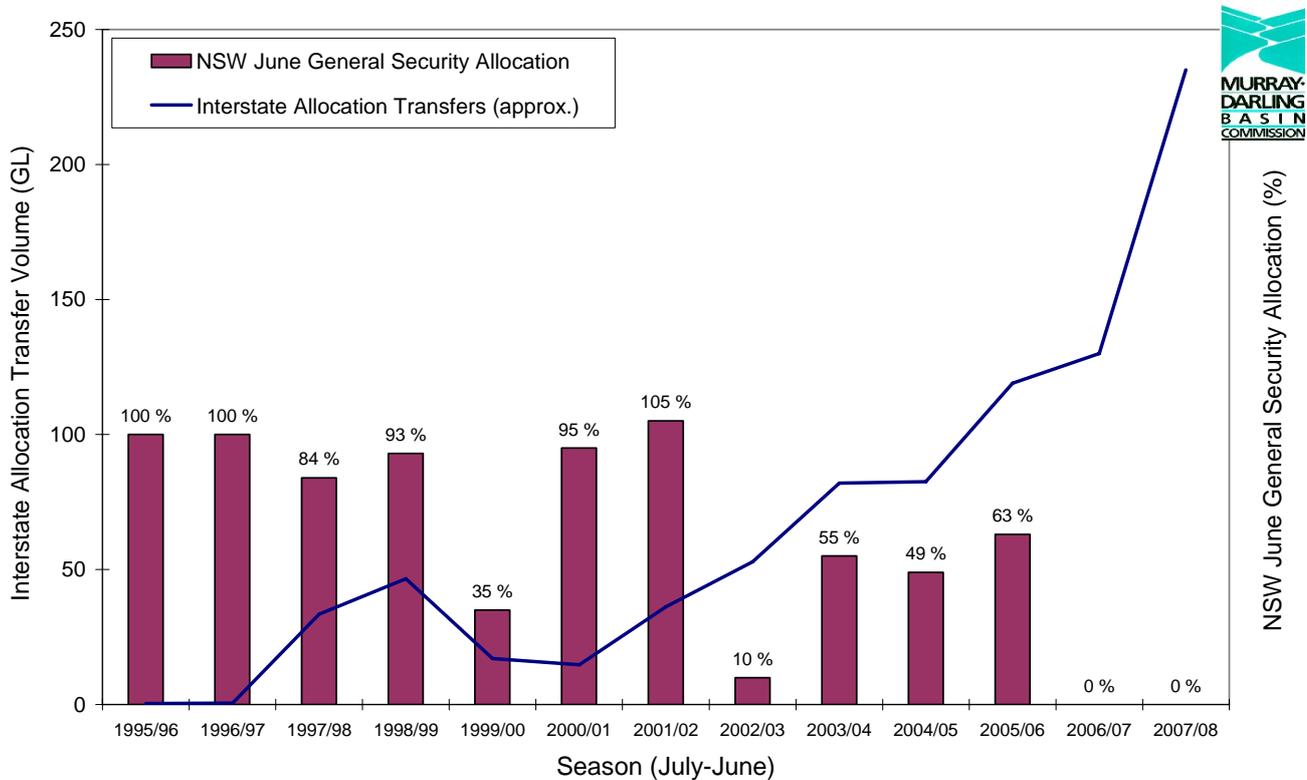
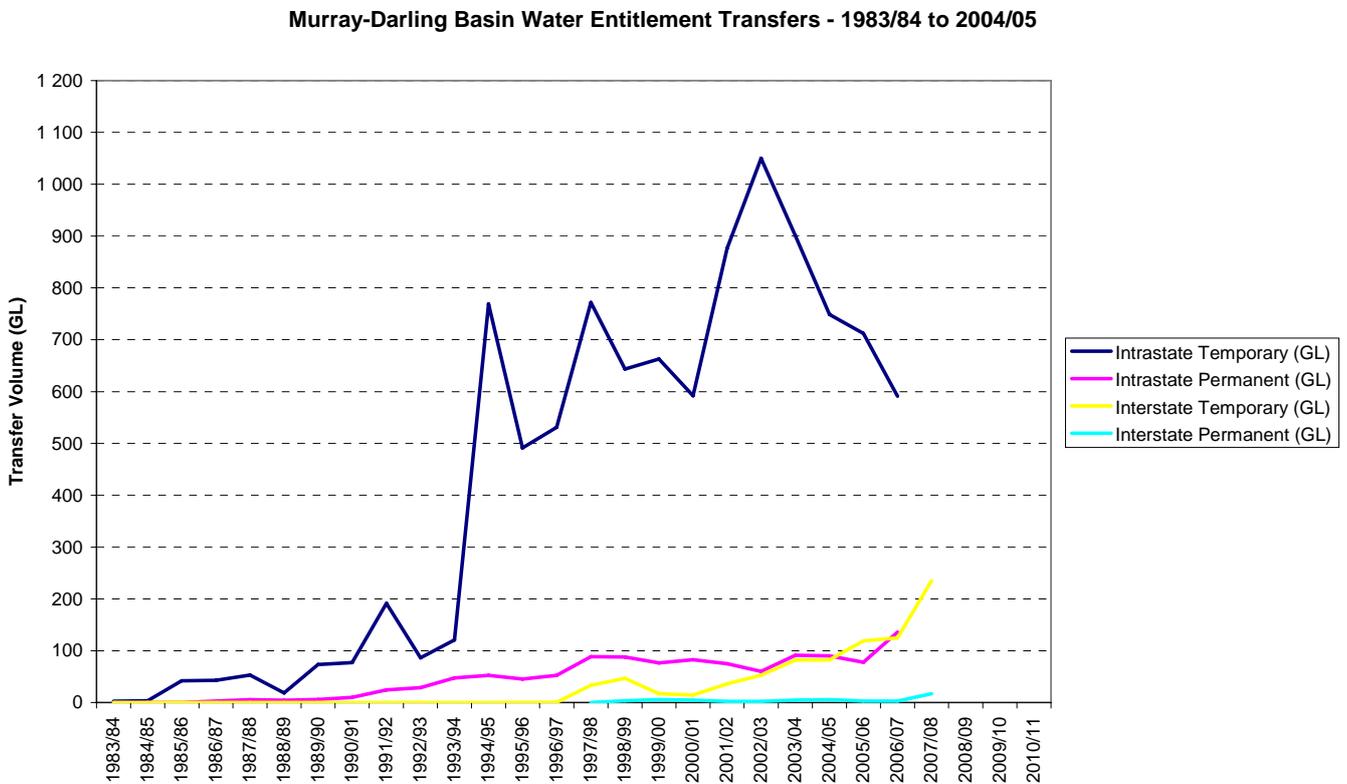


