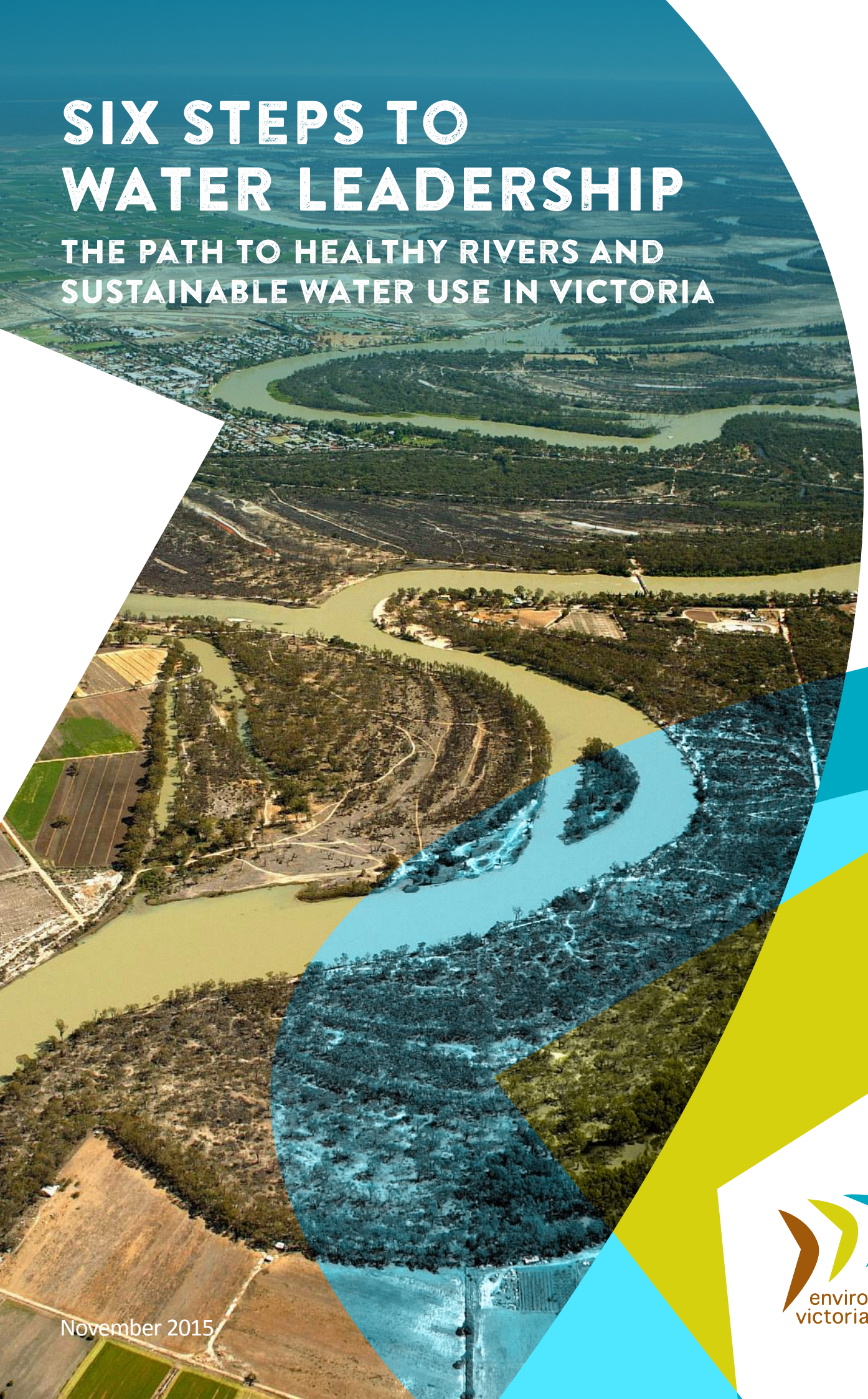
SIX STEPS TO WATER LEADERSHIP

THE PATH TO HEALTHY RIVERS AND SUSTAINABLE WATER USE IN VICTORIA



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01 INTRODUCTION

THE CASE FOR ACTION

THE MISMATCH BETWEEN A SOCIETY THAT DEMANDS WATER CONSTANTLY AND A CLIMATE THAT SUPPLIES IT ONLY OCCASIONALLY POSES HUGE CHALLENGES FOR OUR GOVERNMENT AND WATER MANAGERS.

