The Murray Darling Basin Plan amid Drought and Civil Discontent

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A more detailed paper is downloadable at
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The Australian government introduced the Water Act in 2007 in attempt to deal with sustainability within the Murray Darling Basin. This included a combination of buybacks of water entitlements from irrigators for the environment and irrigation infrastructure upgrades. Lobbyists railed against this, although buybacks were treated by many farmers as a financial option. TERM-H2O modelling indicated that farmers would benefit from terms-of-trade gains through the rising price of water that would more than offset income losses from reduced farm output.

A change of government resulted in a cessation of buybacks and ramping up of irrigation upgrades under revisions to the Murray Darling Basin Plan (McCormick 2007). Several Australian agricultural economists contributed to an exposé on the wastefulness and inequity of the irrigation upgrades.[1] One of the problems arose from inconsistencies between state governments and the Commonwealth government. This came to a head when irrigators in northern New South Wales, who are not subject to a water cap under state rules, were able to use Commonwealth funding to pay for irrigation upgrades. Much of this consisted of building dams, thereby diverting water that previously would have reached downstream sites. In most years, high water prices result in greatly diminished rice and cotton production. In 2017-18, the volume of water used for cotton production was far higher than in any previous year when water prices were at drought levels. This circumstance may have arisen from drought descending on the northern basin after the filling of Commonwealth funded dams. A double fish kill in the downstream Menindee Lakes over the following year was, to many, symptomatic of government failure. Given that three years of extreme drought have now occurred in the northern basin, it is highly probable that fish kills may have occurred, perhaps later, if on-farm dams in the northern basin had not been filled early in 2017.

Prolonged drought has resulted in extreme stress within basin communities. Disturbingly, with climate change the western Indian Ocean appears to be warming more so than the eastern ocean. A positive Indian Ocean dipole (i.e., the ocean temperature is higher in the west than the east) associated with drought in eastern Australia appears to be increasingly frequent. Higher social returns will arise from structural assistance packages in basin communities that target sectors other than those suffering from more frequent collapses in productivity.

TERM-H2O has been updated to deal with policy scenarios under the basin plan, specifically $4 billion of funding from 2020 to 2024. Irrigation upgrades even at the regional level result in only relatively small gains. In part, this is because inputs may be diverted from dryland to irrigated farming. The regional employment impacts are most marked during the construction of upgrades, with a 1000 additional jobs in the basin. Thereafter, additional jobs fall to

[1] https://www.abc.net.au/4corners/cash-splash/11289412

around 100 above base. Previous TERM-H2O has shown that public funding of essential services in the basin would provide many-fold the number of jobs provided by upgrades for a given amount of spending. Quite simply, the liveability of regions can be improved by adequate services provisions to the benefit of many, whereas irrigation upgrades are likely to benefit only a handful of community inhabitants.

Public funding of irrigation infrastructure upgrades appears to be inherently wasteful. For example, proposed upgrades of $4 billion between 2020 and 2024 result in modelled welfare losses exceeding $1.2 billion.