Figure 4 demonstrates that within-state, or intra-state trade, far exceeds interstate trade. It also demonstrates that temporary or allocation trade makes up a substantial proportion of the amount traded in any given year, but that because permanent trades are cumulative, these are also significant volumes. Entitlement trades are sometimes referred to as buying “paper water” because entitlements do not necessarily have “real water” attached, unless water has been allocated in a given year. In some river systems, certain types of entitlements have had zero or close to zero water allocated for several years.

Figure 4: Permanent and temporary Intra-state trade compared with interstate trade



### The importance of trade to permanent plantings in time of water scarcity

The last two water years (06-07 and 07-08) have seen escalating prices for allocation water and demonstrated the importance of trade to permanent viticultural and horticultural plantings. Vineyards and orchards are not only capital-intensive but also generate crops of high value. Furthermore, in the semi-arid irrigation districts, they will suffer extreme stress or die if left unwatered. Many owners of permanent plantings chose to supplement low allocations with water they could purchase through the water markets.

In effect, the last two dry years have shown that the water market is behaving in accordance with market theory – water has moved to the highest bidder, generally the highest valued user. If Australian governments had not begun implementing policies that support water markets a decade or so ago, then this would not have been an option.

### Recent developments

The policies and rules governing interstate water trade continue to evolve. For example, in 2008 the Basin governments agreed to allow water to be traded to the Australian Capital Territory in order to fulfil future demand without breaching ‘the Cap’.

Basin governments also agreed in 2008 to allow water to be traded out of storages in the lower Darling.

Water trade not only allows trade between irrigators but also enables inter-sectoral trade. To date, this is relatively small, but there are examples of trade to urban water authorities and mining. Trade to major urban centres remains controversial, as does the development of infrastructure which supports the movement of water over the Dividing Range to the larger cities. For example, Victoria's Goldfields Super Pipe will link the cities of Bendigo and Ballarat to the more reliable supplies of the Goulburn River system. Water to supply these cities has been acquired by purchasing irrigation entitlements.