Australia is the driest inhabited continent on Earth. Our unique climate of 'droughts and flooding rains' makes our river systems the most variable in the world. Under natural conditions our rivers either have abundant water spread out on the floodplain or virtually no water at all. 'Average' rainfall years are few and far between, and are becoming even rarer as the climate changes. Yet we people and our cities, animals and crops require water all year, every year.

This basic mismatch between a society that demands water constantly and a climate that supplies it only occasionally poses huge challenges for our government and water managers. The consequences for our rivers, creeks and wetlands have been disastrous.

As a rule of thumb, a river can give up to a third of its water for consumptive use, such as irrigation and drinking, and remain in reasonable health. Some of Victoria's hardest-working rivers, like the Yarra, Murray and the Goulburn, give up far more than that on a regular basis. The inevitable result is that the health of our rivers, streams and wetlands has massively declined. Currently, just 23 percent of our rivers are classified as being in good or excellent condition and three quarters of wetlands on private land have disappeared altogether since European settlement.[1] We are quickly depleting the natural capital that supports our economic and social fabric.

The Andrews Government was elected in November 2014 with a promise to restore Victoria's status as a leader on environmental issues. This promise and recognition of the need for environmental leadership has opened up new possibilities for water reform in Victoria and nationally. Water Minister Lisa Neville told the Parliament in April 2015 that "we will take enormous steps forward to make sure that Victoria is once again a leader in environment and climate change."[2] She has also said that

Consumptive use is water extracted from rivers and groundwater for all types of human use in agriculture (especially irrigation) and in towns and cities.

[1] Commissioner for Environmental Sustainability Victoria, 2013, *State of the Environment report*, p. 137.

[2] Neville, L (Minister for Environment, Climate Change and Water), 2015, Hansard, 16 April.

Above: Runners and walkers take in the view along the Yarra River.

"preserving the future of our water supplies requires a new vision and that calls for a fresh and balanced approach, starting at the top."[3]

This report examines what that new vision and fresh approach could look like. It assesses factors driving the decline of our river systems, outlines past achievements and subsequent backsliding by Coalition governments, and describes case studies from around the world. From this evidence base, the report sets out six key steps to water leadership:

1. A Murray-Darling Basin Plan that restores our rivers, wetlands and national parks
2. A state-wide plan for water sensitive towns and cities
3. A Victorian Environmental Assessment Council (VEAC) investigation into the status and management of freshwater ecosystems
4. Reforming the Victorian Water Act to give our rivers a fair share of water
5. Reconnecting river corridors and restoring the river banks
6. Managing surface and groundwater together.

Premier Andrews' decision to include water with the environment and climate change portfolios should place a greater environmental focus on water. However so far there has been little change from the previous government's approach. As the Andrews Government approaches its first anniversary and starts to develop a State Water Plan, it's time to refocus on restoring the condition of our freshwater dependent ecosystems. Improving the health of our waterways and catchments is fundamental to supporting jobs and economic productivity and to enhancing Victoria's liveability, health and wellbeing. The six steps outlined in this report provide a path to achieving these goals.

A **gigalitre (GL)** is equivalent to one billion litres (1,000,000,000), or approximately 400 olympic size pools. Most figures in this report are given as gigalitres.

[3] Neville, L (Minister for Environment, Climate Change and Water), 2015, *A New Vision To Manage And Preserve Our Water Supplies*, media release, 8 April.

02
WHY VICTORIA NEEDS TO LEAD

VICTORIA'S RIVERS ARE THE LIFEBLOOD OF OUR LANDSCAPES

THE ONLY RIVERS IN VICTORIA IN GOOD CONDITION ARE IN THE EAST WHERE DEMAND FOR WATER IS LOW AND LANDSCAPES ARE LARGELY INTACT.

Rivers connect, support and nurture communities of all kinds – animals, plants and people. They give us water to drink and to grow our crops, clean up pollution and bring fertility to the soil. They are part of our culture, our history and our stories, and every Victorian has a special place on a creek or river bank that they love and enjoy.