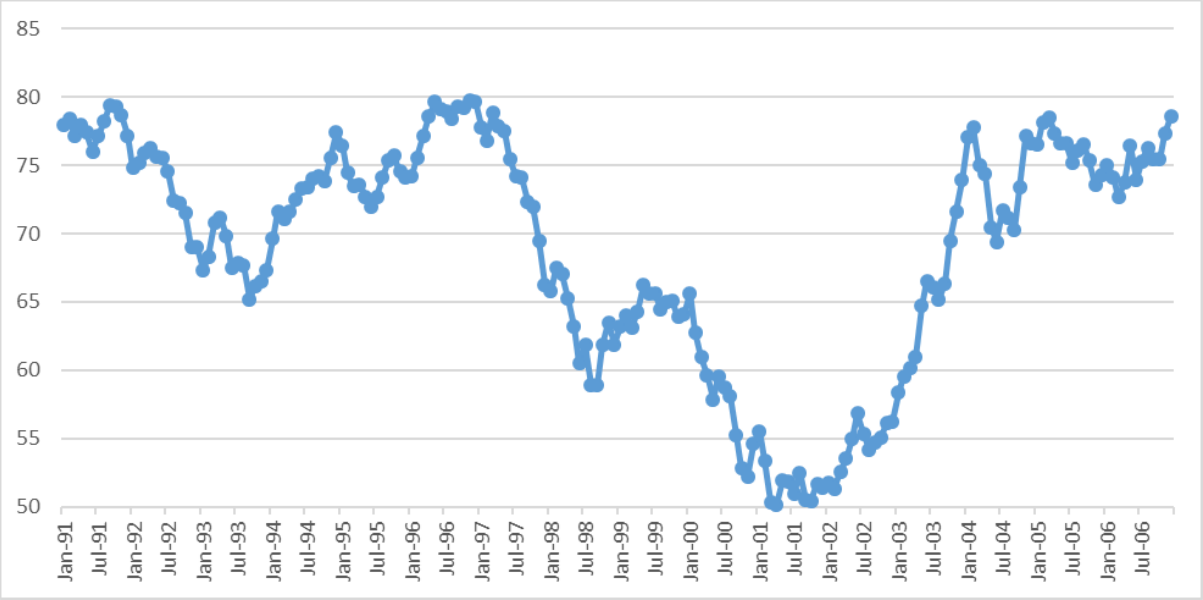
Many basin community members may apportion blame to government intervention, not least the basin plan, for drought-induced woes. Amid the stresses of drought, isolation, variable commodity prices and other elements of structural change, false attribution is understandable. The challenge for economic modellers and others is to steer policy makers towards more efficient responses while not being drowned out by lobbyists of different persuasions.

Key drivers of economic hardship in the Murray Darling Basin since the 2007 Water Act

Australia's exchange rate

Australia's agricultural output is highly exposed to international competition. In the period from January 1991 to December 2006, the Australian dollar did not reach US80c in a single month out of the 192 months in this time (figure 1). Many industries took advantage in this time of the low dollar to expand and launch export sales. For example, Australia's vineyard plantings increased from 60,000 hectares to 167,000 hectares. Wine exports as a share of production volume rose from less than 14% in 1991 to over 50% in 2006.

Figure 1: The US/AUS exchange rate, 1991 to 2006

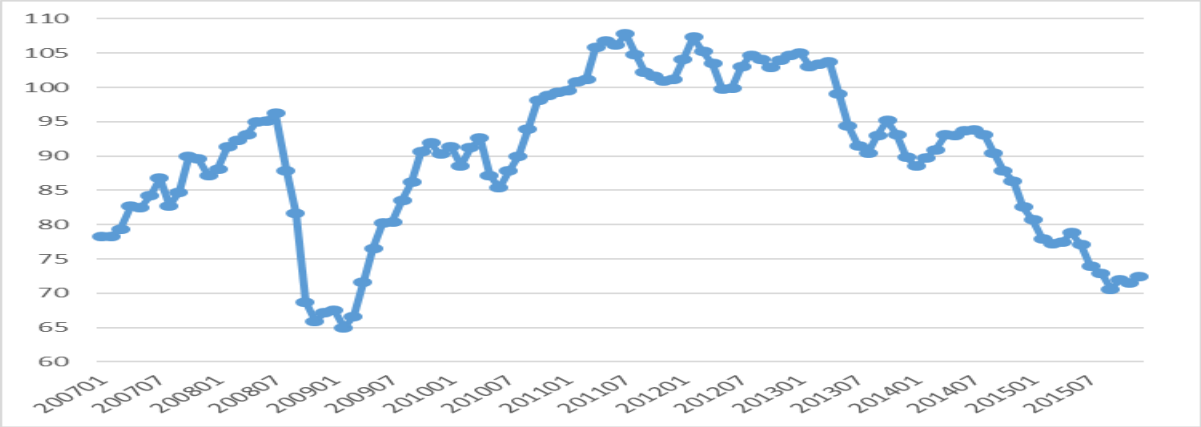


Source: http://fx.sauder.ubc.ca/cgi/fxdata

Contrast this with the period from 2007 on. In the 108 months from January 2007 to December 2015, the Australian dollar traded at a monthly average exceeding US80c for 86 of those months (figure 1).