### **Purchasing entitlements to rebalance extraction volumes**

Australian governments have entered the water markets, purchasing entitlements as a way of redressing over-allocation. By acquiring water rights they plan to create a "pool" of water to be used for environmental watering. To date the majority of this purchasing has been focused on purchasing entitlements.

The Commonwealth Government has committed A\$3 billion dollars to purchasing entitlements within the Murray Darling Basin over the next decade. The total current capital value of the entitlements in the Murray Darling Basin has been estimated at A\$12 billion (Waterfind 2008).

Governments have also signaled their intentions to move to purchases of farms – buying the land with the water entitlements attached as a way of accelerating water recovery.

In addition to land purchases and entitlements, temporary or allocation water has been bought for the environment to supply water to critical water bird breeding habitats in the Narran Lakes.

### **Narran lakes water purchase – an example of allocation trade for the environment**

During the 2007–2008 summer, the northern Basin's rivers experienced one of the most significant flood events of recent decades, with magnificent floods in the Paroo and Warrego systems. The widespread summer rains resulted in the partial filling of the Ramsar-listed Narran Lakes, but high temperatures in February and March resulted in rapid evaporation.

Large numbers of waterbirds had been attracted to the area to breed. This breeding event was one of the largest ever recorded at Narran Lakes, and the largest in the Murray–Darling Basin since 1998.

In April, the Murray Darling basin Commission (MDBC) purchased 10,423 ML of irrigation water to provide environmental flows to the wetlands at Narran Lakes, maintaining lake water levels to sustain the breeding birds. Over 74,000 breeding pairs were recorded, including straw-necked ibis and royal spoonbills.

The colonial waterbird breeding event was significantly improved by buying water to maintain lake levels at the nesting sites. It is estimated that 80,000 birds fledged during the breeding event. Based on the number of the later hatched chicks in the initial breeding colony the figure would have been closer to 36,000 had the Commission not intervened to provide water. After the watering event, the Narran Lakes became a local refuge for many other species of waterbirds, in particular thousands of ducks.

This is the first time the Commission has purchased environmental water in the northern Basin, and the also the first time the Commission has purchased 'temporary water' for environmental purposes. Here, temporary water refers to water extracted from rivers or through floodplain harvesting under approved event flow management rules. This water is usually diverted to large on-farm storages until applied to crops – typically cotton and wheat.

The successful outcomes from this initiative were due to the collaboration, involvement and support of the Queensland and New South Wales agencies that provided important data on the feasibility of purchase. Once the decision was made to purchase the water, these agencies also provided on-ground support to liaise with landholders along the Narran River and manage the

flow event from the farm involved. Overall, these outcomes are a good example of cooperation among multiple jurisdictions.

A comprehensive monitoring and evaluation program aims to determine the ecological responses to the watering and to identify future principles and options for delivering environmental water in the northern part of the Basin, including future use of 'temporary water.' The event also demonstrated that it is important that environmental watering events are supported by the local community. Media monitoring of the event indicates a positive local response from landholders as indicated from this quote taken from ABC Country Hour on 27 March 2008:

*"Farmer Leith Bouilly says the 11-thousand megalitres of water was purchased from a Queensland landholder is a win-win situation for both agriculture and the environment. I think where a specific ecological outcome has been recognised as important and the Murray Darling Basin Commission has stepped in the market and purchased water for it. She says "at some point we have to be able to put an economic value on ecological outcomes and this begins to do that".*

*"My understanding is that it was a private sale, a commercial agreement entered into by the Murray Darling Basin Commission and the individual".*

*"The individual continues to hold their entitlement and they'll be able to continue to use that in the future to extract water, what they've done is sold a volume of water out of their storage, so that'll be put back into the river and run down to the Narran Lakes".*

Also the return of water and wildlife to the Narran Lakes was marked by a special aboriginal community day at the Lakes in April, hosted by the NSW National Parks and Wildlife. The community day emphasised the importance of the Narran Lakes to the Gamilaroi/Yuwaalaraay people. It was reported on the ABC radio national's indigenous program AWAYE! (10 May 2008) which stated that "*the migratory water birds that once flocked thousands of kilometres to the **Narran Lakes** have returned and so has the Aboriginal community ...*"