Victoria has some truly spectacular rivers, from the internationally recognised red gum wetlands along the Murray and the Goulburn, to the rapids of the Mitchell, to unsung gems like the Macalister in Gippsland and the Glenelg in the southwest. Whether it's a pristine alpine stream or a degraded suburban creek, every river in Victoria has value to its community.

Right: Macalister River.

Above: Glenelg River near Balmoral.

Our rivers are an essential element of the 'natural capital' that supports Victoria's economic activity. A recent report from The Future Economy Group demonstrates how maintaining and rebuilding natural capital adds value to the economy and shows that investment in environmental restoration will repay itself in increased employment, economic output, liveability and wellbeing.[4] Water is particularly crucial to Victoria's biggest export earners – agriculture and tourism.

Despite their incredible value and importance, Victoria's rivers have not been well looked after. During the twentieth century, thousands of dams and weirs were constructed to collect water for consumption and make it available more consistently from year to year. The combined impact of dam construction, increasing water extraction and land clearing for agriculture has devastated freshwater ecosystems.

The Index of Stream Condition[5] reveals that only 23 percent of river reaches are in good or excellent condition while 32 percent are in poor or very poor condition (see Figure 1). The only rivers in Victoria in good condition are in the east where demand for water is low and landscapes are largely intact.[6]

What's more, this state of affairs has not improved since the previous assessment in 2004 (see Figure 2). Victoria's efforts to improve conditions are holding the line for some rivers, but others may be beyond repair.

A **river reach** is a general term for a length of river or stream. The Index of Stream Condition uses a standard set of reaches to assess river condition every five years.

Natural capital is the economic value given to natural assets, such as freshwater, land and soil, forests and oceans, and biodiversity. Natural capital underpins all aspects of society and all economic activity.

[4] The Future Economy Group, 2014, *The Economic Impact of Diminishing Natural Capital in Victoria*. http://www.futureeconomy.com.au/download-reports/.

[5] Department of Environment and Primary Industries, 2013, *Third Index of Stream Condition*. http://www.depi.vic.gov.au/water/water-resource-reporting/Third-Index-of-Stream-Condition-report.

Figure 1. Overall river condition in Victoria in 2010. Source: Third Index of Stream Condition.