A combination of prolonged drought from 2006 to 2008 and a stronger dollar thereafter lowered returns to grape-growers. From being a shining light in export expansion, the wine industry struggled with a loss of competitiveness as the mining boom strengthened the Australian dollar. Drought diminished water allocations, raising the costs of grape productions as prices fell. Consequently, national plantings fell to less than 150,000 hectares by 2012 (Anderson and Pinilla, 2017).

Figure 2: The US/AUS exchange rate, 2007 to 2015



Source: http://fx.sauder.ubc.ca/cgi/fxdata

Unforeseen international events

The dairy sector, which uses around one-sixth of the irrigation water in the Basin in a normal year, suffered during the millennium drought as water became scarce. Some dairy farmers sold their diminished annual allocations during drought, using the proceeds to buy in stock feed. This adaptation enabled them to make the best of difficult circumstances. Regions outside the Basin had stock feed available at prices low enough to make the trade viable.

Circumstances have changed. Russian-backed rebels shot down Malaysian Airlines flight 17 over eastern Ukraine in July 2014. The European Union imposed trade sanctions on Russia in response. Russia retaliated by banning all imports from Europe. Europe's biggest market for dairy products before the ban had been Russia. Russia also banned Australian imports. These actions pushed global prices for dairy products down, adversely affecting the profitability of dairy farms (Brooks 2016). Even without the drought that crept over the Basin in 2017 and worsened in 2018 and 2019, dairy farmers would have struggled given the MH17 disaster.

Consequences

Adverse circumstances beyond the control of government have given critics of the 2007 Water Act and the 2012 Murray Darling Basin Plan an excuse to confuse policy and catastrophe. Folk analytics has displaced quantitative analysis in driving tweaks to government responses ever since.

The two main spending components of the 2007 Water Act were Commonwealth buybacks of irrigation water rights and public spending on infrastructure upgrades. Let us examine buybacks first. We note that buybacks were fully compensated at market prices and voluntary. Some contest the notion that buybacks were voluntary on the basis that some farmers were compelled to sell water rights due to financial stress. The alternative was potential bankruptcy.

Without any quantitative analysis, we can infer that if farmers sell water rights voluntarily at market prices, they are no worse off due to the buyback process. TERM-H2O modelling (Dixon *et al*., 2011; Wittwer 2012) revealed that far from depressing Basin regions, buybacks actually resulted in a small increase in overall spending.

Some critics of buybacks at the time asserted that they were equivalent to a permanent drought. The record rainfall event in the two years 2011 and 2012 drowned out this criticism. However, we can compare the direct impacts of drought alongside buybacks (table 1). Drought diminishes dry-land productivity, rainfall on irrigated land and water allocations. There is no direct compensation and the process is involuntary. Buybacks provide a stark contrast: they are fully compensated and voluntary. A volume of 3500 GL proposed early in the process would have reduced water available for irrigation by around 32%, implemented over a number of years so that farmers could gradually introduce water-saving measures, lessening the impact of buybacks on irrigated output.

Table 1: Estimates of direct impacts of drought and buybacks on Murray-Darling Basin farming

	Drought 2007-08	Fully implemented buybacks (3500 GL) relative to
Dry-land productivity	-20%	0
Irrigation: rain	-52%	0
:water	-52%	-32%
Compensation	No	Full
Process	Involuntary	Voluntary

a Scaled to Basin-wide impacts from estimates of southern Basin impacts reported in Wittwer (2011).

To summarise, there appear to be several reasons why buybacks have become a scapegoat for hard times among some people within Basin communities. First, the 2007 Water Act may have conveyed the impression among those concerned for the health of the river that farmers were the problem in the Basin. Second, the Act was introduced at a time when Australian farmers were losing international competitiveness due to a soaring Australian dollar resulting from the mining boom. Third, when the Act was introduced the Basin was in drought. Droughts are always associated with community stress.

