The Murray Darling Basin Plan

The 'Just Add Water' Approach is failing communities and the environment – Multiple Measures Approaches Needed

Background to Plan

The Murray-Darling Basin Plan (MDB Plan) was developed to improve the health of rivers and floodplains by acquiring water for the environment, at a cost of $13 billion to the Australian taxpayer. The MDB Plan was signed into law in November 2012 under the Commonwealth Water Act 2007. The MDB Plan sets limits on how much water can be taken from the Basin for irrigation, drinking water, industry or for other purposes in the future. The MDB Plan is based on the results of the 'Benchmark Model'[1], an inundation model which assumes if you inundate an area of floodplain for a set period of time, you will restore the health of that system (MDBA 2012a). This single measure approach is an assumption, not a reality, in what is now a heavily modified landscape, regulated, host to a number of introduced species such as carp, and devoid of much natural riparian vegetation and native species. Figure 1 displays the thinking behind the MDB Plan and that 'natural' type inundation of the floodplain is key to restoring river and wetland health. Water recovered from consumptive use is used for environmental flows to try to improve the health of the Basin's rivers, wetlands, floodplains, plant and animal habitats.

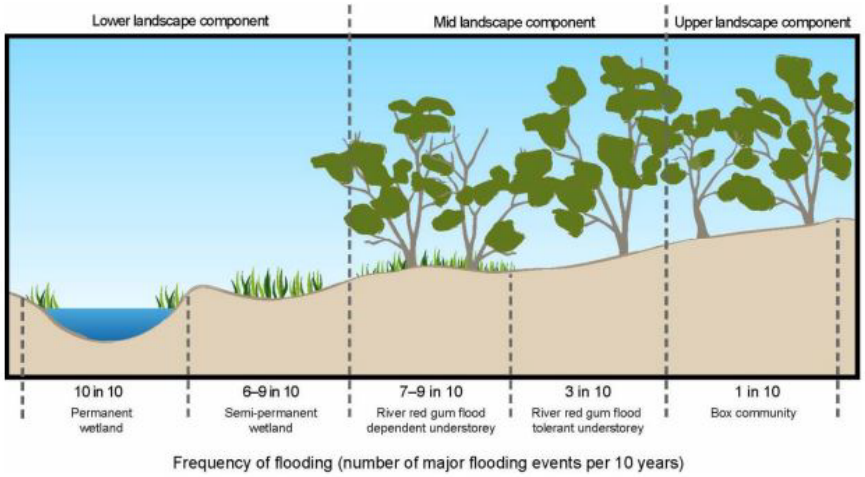


Figure 1 - Flooding requirements of selected vegetation communities for Murray Darling Basin lowland forests (Source: based on Ecological Associates 2006).

Basin Plan– The 'Just Add Water' Approach is Inadequate

Despite overwhelming evidence that the inundation modelling (Benchmark Model) used is based on flawed assumptions, is inaccurate and doesn't represent the ecological reality of the Basin (Blackmore 2017, Gell et al 2019), this model still underpins the entire implementation of the MDB Plan. In addition, the modelled amounts of water are unable to be delivered due to physical constraints and unacceptable consequences for local communities and their environment. A new way forward is needed.

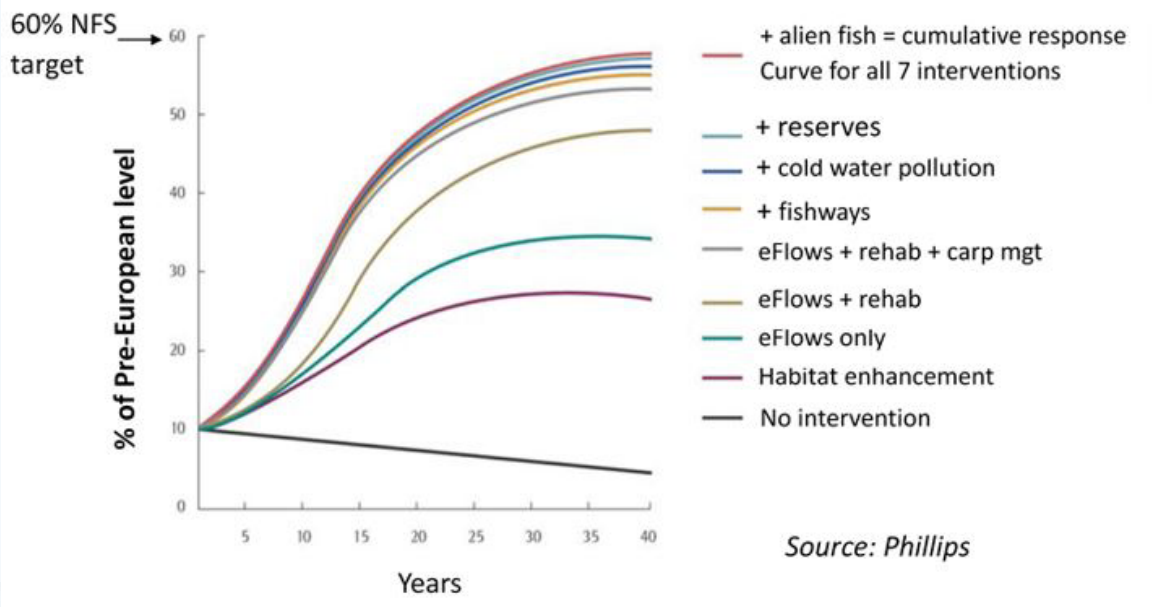
MDB degradation of the natural environment – A combination of factors