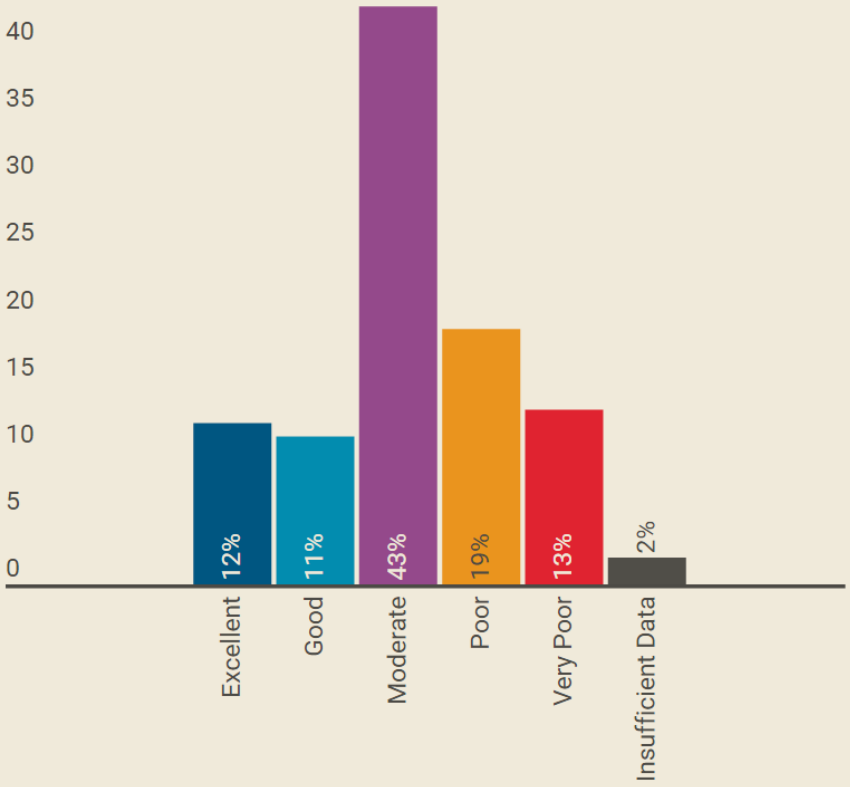
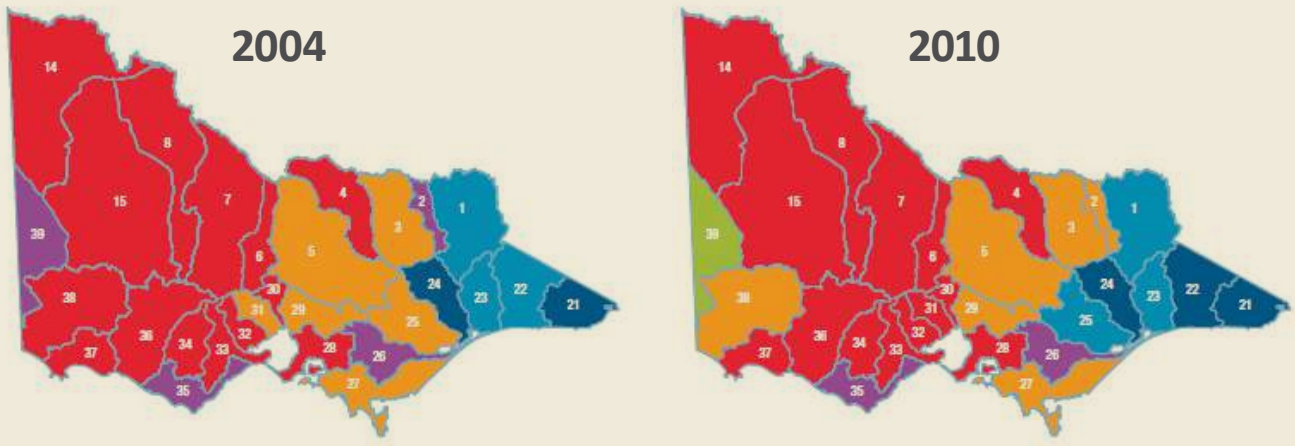


Figure 2. River condition in 2004 and 2010 – little has changed. Red indicates that less than 10 percent of river reaches are in good condition. Source: Third Index of Stream Condition.



Environmental Condition	Basin Names			
>70%	1 Upper Murray	14 Mallee	27 South Gippsland	35 Otway
51-70%	2 Kiewa	15 Wimmera	28 Bunyip	36 Hopkins
31-50%	3 Ovens	21 East Gippsland	29 Yarra	37 Portland
11-30%	4 Broken	22 Snowy	30 Maribyrnong	38 Glenelg
<10%	5 Goulburn	23 Tambo	31 Werribee	39 Millicent Coast
Insufficient Data	6 Campaspe	24 Mitchell	32 Moorabool	
	7 Loddon	25 Thomson	33 Barwon	
	8 Avoca	26 LaTrobe	34 Corangamite	

WHAT HAPPENS WHEN RIVERS GET SICK

Unhealthy rivers are not just an environmental problem. In time of water shortage due to drought or climate change, water quality can seriously decline, leaving the water unusable for any purpose. Fortunately most of our rivers have not yet reached this point on a permanent basis, but the following examples of what happened during the Millennium drought serve as a reminder of what could happen to our rivers if we fail to protect them.

THE WIMMERA RIVER IN 2009 – TWICE AS SALTY AS SEA WATER

During the Millennium drought, the Wimmera River ceased to flow. The lack of water flow coupled with historic land clearing meant that salty groundwater was able to come to the surface and penetrate the river bed. The inevitable result was unusable water and dead trees.

Left: The Wimmera River at Jeparit, August 2009.

CHAPTER 02
WHY VICTORIA NEEDS TO LEAD

PSYCHE BEND LAGOON NEAR MILDURA IN 2007 – SALINE AND ACIDIC

During the Millennium drought when water was in short supply, Psyche Bend Lagoon became severely affected by salty drainage water from irrigation properties, coupled with intrusion by saline groundwater. The resultant chemical reactions turned the lagoon more acidic than battery acid, making it too toxic for any type of use.

