

River health implications of water transfer in the flow stressed Moorabool River catchment.

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Abstract

The Moorabool River is one of Victoria's most flow stressed river systems. It is integral for the supply of water for two of Victoria's largest regional centres, Geelong and Ballarat. Over 60 per cent of the average natural flow of the river system is harvested each year, with over 80 per cent of the average summer flows harvested. Modelling undertaken for the Moorabool River system indicates that there is a 20 GL shortfall in the volume required to meet the environmental flow requirements.

A strategic water sharing plan for the central part of Victoria, incorporating Geelong, Ballarat, Melbourne and West Gippsland is currently under development. Directions set in the Central Sustainable Water Strategy (CSWS) will determine the trajectory for the health of the Moorabool River.

The Corangamite Catchment Management Authority, in undertaking its new role as "caretaker of river health" and manager of the environmental water reserve, has been central to the discussions relating to a share of the over allocated water for river health. The process has been one of adaptive thinking, experimentation with new methodologies and gaining new knowledge previously held externally to CMAs.

A discussion paper released for the Central Sustainable Water Strategy (Department of Sustainability and Environment, 2005) has indicated that Geelong's share of water within the Lal Lal Reservoir may be transferred in the medium to long term to meet Ballarat's future demand for water. Intuitively this transfer of water should not raise any particular concerns for river health, however the details relating to the possible operation and management of the entitlement transfer have the potential to lead to a significant decline in river health for the Moorabool River.

The Moorabool River between Lal Lal Reservoir and She Oaks Weir is used as a conduit for delivery of water for urban water supply. This river reach is in moderate to good condition, with extensive remnant vegetation, pool habitats and instream vegetation of higher value than other sections of the river system.

The transfer of the Geelong entitlement has the potential to significantly degrade this river reach if the flows currently provided to the river as a result of the river being used as a conduit cease. Current passing flows in the Bulk Entitlement of Central Highlands Water are low, and thus the environment has benefited from the transfer of water between water supply infrastructure. A decision to transfer the entitlement without providing compensation flows to this river reach will have significant impact on the river system.

CMAs and other environmental flow managers need to actively participate in the development of operating rules and negotiations for major water trades to ensure that water allocation processes maximise benefits to river health. Whilst a 1:1 ratio transfer of an entitlement between authorities may appear to have little consequence for river health, investigation into the operation of such transfers should occur.

Introduction

Water trading has now been accepted as the best way to ensure that our precious water resources are used for high value uses. However, in catchments where urban water supply is the dominant water use, we are now seeing extensive transfers between both rural and urban water authorities and between urban water

authorities. The transfers are occurring, not to a higher value water use, but to users who have a more urgent or greater need for water in the short to medium term. Such transfers may occur within river basins as transfers between small regional towns, or potentially across river basins, as transfers between larger regional towns and metropolitan centres.

At a first glance, a transfer between users connected to the same river system would appear to have little impact on the health of that river system. However, the operational details of such a transfer should be investigated prior to the transfer occurring. One such case has been highlighted on the Moorabool River in central Victoria. The water authorities supplying the water needs of the regional centres of Geelong and Ballarat both hold Bulk Water Entitlements from the Moorabool River. The discussion paper for the Central Sustainable Water Strategy (CSWS) (Department of Sustainability and Environment, 2005a) and the water authorities own water supply demand strategies had identified that Ballarat has a more urgent or greater need for an entitlement from the West Moorabool River than Geelong. A transfer of 7 GL of Bulk Entitlement currently held in the Lal Lal Reservoir was proposed. A detailed look at the current operation of this entitlement for Geelong, shows that current operations may in fact be more beneficial, or pose less risk, to the lower Moorabool River than operations following a transfer. This is due to the river being used as a conduit between the Lal Lal Reservoir and the Geelong Water Supply off-take at She Oaks.

Moorabool River Catchment

The Moorabool River Catchment is 1,150 km² extending from the Great Dividing Range near Ballarat to the Barwon River west of Geelong as shown in figure 1. There are two main branches of the Moorabool River, the East and West, which join at Morrissions before the river flows through a fairly confined valley before joining the Barwon River near Geelong.