River regulation and landscape modification has brought much prosperity, food security and recreational activities to Australia, but at a significant cost to the natural environment. A combination of factors has led to the decline of both physical and biological parameters within our rivers and wetlands. Finding a balance for a healthy modified environment will require addressing each of these factors and proposing ways forward to tackle them at multiple levels.

In 2001 an expert panel convened and used modelling to produce cumulative response curves to assess the success of single restoration approaches vs a multiple measures intervention approach, where interventions were undertaken together (Figure 2). The expert panel concluded that there was good evidence to support that with all seven strategic interventions undertaken in an integrated way (with suitable levels of investment for all strategies, as opposed to a focus on one measure), the proposed target level of restoring native fish communities to 60 per cent of their pre-European level is achievable, and most of it could be achieved within 40 years.

[1]The benchmark model is a modification of the BP-2800 scenario (model run 847 (MDBA, 2012a), which informed development of the Basin Plan. With a set of mandated refinements described in Schedule 6 (Part 2) of the Basin Plan and a number of non-mandated changes jurisdictions have agreed to be included in the benchmark model.

They also noted that the constraints to such an approach were financial rather than a lack of understanding about how to fix the problem. Figure 2 highlights the fact that if a single measure water only approach is taken, returning environmental flows to the system without the other interventions, fish populations would only reach half of the target set, no matter the timeframe. However, when combined with the other interventions with equal investment, the target could be met within the 40-year timeframe. Although these are only modelled intervention response curves, there is good evidence from around the world that multiple measure approaches are needed. The multiple measures style approach is not new and formed the basis of the original Native Fish Strategy, which aimed to restore native fish populations to 60% of pre-European levels within 40 years. However, this program is now defunct due to a lack of financial investment (Koehn et al 2014).



Currently we have $13 billion being spent on a single measure water only based approach, and comparatively very little being spent on the other measures needed to successfully restore native fish populations. This is the same for other important fauna and flora such as birds and frogs. A multiple measures approach which aims to address the multiple threats which have led to a decline in the health of our rivers and wetlands is needed, an approach which supports the triple-bottom line approach originally envisioned under the MDB Plan.

Multiple Measures – A pragmatic way to achieve the social and ecological aspirations within the basin

More recently two evidence-based and pragmatic ways forward have been proposed - approaches that could significantly improve the ecological health of the basin and help in meeting the ecological objectives set out in the Basin Plan without devastating rural communities as the current plan does. These approaches could positively impact local communities most greatly impacted by the current MDB Plan implementation, by providing employment opportunities as opposed to remotely run water initiatives, which benefit centralised government and large city based academic institutions.

Baumgartner et al (2020) 'Ten complementary measures to assist with environmental watering programs in the Murray–Darling river system, Australia' states that simply recovering water will not work to deliver anticipated environmental benefits. The authors have proposed a multiple measures approach through ten already practised complementary measures which would maximise the benefits of environmental flows. They are summarised below.

In addition, and primarily focussed on native fish (although the actions would benefit the ecosystem as a whole) is the recently signed Native Fish Recovery Strategy (NFRS) – Working together for the future of native fish (MDBA 2020). The NFRS has been established leading on from the original Native Fish Strategy which ended in 2010 due to lack of continued government investment. In this approach, environmental water becomes one important input that needs to be integrated with the other measures to maximise success and decrease wasting water. The Strategy has a 30-year horizon to 2050, with 10-year implementation stages that aim to achieve four broad outcomes:

Outcome One: Recovery and persistence of native fish
Outcome Two: Threats to native fish are identified and mitigated
Outcome Three: Communities are actively involved in native fish recovery
Outcome Four: Recovery actions are informed by best available knowledge.