Left: Psyche Bend Lagoon near Mildura, 2007 – the release of iron due to acidic conditions gives the water its red colour.

THE MOORABOOL RIVER IN 2007 – CHOKED WITH ALGAE

The Moorabool River supplies water to Geelong and Ballarat as well as to vineyards and potato growers in the area. In 2007 almost all the available water was extracted from the river. All that was left were disconnected pools that became choked with algae and unusable for any purpose.

Left: The Moorabool River near Batesford, January 2007.

THE IMPACT OF CLIMATE CHANGE ON VICTORIA'S RIVERS

Rainfall in Victoria has been declining since the 1970s (see Figure 3), with the major decrease occurring in winter and spring. This is particularly concerning as these are the main seasons when rainfall replenishes rivers, reservoirs and groundwater.

It is likely that this downward trend will intensify. Climate projections indicate that over time Victoria's climate will become warmer and, for most of the state, drier than during the second half of the twentieth century. By 2030, stream flow is projected to decrease by 25 to 40 percent in river systems in northern and western Victoria. By 2070, stream flow may decrease by up to 50 percent across much of the state. A rise in temperature of just one degree Celsius in the Murray-Darling Basin would reduce annual inflow by 15 percent even if rainfall does not change.[7]

BY 2030, STREAM FLOW IS PROJECTED TO DECREASE BY 25 TO 40 PERCENT IN RIVER SYSTEMS IN NORTHERN AND WESTERN VICTORIA.

[7] Commissioner for Environmental Sustainability Victoria, 2008, *State of the Environment Report*, p. 421.

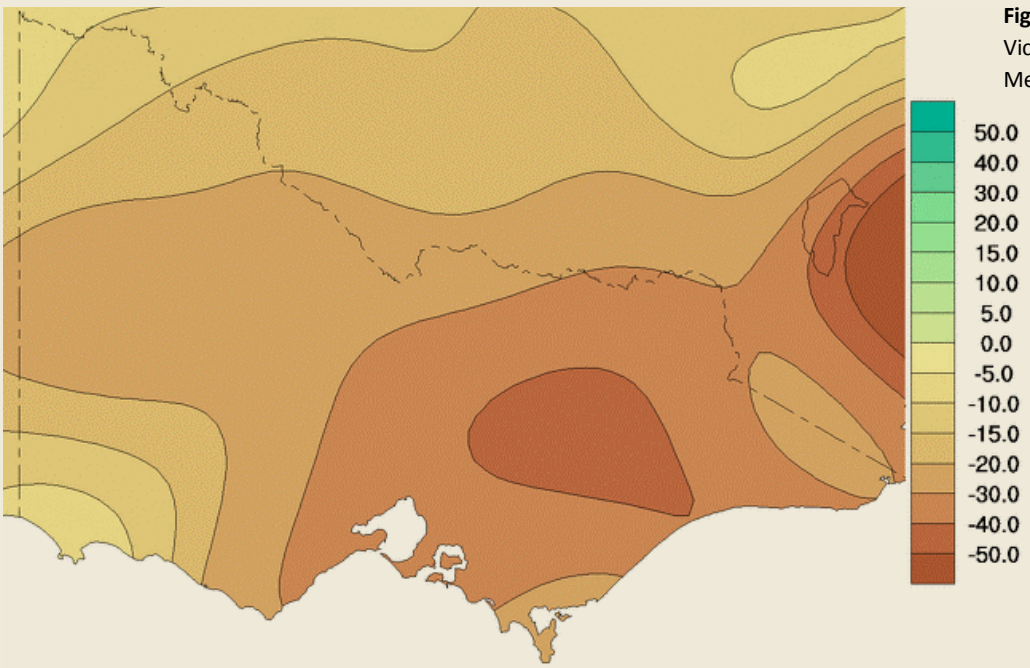


Figure 3. Decline in total rainfall in Victoria 1970-2014. Source: Bureau of Meteorology.

