A Regional Perspective on Delivering the Environmental Water Reserve

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Introduction

The past nine years of below average rainfall has resulted in a significant increase in our understanding of the impacts of rural and urban water use on river health. This awareness and understanding has lead to significant debate and expectations that water resource managers will manage their resources within the sustainable limits of river and aquifer systems.

In 2002 the Victorian government released the Victorian River Health Strategy (VRHS) (DNRE 2002) which provided a significant shift in the policy framework for river and water resource management in Victoria. The Strategy articulated the state expectations of river health through development of:

- A long term vision for river health,
- Five and ten year implementation and resource condition targets for Victoria’s Rivers,
- An integrated management framework delivered through regional river health strategies.

The policy framework developed through the VRHS was further enhanced through the release in 2004 of the white paper, Our Water Our Future Action Plan. Our Water Our Future detailed 119 individual actions that addressed key issues for surface and groundwater management. A key part of this initiative was the long term protection of rivers and aquifers through:

- Establishment of the Environmental Water Reserve as a legislated water entitlement for the environment, through the provisions of the Water Act 1989.
- Water Recovery Programs for priority regulated and unregulated rivers.
- Sustainable Water Strategies - to establish further priorities for environmental water reserve enhancement.
- Catchment Management Authorities delegated as caretaker of river health and manager of the environmental water reserve.
- Capping of water entitlements in seven catchments across southern Victoria in recognition of the impacts to rivers.
- $100M over four years for improved water management and restoration of rivers and aquifers.

This paper will provide an overview of the progress made by Corangamite CMA in the development and implementation of the Environmental Water Reserve for the Corangamite region.
The Environmental Water Reserve

River flows are one of the major factors affecting river health. River ecosystems and process have adapted to a highly variable flow regime which contributes to functions such as:

- breeding cues,
- stream channel maintenance and sediment cycling,
- colonial water bird nesting,
- fish passage,
- algae and toxicant suppression,
- carbon and nutrient cycling.

Catchment clearing and development has resulted in a significant reduction in the health of many river systems. Issues such as the loss of riparian habitat, desnagging and erosion are important, however a key driver for river health is a diverse flow regime which is able to support the ecological functioning of the river.

The environmental water reserve is an allocation of water to sustain river health and ecological processes. The environmental water reserve will be delivered in two ways. In regulated river systems, the environmental water reserve will be in the form of an allocation, held in storage and released under an annual watering plan. For unregulated river systems, such as those in the Corangamite region, the environmental water reserve will be provided through management of water extractions through caps, diversion bans and the provision of passing flows. In these systems, the initial environmental water reserve will be defined as the water remaining after bulk entitlements and licensed diversions have been removed and water available under the sustainable diversion limits.

Overview of the Corangamite Region

The Corangamite CMA region (figure 1) comprises an area of 13,340 square kilometers of southwest Victoria with a population of 330,000 it includes all or part of the Cities of Ballarat and Greater Geelong, the Borough of Queenscliff and the Shires of Moorabool, Surf Coast, Corangamite, Golden Plains, Colac Otway and Moyne. It encompasses four major river basins, the Moorabool River, Barwon River, Lake Corangamite and Otway Coast Basins.

The rivers and streams of the Corangamite region are an array of diverse systems that include ecologically healthy rivers and estuaries draining to Bass Strait and the Southern Ocean; highly stressed rivers flowing south from the Central Highlands and the streams of the basalt plains draining into the terminal lakes around Colac including Australia’s largest perennial lake, Lake Corangamite.

The character and nature of these rivers and their catchments has changed significantly through clearing of the catchment for agriculture and urban development. The growth and development of industry and urban populations has been reliant on the availability of high quality surface and groundwater resources. This development has lead to the majority of the rivers in the agricultural and urban areas of the region being in poor to moderate condition.
Water use and environmental water requirements in the Corangamite Region

Urban populations of Geelong, Ballarat, Colac and Warrnambool and the Surf Coast region are responsible for 70% of the water use in the Corangamite region. This is a departure from national and northern Victorian figures where 70% of the water use is by agriculture (NLWRA 2002).