Figure 1: The Moorabool River Catchment (Source: Corangamite CMA, 2005)

The Moorabool River catchment is highly developed for agriculture, although increasingly peri-urban development is encroaching on rural activity in the upper East and West branches and on the lower Moorabool between She Oaks and Batesford. Agricultural activities within the catchment include grazing,

large scale potato growing, along with increasing areas of cropping of Lucerne and other fodder crops. A small irrigated market gardening area is located on the lower Moorabool between She Oaks and Batesford.

Current water use

The Moorabool River is considered to be an unregulated river for agricultural water supply, however the flow regime of the river is highly modified and regulated for the purposes of urban water supply. Approximately seventy per cent of water use is for urban supply. Two regional urban water authorities harvest water from the Moorabool River system. Central Highlands Water, who supply water to Ballarat and district harvests from the West Moorabool River using the Moorabool and Lal Lal Reservoirs. Barwon Water supplies water to Geelong and district and harvests from the West Moorabool River via the Lal Lal Reservoir and She Oaks Weir, and from the East Moorabool River via the Bostock Reservoir. A number of private river diverters have licences to take and use water from the river system, these are unregulated licences and as such offer no assumed security of supply. Recent investigations have also identified that a significant volume of farm dams are located within the catchment (12,300 ML) (Corangamite CMA, 2005), which account for 21 per cent of the water use. Table 1 shows the total water allocations within the catchment and the current water use in 2004.

Table 1. Estimates of water use and availability from the Moorabool River Catchment

Water User	Bulk entitlement or licensed volume	Current use (average annual megalitres)
Upper West Moorabool (Ballarat)	10,500	
Lal Lal Reservoir (Ballarat)	14,000	
Ballarat Total	24,500	16,600
Lal Lal Reservoir (Geelong)	7,000	
She Oaks (Geelong)	2,000	
Meredith (Geelong)	600	
Upper East Moorabool (Geelong)	9,000	
Geelong Total	18,600	7,600
Private diverters	2,700	1,200
Farm dams	12,300	12,300
Total	58,100	

Source: Adapted from Corangamite CMA, 2005

River Health and Environmental Flows

In 2005, Corangamite CMA released the Moorabool River Water Resources Assessment. This project assessed:

- The environmental flow needs of the Moorabool River using the FLOWS methodology (Department of Sustainability and Environment 2002);
- Water use (including the volume and impact on stream flow of farm dams);
- Current and natural flows; and
- The impact on urban water supply yield if the recommended environmental flows were provided.

The study confirmed anecdotal evidence that the Moorabool River is extremely flow stressed in most reaches. The study found that there is a 20,000 ML shortfall in the average annual of water required to meet the recommended environmental flows. All flow components across the recommended environmental flow regime were severely impacted by urban and rural water use. Of particular concern was the inability to meet even the summer low flows essential for maintaining habitat connectivity and water quality over the summer period. For example at the lowest point in the system, Batesford, the recommended summer low flows are met less than 50 per cent of the time under current water use conditions (Sinclair Knight Merz, 2004)

Whilst flow stress is an important issue for the Moorabool catchment there are many other issues impacting on river health. There are over 15 on-stream storages which act as barriers to native fish migration. Native stream side vegetation is largely absent from many reaches along the rivers length and willows dominate

some reaches. Although there are many issues impacting on river health, many natural values still exist and the reach between Lal Lal and She Oaks Weir is particularly important due to the quality of the native stream side vegetation and intact instream habitat features as shown in figure 2 and 3.



Figure 2 & 3: West Moorabool River between Lal Lal Reservoir and She Oaks Weir

The Moorabool River below She Oaks is quite altered, but essential as a conduit of flows towards the lower Barwon River and the Ramsar listed Lake Connewarre wetlands.

Local Water Supply Issues

Ballarat has Victoria's 3rd largest population, and was originally developed during the gold rush. Whilst Ballarat was located in a gold rich area of Victoria, it was located at the top of five separate river catchments and is considered 'water poor'. The population of Ballarat is expected to grow from 96,000 to 149,000 people by 2055 (Department of Sustainability and Environment, 2006) in response to an increased commuter population to Melbourne and many choosing a regional lifestyle. Meeting the water needs of this population was discussed in great detail during the recently released Options Paper for Ballarat's Water Supply (Central Highlands Water, 2005). One option identified in the development of this paper, and previously through historical agreements between the water authorities, is the transfer of the Geelong Bulk Entitlement in Lal Lal Reservoir.