The situation is made worse for rivers and wetlands by the way water is shared between consumptive users and the environment. In most river systems there is a cap on the amount of water that can be diverted for use, and any water that is left over after that ('above cap' water) is for environmental purposes. When inflows are reduced by drought or climate change, above cap water – the environment's share – is impacted the most.[8] Users may have to cope with less water through restrictions or reduced allocations, but the environment is impacted even more heavily and in some rivers may lose its share altogether.

Figure 4 shows the impacts of consumptive use and climate change on the environment's share of water in the Goulburn River.[9] Under historical climate conditions, the river was already giving up half its water for consumptive use, mainly for irrigation. As stream flow declines due to climate change, the overall volume of water will reduce, but the environment's share will reduce even more than water for consumption.

Figure 4 illustrates why it is so important that the environment has access to secure, reliable water entitlements and rivers have a guaranteed 'sustainable baseflow' (See step 4 of our recommendations on page 33). Providing rivers with a guaranteed share of their own water means the risk of drought and climate change is shared equitably between different users.

[8] Department of Sustainability and Environment, 2009, *Northern Region Sustainable Water Strategy,* p. 24.

[9] CSIRO Murray-Darling Basin Sustainable Yields Project, 2008, *Water Availability in the Goulburn-Broken.*

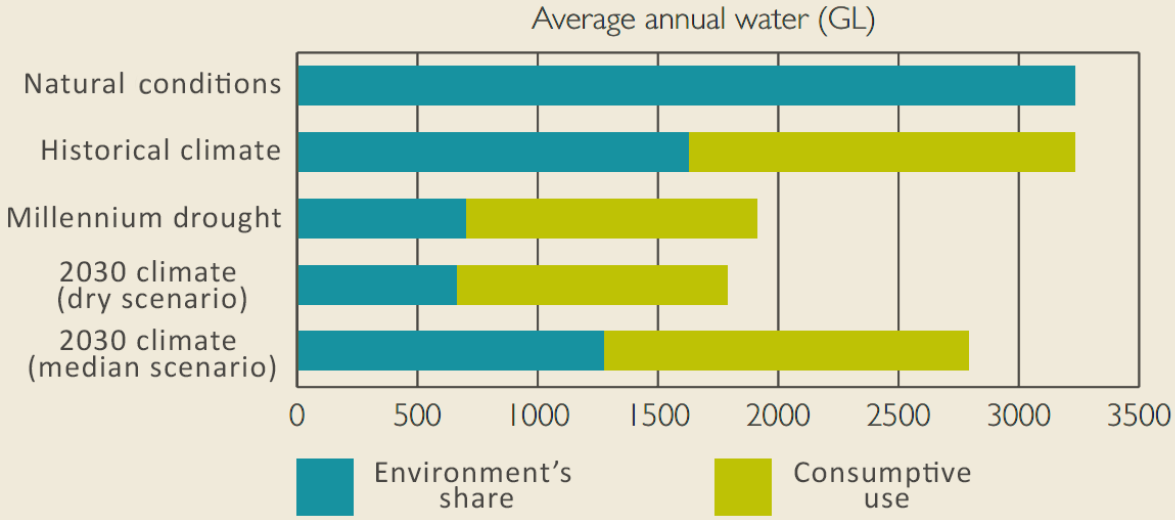


Figure 4. The impact of climate change on water availability in the Goulburn River (based on CSIRO Sustainable Yields project). The environment's share is more heavily impacted than water for consumptive use.

WATER USE IN VICTORIA

On average, over five trillion litres of water are extracted from Victoria's rivers each year. Between 75 and 80 percent of this water is used for irrigated agriculture (see Figure 5).[10] Irrigation occurs primarily in northern Victoria and the biggest consumer of irrigation water in the state is the dairy industry.

In order to meet this demand, most of Victoria's rivers including the Barwon, the Thomson, the Loddon and the Wimmera give up much more water in dry years than they can afford to for river health. The impact can be devastating. For example, according to a report from the Department of Sustainability and Environment in 2007: "In these (dry) years, about 95 percent of the flow is extracted for towns and irrigation. The drought now being faced by the Campaspe River environment is 20 times harsher than a natural drought."[11]

With declining rainfall, a strengthening El Nino and climate change becoming more apparent by the day, the need for leadership in protecting river health in Victoria has never been greater.