Water supply to urban populations is predominantly drawn from the Barwon, Moorabool and Gellibrand rivers. The current level of demand has resulted in significant reductions to natural flows with the greatest reduction in the Moorabool River. The Barwon and Moorabool rivers in the Corangamite region are two of the seven capped southern Victorian catchments. As manager of the environmental water reserve, Corangamite CMA is undertaking investigations to determine environmental flow requirements in the Barwon and Gellibrand rivers. Investigations in Moorabool River catchment have been completed.

The Moorabool River Water Resource Assessment (CCMA 2005) identified there was a significant over-allocation of water across the many users in the catchment. The extent of allocation is such that there is a degree of overlap between bulk entitlements, private water users (including diverters), farm dam owners and groundwater users (Table 1).

The investigation also assessed the proportion of water available for the environment (Figure 2). On average, 39 per cent of water in the Moorabool River is available to the environment, 61 per cent is collected by water users. Of particular concern for river health is the December to May (summer/autumn) period, where only 19 per cent of the stream flow is available for the environment. Water use during the winter/spring period is also substantial, with only 43 per cent of the water available for the environment. These figures represent river flows in the lower Moorabool River at Batesford under current use and operating rules.
If bulk entitlement and licence users reach full allocation level, as anticipated, the Moorabool River would be further stressed. These levels of extraction will result in significant impacts on security of supply for all users as well as impacts on stream condition, including:

- decline in the health of streamside vegetation,
- loss of native and recreational fish species,
- decline in water quality, leading to episodes of blue green algal bloom and high salinity,
- decline in the health of the Ramsar listed Lake Connewarre.

Table 1 Bulk entitlement, licensed volume use and current use across all water users.

<table>
<thead>
<tr>
<th>Diverter</th>
<th>Bulk Entitlement Volume (megalitres)</th>
<th>Licensed Volume (megalitres)</th>
<th>Current use (average annual megalitres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper West Moorabool (CHW)</td>
<td>10,500</td>
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<td>1,200</td>
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<td>Farm Dams</td>
<td></td>
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<td>14,401</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>45,800</strong></td>
<td><strong>39,801</strong></td>
<td></td>
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</tbody>
</table>

![Figure 2](image_url)

Figure 2 – Average proportion of water available for environmental flows and water use under current use and operating rules in the Moorabool River
Environmental flow investigations for the Barwon and Gellibrand Rivers are scheduled to be completed in October and November 2005. Preliminary results from the study in the Barwon River indicate there have been significant changes in flows to the river as a result of diversion for urban and rural use. Of particular interest and concern is the volume of water held in farm dams which is equivalent to the total annual volumes of bulk entitlements for both Barwon Water and Central Highlands Water (Table 2).

While significant water use is occurring, flow data indicates there is still significant variability to seasonal flow patterns in the Barwon River. When the environmental flow requirements are known, a comparison of current flows and environmental requirements may find that some flow components to support key ecological processes are part of the current flow regime. If this were to be the case then minimal negotiations would be required to provide an environmental water reserve which would clearly meet the objectives set out in Our Water Our Future.

### Table 2 Water use in the Barwon Catchment

<table>
<thead>
<tr>
<th></th>
<th>ML per year</th>
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</thead>
<tbody>
<tr>
<td><strong>Bulk Entitlements</strong></td>
<td></td>
</tr>
<tr>
<td>Leigh River</td>
<td>1,770</td>
</tr>
<tr>
<td>Barwon River max</td>
<td>43,470</td>
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<tr>
<td><strong>Private diverters</strong></td>
<td></td>
</tr>
<tr>
<td>Leigh River</td>
<td>1,600</td>
</tr>
<tr>
<td>Barwon River</td>
<td>2,200</td>
</tr>
<tr>
<td><strong>Farm Dams</strong></td>
<td>(Volume ML)</td>
</tr>
<tr>
<td>Leigh River</td>
<td>14,000</td>
</tr>
<tr>
<td>Barwon River</td>
<td>30,000</td>
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</tbody>
</table>

Current use from the Gellibrand River indicates the level of stress to the river is significantly lower than the Barwon and Moorabool rivers (table 3). Due to the lower proportion of river flow extracted and the more intact riparian and instream conditions, the Gellibrand River is in good to excellent condition for a large proportion of its length and has the ability to improve in condition through complementary habitat works such as willow removal, riparian restoration and improved land management practices.