Modelling of proposed infrastructure upgrades from 2020 to 2024: scenario 1

The scenario depicted in this study allocates $800 million of infrastructure upgrades to Murray-Darling Basin regions in each of five years from 2019-20 to 2023-24. The objective is to increase efficiency in irrigated agriculture and town water usage so nearly 500 GL of irrigation water entitlements are diverted for environmental purposes. Investments at the regional level have been mapped from data provided by Marsden Jacob at the natural resource management region (NRM) to SA3 regions within TERM-H2O.

The productivity of irrigation agriculture rises successively from 2021 to 2025. ABARES provided estimates of increased outputs. We assumed that three-quarters of the increased irrigation output estimated by ABARES was due to factor transfers and one quarter due to productivity gains.

Figure 3: Macro impact, Murray Darling Basin, scenario 1
(% deviation from base)

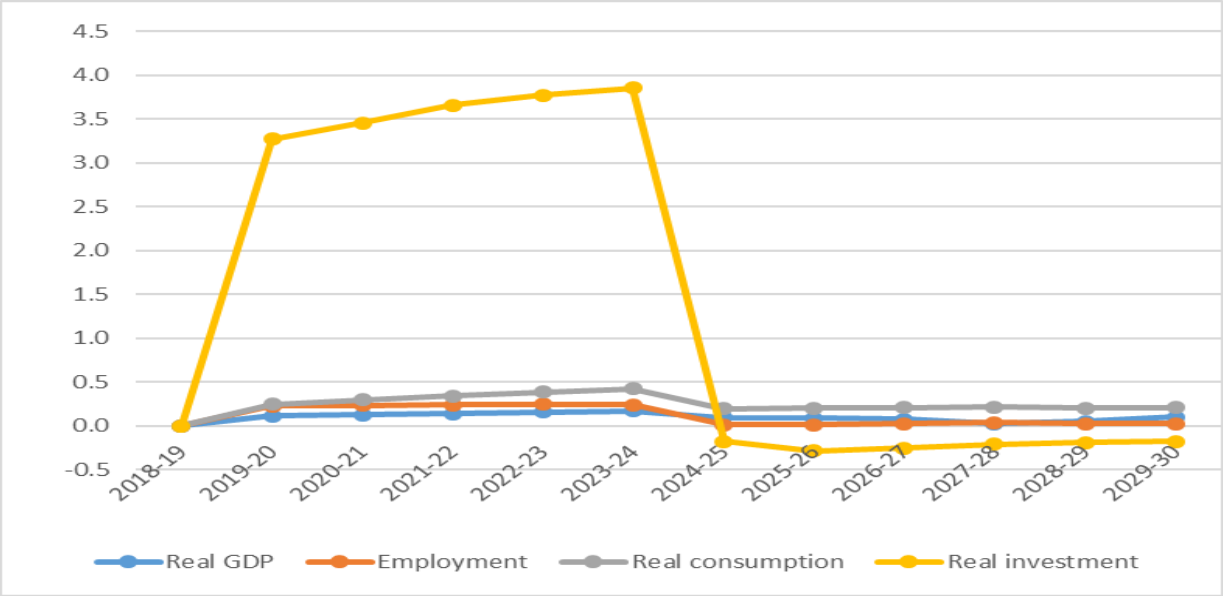


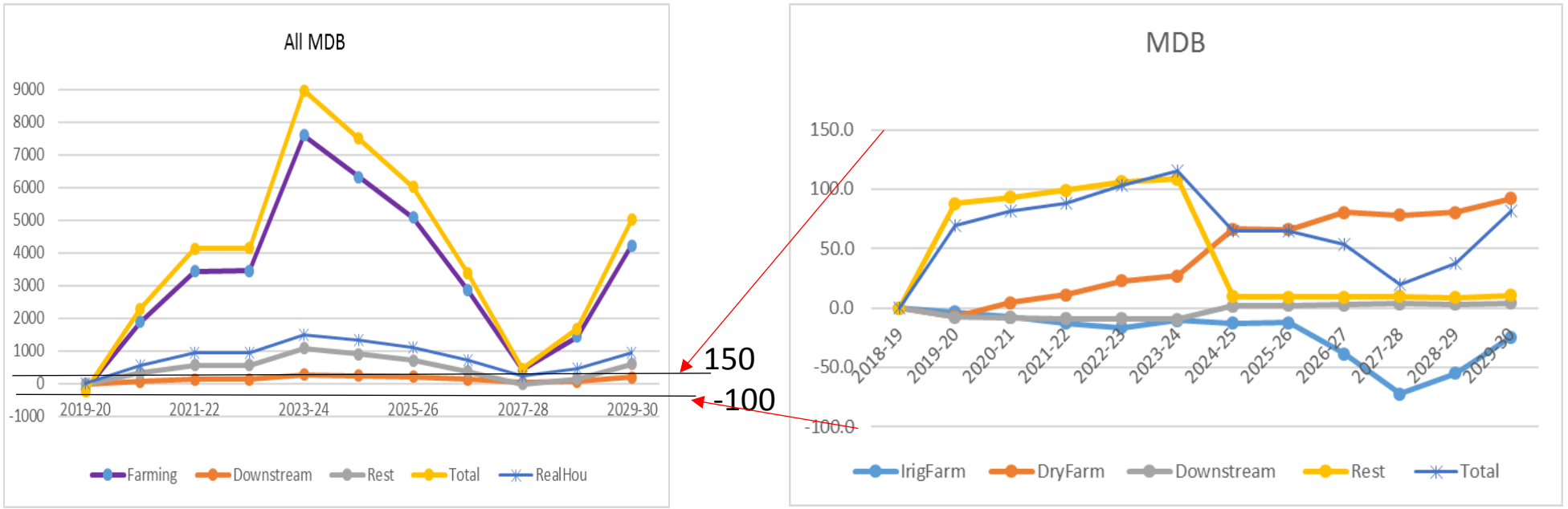
Figure 3 shows percentage deviations in Basin-wide macro variables. The investment phase raises Basin-wide investment by around 3.5% above forecast. At the same time, Basin-wide employment rises by around 0.25% or around 1000 jobs. Once the investment phase has ended and almost 500 GL of water rights allocated to the environment, employment moves back towards base. From 2024-25, Basin-wide employment increases by around 100 jobs relative to the base.