Other options for Ballarat include connecting with supply systems north of the Great Dividing Range, accessing small groundwater reserves, linking water supply to Melbourne and potable reuse of treated wastewater in the longer term. The transfer of the Lal Lal Entitlement is strongly supported by many in the Ballarat community.

River Health Trajectory

The Index of Stream Condition (Department of Sustainability and Environment, 2006) indicates that the condition of the West Moorabool River ranges from moderate to very poor, although the focus reach for this discussion is currently in moderate condition. The Corangamite Regional River Health Strategy (CRHS) (2006) indicates that the condition of the West Moorabool River will be maintained if the five year action plans identified in the strategy are undertaken. The baseline condition used in the CRHS is current condition. It is important to note that if no action is taken, a decline in river health may also occur if water use up to full entitlement levels occurs, as current use is well below full entitlement as shown in Table 1. Undertaking the actions in the CRHS will ensure that the goals of the Victorian River Health Strategy (Department of Sustainability and Environment, 2002), of ensuring no net decline in the health of any river will be met.

Therefore in considering the implications of the transfer of the Lal Lal Entitlement we must consider the likely condition of the West Moorabool and lower Moorabool River under the full uptake of the water

entitlements against the predicted condition of the river under various operating strategies following the entitlement transfer.

Catchment Management Authorities- Manager of the Environmental Water Reserve

In 2004, the Victorian Government released its White Paper on water "Our Water Our Future (Victorian Government, 2004). A key action in Our Water Our Future was the establishment of an environmental water reserve for every Victorian River. The environmental water reserve is a share of river flow set aside under the *Water Act 1989* to meet the environmental water needs of each river system. The White Paper also identified that the catchment management authorities would become the caretakers of river health, adding the role of manager of the environmental water reserve.

In undertaking the role of the manager of the environmental water reserve, Appendix C of Our Water Our Future (2004) outlined the following responsibilities for the catchment management authorities:

- Liaising with storage managers to negotiate effective environmental release patterns.
- Providing input into sustainable water strategies, stream flow management plans and groundwater management plans.
- Monitoring and reporting on environmental condition.
- Engaging with community on environmental flow issues.
- Developing operating strategies for the use of the environmental allocations held in storage
- Developing annual environmental watering plans

Relationships and Knowledge Sharing

In undertaking the role of manager of the environmental water reserve, a partnership approach is required. River health managers must work together with water supply planners and operators to ensure that through harvesting of water for human uses risk to river health is minimised. It is essential that river health managers are active participants in all aspects of water supply planning from the local water supply demand planning by local water authorities through to regional or state-wide planning activities such as sustainable water strategies and policy development, in addition to the role of environmental advocate.

River health managers need to have a thorough understanding of the operation of their local water supply systems, including an understanding of any hydrological models that may be applicable to the system. This will allow real buy-in to discussion when new augmentation or trading options are raised.

In addition to this it is important for river health managers to be able to clearly articulate the environmental flow recommendations, to understand the science (including the limitations) and importantly, to be able to articulate the risk of not providing the environmental flow recommendations at a whole of river system scale and a reach scale such as the Moorabool River between Lal Lal Reservoir and She Oaks Weir.

Whilst data on population growth and water demand is rarely queried during the release of water planning documents, the "claim" for more water for the environment will be tested. Not only by those seeking more water, but also by those seeking to protect rivers.

The Lal Lal Transfer (an example)

As shown in Table 1, capacity and water entitlements in the Lal Lal Reservoir are shared between two regional water authorities. The water is used to supply a large proportion of Ballarat's water supply and a smaller proportion of Geelong's water supply. The reservoir was constructed in the mid 1970's and an agreement was reached between the regional water authorities that the whole capacity of the Lal Lal Reservoir would eventually be transferred to meet the water needs of Ballarat's growing population (Department of Sustainability and Environment, 2006a & b).