### Table 3 Water use in the Gellibrand Catchment

<table>
<thead>
<tr>
<th></th>
<th>ML per year</th>
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</thead>
<tbody>
<tr>
<td><strong>Bulk Entitlements</strong></td>
<td></td>
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<tr>
<td>West Gellibrand Barwon Water</td>
<td>5,400</td>
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<tr>
<td>Wannon Water</td>
<td>12,800</td>
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<tr>
<td><strong>Private Diverters</strong></td>
<td></td>
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<tr>
<td></td>
<td>1,948</td>
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<td><strong>Farm dams</strong></td>
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<td></td>
<td>2,798</td>
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Environmental Flow investigations on the Moorabool, Barwon and Gellibrand Rivers have used the Victorian FLOWS methodology. A key output from the methodology is the identification of flow dependent environmental values, objectives for the condition or function of the values and the water regime needed to meet the objectives.
Key flow dependent environmental assets for the Barwon River include:

- Fish and waterbird populations that inhabit the internationally significant Ramsar listed Lake Connewarre and Barwon River estuary.
- Forty Four species of fish in freshwater and the estuary including Australian Grayling (Environment Protection and Biodiversity Conservation Act listed), Dwarf Galaxias, Yarra Pigmy Perch (all Flora and Fauna Guarantee listed).
- River Red Gum, Shrubby Vegetation assemblages, Emergent aquatic plant communities, Reedy vegetation communities, Salt marsh communities.
- Intact riparian vegetation communities through Leigh River gorge.
- Floodplain billabongs on mid Barwon and lower Leigh River.
- Seven threatened plant species including Hairy Anchor Plant.

Should the environmental flow requirements in any system not be met it significantly increases the risk of loss of flow dependent environmental assets. This is particularly serious if these assets are of rare or threatened status or of international significance. For example, environmental flow requirements can not be met in the Moorabool River under the current level of demand, more than 30-50% of the time in the lower reaches. This potentially impacts on the lower Barwon River, which the Moorabool joins near Geelong, where the flow regime must support the threatened Australian Grayling and the Ramsar listed Lake Connewarre.

**Delivering the Environmental Water Reserve for the Corangamite Region**

The implementation of the environmental water reserve in the Corangamite Region for the Barwon, Moorabool and Gellibrand Rivers will be undertaken through two mechanisms, the Central Sustainable Water Strategy and stream flow management plans.

The Central Sustainable Water Strategy will consider the water requirements for the urban populations including Melbourne, Geelong, Ballarat and Gippsland and the environmental water reserve of all rivers in these regions.

Stream flow management plans will be developed for the Barwon and Gellibrand Rivers. These plans, which are developed under the provisions of the *Water Act 1989*, provide prescriptions for the management of Section 51, Take and Use Licences (private diversions). Such prescriptions include allocation limits for both the summer and winter periods, minimum flow rates below which private diverters may not harvest water and rules for the transfer of licences. Management of the private diverters according to these rules enables the provision of the environmental water reserve through the protection of run of river stream flows. Our Water Our Future Action Plan specifies that the Government will co-invest with private diverters to enhance the environmental water reserve in the rivers subject to stream flow management plans.

Projections indicate there will continue to be a steady increase in growth in Geelong, Ballarat and other smaller towns in the central region. In one of the major growth corridors to the south of Geelong the projected population is 70,000 over the next 30 years.

While household water consumption has decreased in response to general recognition of the value of water and implementation of permanent water saving measures, demand will continue to grow through urban expansion. Over the longer term this will result in an uptake of the full bulk entitlement of urban water authorities, increasing the risk to river health from flow stress.
A key issue that needs to be challenged is the issue of urban security of supply. The water allocation framework is based on an industry standard of 95% security of supply i.e. water restrictions implemented every one in 20 years. This expectation needs to be questioned and discussed at a broader community level and lowered with community support. Communities have already shown a strong commitment to saving water. In fact, in some areas savings have been well beyond the expected response from water restrictions. This current drought may be an opportunity to build on this level of community support allowing us to move towards a more sustainable level of security of supply, perhaps 90%?