Figure 4 shows the small marginal impact of the program relative to seasonal variation. Note that dry-land farming output increases relative to base as water is reduced for environmental purposes (right hand side of figure 4). This is because part of the ongoing adjustment to reduced water availability is to move farm factors into dry-land farming. An example might be dairy cattle production relying increasingly on either dry-land fodder or fodder purchased from elsewhere rather than irrigated pasture.

The productivity improvements in irrigated agriculture in most years offset the loss in irrigated output due to reduced water availability. However, in the drought years of 2027-28 and 2028-29, irrigated output falls significantly below base. This is because water is many-fold more valuable in drought years than normal years, and therefore the economic losses of water set aside for non-economic uses increases many-fold.

Figure 4: Value-added by broad sector and aggregate consumption, all Murray Darling Basin

($m year-on-year changes due to seasonal variation)



Spend same funds over 10 years in human services in Basin: scenario 2

This time, the funds target services, namely health, education and community care. This spending has immediate regional benefits. Real GDP in the Basin rises to around 0.4% above base for all years of the decade in which the spending occurs. Employment initially rises by 2100 jobs in 2019-20 relative to the base. That is, half the dollar amount of infrastructure spending results in twice as many jobs. The employment gain relative to base tapers off slightly over time, so that in 2028-29, the final year of additional services spending, Basin jobs are around 1800 above the base. The finding that spending on relatively labour-intensive services creates four times as many jobs per dollar spent as comparable spending on infrastructure upgrades is consistent with Wittwer and Dixon (2013).

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