<http://www.abc.net.au/rn/awaye/stories/2008/2238085>

The purchase of water for the lakes also received international acknowledgement. Australia's action to protect this Ramsar wetland through the water purchase was acknowledged at the Oceania Regional meeting of Ramsar (Apia, Samoa, 10-11 April 2008) and the MDBC press release was posted on the Ramsar Convention's website: [www.ramsar.org](http://www.ramsar.org)

There are several other insights gained from the action: the four year Narran Lakes Ecosystem Project had a Community Reference Panel and provided briefings to the Lower Balonne Area Community Reference Group during the course of this project. There is some evidence that the willingness of the irrigator from whom the water purchase was made was influenced through his understanding of the importance of Narran Lakes through this project.

## **Trends and Future directions in water trade and irrigated agriculture**

There have been steady increases in intra-state and interstate trade (figures 3 and 4). Trends for trade were documented and analysed as part of the tri state Pilot Project. Understanding the influences underlying these trends has been important in the expansion and general development of interstate water trade.

The period of the Pilot Project was not subject to the same climatological, political and management influences as the 2006/07 and 2007/08 trading seasons. Hence the MDBC plans to commission work which aims to help understand the motivation and key drivers for the behaviour of market participants in years such as 2006/07 and 2007/08.

The drought years have demonstrated the significance of trade as adaptation mechanism for existing high value industries in the Basin. There is now a mix of scarcity, uncertainty due to climate change and the influence of government buy backs influencing the market

Given that irrigated agriculture may continue to be subjected to significant adaptation pressures in the near future, the MDBC continues to seek a better understanding of the recent trends, drivers of change and market dynamics. The MDBC is aware that climate change, drought, structural change and policy change are all contributing contribute to change in the basin.

The future of irrigated agriculture in the southern connected Murray-Darling Basin will reflect wider trends and drivers of change in irrigated agriculture more generally. It is fair to say that is a dynamic area of policy which interfaces with other policies such as climate change and energy policy, global trade, food security, biofuels and regional development.

One of the policy issues worthy of further examination is the question: why is the great majority of investment in new irriagtion based on traded water is going into Greenfield's sites while the majority of government dollars for refurbishment is going into established distribution systems?

Traded water has been critical to new developments which are mostly being undertaken on green-fields sites, with private infrastructure, such as pump and pipes. Businesses are investing in new irrigation infrastructure for permanent planting up to 14 kilometres from the rivers.

The MDBC is seeking to gain insights into future of irrigated agriculture and the role of trade under changes in policy, commodity and capital markets as well as trying to understand how climate change and the changing balance between consumptive and environmental water is influencing and may further influence the water market.

There is clearly a complex set of relationships between

- increased uncertainty/reliability as a result of climate change;
- increased value of water due to scarcity and its value for “saving” permanent plantings with high capital values;
- increased demand in the water market due to government buy backs;
- processes to address over –allocation of water.

## **Conclusions**

Irrigation industries are currently exposed to the extremely low water availability in the southern Murray Darling Basin. The impacts of the extended drought/climate change are unprecedented and recent scientific studies are consistently sounding warnings that long term rainfall and runoff reductions are likely. Storage volumes are likely to be reduced due to lower rainfall, higher temperature and increased evaporative demand; therefore there is lower likelihood of 100% allocation in most system in most years.

Adaptation is paramount in the face of climate change, policy change and market changes. Water markets are providing one key adaptation measure.

Australia’s systematic introduction of pro-market based policies or “water markets” is supporting:

- drought responses and climate change adaptation– in both rural and urban areas
- structural adjustment in irrigation industries
- access to water for new capital and expertise intensive horticultural and viticultural developments

- ways of rebalancing levels of extraction and environmental water
- providing new opportunities and directions for irrigated agriculture.

It is clear already that the introduction of policies which have enable water trade has been of great benefit to irrigated agriculture. This demonstrates that trade has provided one powerful adaptive mechanism. However we are still unable to clearly define how irrigated agriculture will evolve in the future under the flexibility of water trade and under different policy and scarcity scenarios, but we can sure that irrigated agriculture will continue to evolve.

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