Both the Baumgartner et al 2020 ten complementary measures approach and the NFRS are multiple measure, inclusive and pragmatic approaches relying on the best available information to date and focussed on an inclusive, implementation and learning together platform.

Ten Complementary Measures to replace a 'Just Add Water' MDB Plan Approach

Measure 1: Integrated aquatic pest control

Invasive species released or escaped into the rivers and wetlands have benefited greatly from the regulation of rivers, the loss of habitat and species, and are directly related to a reduction in our native fauna and flora. Common carp are one of the most invasive fish species in the world and are currently contributing to the decline in our river and wetland health. Environmental water can exacerbate the problem with inundating wetlands and leading to proliferation of pest species such as carp, negating the original benefit of the water (Koehn et al 2016). Strategies are available to control invasive species, but currently lack any adequate funding and lack a concerted and co-ordinated approach at a Basin level.

Measure 2: Sustainable agricultural infrastructure

Irrigation infrastructure such as offtakes and pumps can have unintended environmental impacts either by disrupting biological cues such as spawning, directly blocking connectivity and/or extracting/redirecting species such as fish from the river and wetland environment. For example, pumps can suck up fish and other aquatic biota and pump them out onto paddocks where they perish, or undershot gates at weirs can kill juvenile and small fish moving under them. Strategies to lessen impacts are readily available such as fish friendly regulators, fish passages, self-cleaning pumps and off-take screens. However, limited investment and lack of a co-ordinated approach is hampering widescale adoption and implementation. Environmental water delivered through such infrastructure can exacerbate the problem if fish and other organisms move and breed while this infrastructure is in use, negating the benefit from environmental water delivery.

Measure 3: Habitat restoration

No amount of environmental water will benefit aquatic fauna and flora if suitable habitats are not available for breeding, feeding and living. Currently in most river and wetland systems habitat is in poor condition. Practical proven strategies are available such as re-snagging, and revegetation along the banks of rivers with submergent plants. This could be done with local community input to stimulate jobs and could occur widescale. Environmental flows and other measures would complement these actions. This would also help off-set erosion problems and increase productivity within rivers and wetlands. This measure has been tried and proven and is only lacking adequate investment and a co-ordinated approach.

Measure 4: Addressing cold water pollution

Water delivered from most of our large dams like Hume is significantly colder in the spring/summer delivery period than natural flows due to water being released from the bottom of dams. This has adverse impacts on the rivers and wetlands such as reducing breeding opportunities, and the cold-water effect can last for 100's of kms downstream. For example, water released at Hume can still have impacts as far as Echuca and Barham, potentially off-setting benefits of environmental water delivery into the Barmah-Millewa Forest. Environmental water delivered from these dams can often impact the water temperature at critical breeding times and offset any benefits. There are engineering based solutions to cold-water pollution, the technology is there, they just need investment. Solutions have been found for Hume dam; investment and a co-ordinated approach is all that is stopping it from occurring.

Measure 5: Enhancing fish passage

Barriers to migration are a major factor to the decline in many native fish species within the MDB, as they are unable to migrate to complete their lifecycle requirements. The delivery of environmental water is ineffective if fish are unable to reach spawning grounds even if the water has stimulated them to move. Fish passage technology exists that is effective in allowing native fish to pass, and has been successful in systems where it has been applied. However not all dams and weirs have adequate fish passage due to a lack of investment in this infrastructure across the entire basin. Fish passage can further be improved through operations such as having weir gates raised and allowing rivers to flow freely during the non-irrigation season.

Measure 6: Enhancing nutrient cycles

In recent decades point source releases of nutrients into rivers and wetlands has significantly reduced due to improved rural land and urban run-off control. However, floodplain and river bank sediments contain high levels of phosphorus which is a key component of blue-green algae blooms which continue to be a challenge within the entire basin. Stock having access to river banks and to a greater extent the delivery of water can exacerbate bank erosion, especially if water is delivered at high constant rates (resulting in a process called notching and bank collapse). As banks collapse, water becomes cloudy, turbidity increases and phosphorous is released leading to ideal conditions for algae blooms to occur, and decreasing the ability for submerged vegetation to grow. Fencing off water ways, and revegetation of banks is a pragmatic and well-established method for stabilising banks, and an increase in aquatic plants and bank vegetation helps to trap sediment and use nutrients within the water, it just takes investment. In addition, delivery of flow in a variable manner as opposed to constant water levels also helps to reduce notching and reduce erosion.