Options to be investigated through the Central Sustainable Water Strategy will involve the reallocation of water sources between water authorities or significant increases in entitlements from existing sources. An example of this is the potential transfer of water entitlements from Barwon Water to Central Highlands Water as detailed in the Options Paper released by Central Highlands Water in March 2005. This option involved transfer of Barwon Water’s entitlement from the Moorabool River to Central Highlands Water, with Barwon Water seeking additional entitlement from the Gellibrand River or other sources. While this option is feasible, it may have a high river health cost.

Assessment of this scenario must include a decision making process that is open and transparent and incorporates public debate on the implications of the proposal including:

- Potential of the transfer to provide flows to the Moorabool River;
- Ecological implications of scenarios delivering more water;
- Ecological implications of scenarios delivering less water including a clear assessment of ecological assets that are impacted and to be traded off; and
- Decommissioning of infrastructure no longer required for extraction.

The decision making process should also ensure that individual rivers are not traded off against each other as part of the allocation process. Instead the focus should be on a comparison of scenarios and an assessment of which options provide the greatest river health benefit or conversely the lowest river health cost.

**Operational Challenges**

While high level directions for water allocation will be made through the Central Sustainable Water Strategy, annual delivery of the environmental water reserve in each of the rivers will be the responsibility of the regional bodies including the CMA and water authorities.

Into the future the relationships between CMA and water authority operators will be essential to ensure that delivery of the environmental water reserve is undertaken with efficiencies from an environmental and economic perspective. This will include discussions on the limitations of infrastructure to deliver particular flow components, maximizing the benefits of releases by synchronizing them with rainfall events and timing maintenance with periods of naturally low flow. All of these having both economic and environmental benefits.

**Conclusion**

The release of the white paper marks a significant advance in the policy and implementation framework for river health and water resource management in Victoria. The Central Sustainable Water Strategy provides the mechanism to redefine the balance between water provided for utilitarian needs and water set aside for maintenance of river health. In summary Our Water Our Future has:
• Ensured that an appropriate environmental water reserve is protected for each river system;
• Has set out clear responsibilities for management of the environmental water reserve
• Has provided a forum for major decision making for long term water resource planning, which takes a triple bottom line approach.
• Provides the funding required developing, implementing and monitoring the environmental water reserve.

In the Corangamite region the key challenge for the CMA, through the Central Sustainable Water Strategy is ensuring that directions are set to ensure that there will be improvements from the initial environmental water reserve, to an enhanced environmental water reserve in the Gellibrand, Moorabool and Barwon Rivers which will sustain river health and meet the ecological objectives. Failure to adequately implement the environmental water reserve will result in a high likelihood that there will be significant loss of habitats of national and international importance and impacts to rare and threatened vegetation communities, fish, and birds.

Acknowledgements

I would like to thank Simone Gunn, Greg Williams (CCMA) and Steve Nicol (DSE) for their help and support in the preparation and review of this paper.

References


DNRE 2002 Healthy Rivers Healthy Communities and Regional Growth. Victorian River Health Strategy. Department of Natural Resources and Environment

A Regional Perspective on Delivering the Environmental Water Reserve

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Overview

• Introduction
• Importance of environmental flows
• Water demand in the region
• EWR and flow dependant assets
• Delivering the EWR
• Challenges
• Conclusion
Policy Framework for River Health

• Victorian River Health Strategy
  – Vision and Targets for Victoria’s Rivers
  – Integrated Management Framework

• Our Water Our Future
  – Establishment of Environmental Water Reserve
  – Water Recovery Programs for priority regulated and unregulated rivers
  – Sustainable Water Strategies - to establish further priorities for EWR enhancement
  – CMAs - caretakers of river health including management of EWR
  – Capping of water entitlements in seven catchments across southern Victoria
OWOF - capped catchments
Carbon and nutrient spiralling...
Aquatic breeding cues...
Colonial waterbird nesting...
Fish passage...
Sediment cycling and channel-form maintenance...
Algae and toxicant suppression...
Features of the region’s rivers