Ballarat's Water Supply Options Paper (Central Highlands Water, 2005), the Ballarat Regional Action Plan (Department of Sustainability and Environment, 2005b) and the Discussion Paper for the Central Sustainable Water Strategy (Department of Sustainability and Environment, 2005a) all indicated that Ballarat's demand would meet supply level at 2010 and thus there is an urgent need to source alternative supplies in the short term. These documents raised the option of honouring the past agreement outlined above, and that the 7,000 ML allocation currently held in Lal Lal to meet Geelong's needs should be transferred meet Ballarat's urgent need in the short term.

How can a water trade lead to a net decline in river health- if no additional water will be taken?

The Geelong entitlement in the Lal Lal Reservoir is currently released, when required, from the Lal Lal Reservoir after which it flows approximately 25 km to the She Oaks Weir where it is harvested. The She Oaks Weir is approximately 10 metres high and is located within a reach of the river known for its intact riparian zone, platypus and blackfish habitat. Downstream of the Weir, passing flow releases provided under the Bulk Entitlement (which are below the recommended needs of the river) along with some leakage occurring from the structure maintain a further reach of intact vegetation and habitat.

If the transfer of water between Geelong and Ballarat occurs it will mean that the river will no longer be used as a supply conduit, up to 7,000 ML of water would no longer be available to this section of the Moorabool River. This would further reduce compliance with the recommended environmental flows for this reach of the river and would lead to a short fall in flow volume for the river of even greater than the existing 20,000 ML per year on average. This would obviously lead to a decline in river health in the immediately affected reach but also further downstream for the river.

Whilst using rivers as a conduit for irrigation or water supply releases is not considered ideal for meeting environmental flow needs, due to issues with the timing and seasonality of flows, in a river considered as flow stressed as the Moorabool River, the availability of this water to maintain water quality, habitat and streamside values is essential.

In considering this transfer of water, the operational rules for which this transfer would occur need to be addressed at the time of the transaction. Most importantly of course, is the consideration of whether the river will get a share of the transaction. An assessment of whether this share would be more beneficial to the river as an environmental allocation held and managed by the environmental water reserve manager or as a series of passing flow rules held as an obligation under a bulk water entitlement by the water authority is also required at the time that the transfer is proposed.

A transfer that has occurred without compensation flows for the environment is unacceptable and would lead to a decline in river health, even though the transfer would not lead to further water allocation within the system. By negotiating acceptable compensation flows based on the recommendations from an environmental flow study which has used a best practice methodology such as FLOWS (Department of Sustainability and Environment, 2002), we are able to ensure that further decline in river health is avoided.

The draft Central Sustainable Water Strategy (2006) indicated that the transfer of water between Geelong and Ballarat was not considered a short term option and thus consideration of this issue would not be required further until such time as the transfer occurred. However, it is likely that the transfer will occur into the future perhaps post 2015, and it is important that the environmental water reserve manager provides a strong position regarding the required passing flows or environmental entitlement that should be provided following the transfer.

With the high demand for water from this catchment and the large volume required to meet the environmental shortfall, prioritisation of the flow components has been undertaken. A subjective assessment of the portions of the recommended environmental flow regime that would be most essential to avoid decline in river health was undertaken. It has been proposed that an environmental entitlement in the Lal Lal Reservoir of up to 3,000 ML would be used to improve the proportion of time that the summer low flows can be met and to provide the required summer freshes each year. It is clearly understood that not providing the entire environmental flow regime puts the river at risk, however a pragmatic approach is required in such a flow stressed, yet important water supply system.

In considering transfers of large volumes of water, river health managers must ensure that analysis is undertaken at a suitable scale. This must include analysis of the impact of the transfer not only as a volume modelled as an annual average, resulting in an conclusions showing no net loss of water available to the environment, but also at a scale showing the impact of the transfer on the seasonality, volume, timing and duration of stream flows which will enable a more complete estimation of the impact of the transfer of river assets and health.

Conclusions

CMAs and other environmental flow managers must actively participate in the development of operating rules and in negotiations for major water trades to ensure that risk to river health is minimised and opportunities for positive outcomes for river health can be identified. Whilst a 1:1 ratio transfer of an entitlement between authorities may appear to have little consequence for river health, investigation into the operation of such transfers should occur.

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