Measure 7: Improving sediment transport

Leading on from to Measure 7 for every tonne of sediment that enters the rivers, approx. 3.5kgs of phosphorous is added to the water. With high summer flows through the choke points in systems such as the Murray and Goulburn, millions of tonnes of sediment is entering our rivers each year, making tonnes of phosphorous available for blue green algae blooms. As with measure 7, investment ready programs are available and NRM bodies such as Catchment Management Authorities (CMA) and Local Land Services (LLS) are trying to tackle the problem having incentives for fencing off riparian areas, and small scale plantings, but the investment is insignificant when compared to water acquisition investment. As these programs would need to be implemented locally, the added benefit of economic stimulus to these rural areas would also be significant if investment ready programs such as riparian fencing and bank revegetation were prioritised.

Measure 8: Addressing salinity

Many of the salinity issues which plagued the food production areas of the MDB have been addressed and existing programs are now aimed at point source problems within the basin. Salt interception schemes and harvesting technology is available and further investment in these schemes at targeted areas is needed, so that saline intrusion into our rivers and wetlands is reduced. Currently, dilution flows are used to deal with salt; a better investment priority would be to concentrate on treating the problem before it enters the rivers and utilising that water elsewhere.

Measure 9: Re-establishing threatened species

Many native species of fauna and flora are now either threatened or locally extinct within their natural home ranges. In most cases if an animal or plant is locally extinct in an area, no amount of environmental water will bring them back, and these habitats are now often occupied by invasive species who directly benefit from the targeted water delivery. For example, wetland small-bodied specialist fish (e.g. Southern Pygmy Perch) are now locally extinct in most of the NSW Basin. Delivery of water to wetlands where they were historically found provides no benefit to them at all, and in-turn it now benefits carp who proliferate when wetlands are watered adding to the nutrient and sediment problems described in measures 6 and 7. Without adequately resourced re-introduction programs together with habitat restoration (measure 3) and invasive animal control (measure 1) these and many other threatened fish species will never return. The knowledge and technology to captively breed many of these species for release is known, it just takes investment and a co-ordinated approach such as through the NFRS and locally based NRM bodies.

Measure 10: Integrating complementary measures into basin scale flow delivery strategies

In direct contrast to the current MDB Plan which has a single water-only focus, integration of all measures is needed to reach the ecological targets set within the plan. For example, if cold-water pollution was addressed in Hume, spawning cues for fish would be improved and environmental flows would then benefit these fish. Fish passage would allow the fish to move to where they want to spawn and if the habitat was enhanced greater success would be achieved at spawning. In addition, if river banks were protected and revegetated with emergent and submerged aquatic plants more habitat would be available for prey items and juvenile fish whilst providing protection for the banks, trapping sediment and increasing production within the river and wetlands themselves. It's not rocket science, that's how nature works, through an integrated process driven approach, and the MDB Plan would be greatly improved by reflecting nature's needs, as opposed to a single measure approach at the exclusion of equal investment in the other measures. In addition, a sole focus on water acquisition actually hurts investment in these other measures as resources are limited and money directed towards environmental water is often re-directed away from other measures to the detriment of the environment.

Way forward and future

The word integrated is integral in relation to meeting the targets we want for our river and wetland systems. Single measure approaches fail to address multi-faceted challenges and the MDB Plan 'Just Add Water' approach will continue to fail until it embraces a fully resourced multiple measures approach. We have the knowledge, tools, and programs (such as the NFRS) to proceed with a multiple measures approach to the MDB Plan, it only takes political will and appropriate investment.

Recommendations

1. Employ a multiple measures approach within the MDB Plan including a suite of measures that are not just aimed at water recovery but ecosystem health recovery in unison with a triple bottom-line approach to stimulate rural economies.
2. Stop further acquisition of water entitlement and invest the remaining MDB Plan funds into an evidence-based, multiple measures approach using a suite of interventions not just aimed at water recovery to achieving the desired environmental outcomes – healthy ecosystems in unison with a triple bottom line (see Baumgartner et al 2020 for way forward).
3. Fully fund the Native Fish Recovery Strategy and employ local communities to implement on-ground activities within it.

NB – It is assumed by many that the worst is nearly over with water recovery under the MDB Plan, however there is still the implementation of the Sustainable Diversion Limit Adjustment Mechanism (SDLAM) and the recovery under the 405GL of upwater. Some of the projects under the SDLAM pose considerable risks to the environment in some areas, along with the third party impacts of delivering the additional water and the economic impacts to individuals and communities if the constraints are relaxed.

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