• Majority drain to the coast
• Highly seasonal flows
• On average are in better condition many other parts of the state
• 70 per cent of water use is urban
## Moorabool - Water Use

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Moorabool Water Use

Average Per Year (ML) | Average Dec. to May (ML) | Average Jun. to Nov. (ML)

49,252 ML (61%) | 10,378 ML (81%) | 38,872 ML (57%)
31,573 ML (39%) | 2,383 ML (19%) | 29,191 ML (43%)

Source: An assessment of water use and Environmental flow requirements for the Moorabool River (Moorabool Water Resource Assessment), CCMA, 2005
Barwon- Water Use

- Bulk Entitlements-
  - Leigh River (CHW) 1,770 ML
  - Barwon River (BW) Max. 43,470 ML /yr
- Private Diversers-
  - Leigh River 1,600ML
  - Barwon River 2,200 ML
- Farm dams-
  - Leigh River approximately 14,000 ML
  - Barwon River approx 30,000 ML
Gellibrand- Water Use

- Bulk Entitlements-
  - West Gellibrand (Barwon Water) 5,400 ML p.a.
  - Gellibrand (Wannon Water) 12,580 ML p.a.
- Private Diverters
  - 1,948 ML
- Farm Dams
  - 2,798 ML
Key Issues

- 70% of the water use in Corangamite the region is by Urban customers
- Licenced diversions are a small component
- Farm dams intercept significant volumes of water
Environmental Water Reserve

Mean Annual Flow
– bulk entitlements
– licenced diversions
– farm dams
+ water available under SDL’s
= Initial EWR

• EWR Determinations
• Moorabool completed
• Barwon & Gellibrand late 2005
Flow Dependant Assets

- Fish and waterbird populations that inhabit the internationally significant Ramsar listed Lake Connewarre and Barwon River estuary.
- Forty Four species of fish in freshwater and the estuary including
  - Australian Grayling (EPBC Act listed),
  - Dwarf Galaxias, Yarra Pigmy Perch (FFG listed).
- Seven threatened plant species
- River Red Gum, Shrubby Vegetation assemblages, Emergent aquatic plant communities, Reedy vegetation communities, Salt marsh communities.
- Intact riparian vegetation communities through Leigh River gorge.
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Enhancing the EWR

• Central Sustainable Water Strategy
• Stream Flow Management Plans
  • Renegotiation of passing flow conditions within BEs
  • Negotiating access to unallocated water in reservoirs
  • Negotiating access to existing allocations, prior to full use of entitlement
  • Sharing of water savings
  • Removal of redundant infrastructure such as diversion weirs
  • Complimentary works to restore streamside and in-stream habitats
  • Sharing of savings from reuse and substitution proposals
Challenges

• Managing urban growth expectations
• Reconnecting urban populations with their water source
  • Stimulating public discussion and debate on river health and supply expectations
  • Urban security of supply, is 95% too much?
• Identifying opportunities for significant river health improvement
• STP discharges, benefit or impact?
Operational Challenges

• Identifying opportunities to deliver enhanced EWR through existing infrastructure
  • wa’s have significant knowledge of delivery system
  • changes to operations could enhance flows

• Identifying limitations of infrastructure
  – Modifying infrastructure for EWR
  – Decommissioning redundant infrastructure
Do nothing

• Significantly elevated risk of loss of river related assets
  – Reduced breeding cues leading to loss of species
  – Loss of national or international recognised species (Ramsar wetlands)
  – Increased incidence of BGA blooms
  – Impact to swimming, water skiing, rowing, canoeing
  – Recreational fishing impacts
Conclusions

• OWOF has delivered an integrated policy framework to improve the long term condition of rivers in the state.
• Enhancing the EWR is a priority mechanism to protect river assets into the future
• Implementation of EWR provides an opportunity for CMAs and WAs in partnership to deliver significant environmental outcomes