[10] Successive Victorian Water Accounts 2003/04 – 2013/14.

[11] Department of Sustainability and Environment, 2007, *Why Rivers Need Water.*

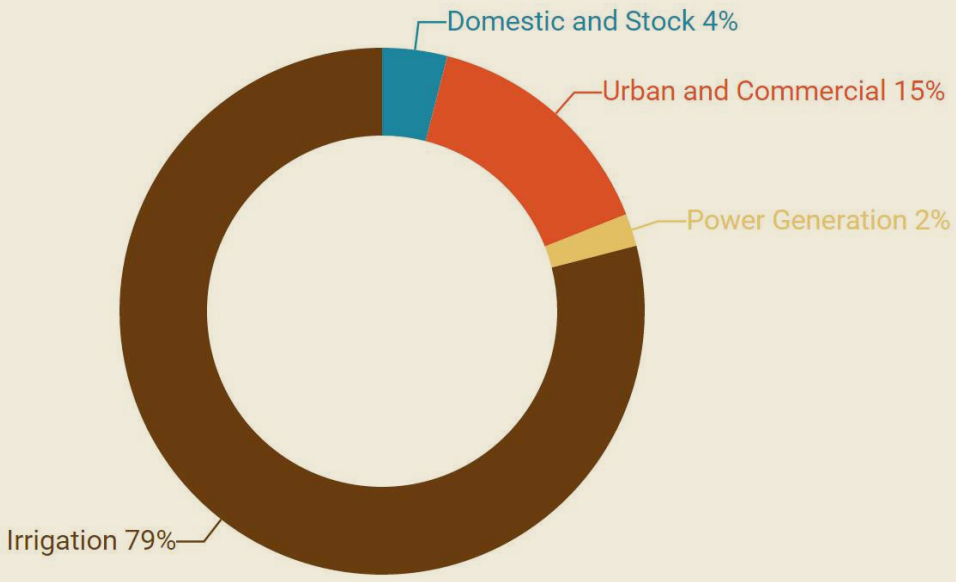


Figure 5. Uses of consumptive water in Victoria. About 80 percent is used for irrigation. Source: Victorian Water Accounts 2013/14.

CHAPTER 02
WHY VICTORIA NEEDS TO LEAD

BETWEEN 75 AND 80 PERCENT OF WATER TAKEN FROM OUR RIVERS IS USED FOR IRRIGATED AGRICULTURE.

21ST CENTURY REFORMS

As irrigation water use rose rapidly from the 1960s onwards, the environmental damage caused to river systems became increasingly obvious. A massive algal bloom on the Darling River in the early 1990s spurred the Council of Australian Government (COAG) to put water reform on the national agenda. Water extractions from the Murray-Darling Basin were capped and water entitlements more clearly defined. As the Millennium drought began to bite, further reform was clearly needed and some major steps were achieved in the 2000s. The Victorian Bracks/Brumby Government was a leading player in all these processes.

- The National Water Initiative was agreed between state and federal governments in 2004. They agreed (amongst other things) to prepare water plans that made provision for the environment and to return over-allocated rivers to sustainable levels of extraction as rapidly as possible.[12]
- The Victorian government released its *Our Water Our Future* White Paper in 2004, which led to groundbreaking reforms. These included the creation of the Environmental Water Reserve, water recovery for stressed rivers like the Murray, the Yarra and the Thomson and changes to the Victorian *Water Act 1989* to address the disproportionate impact of climate change on freshwater environments.
- Under John Howard's leadership, with Malcolm Turnbull as Water Minister, the Commonwealth Water Act was passed with bipartisan support in 2007. The Act directs the management of the Murray-Darling Basin to be conducted in the national interest. It required agreement from all the Basin states including Victoria to set up the Murray-Darling Basin Authority (MDBA) and the Basin Plan process.
- The Victorian Environmental Water Holder (VEWH) was established in 2011 to hold and manage Victoria's environmental water entitlements. The VEWH enables independent and transparent decision making on the use of environmental water to achieve the best environmental outcomes.

[12] http://www.nwc.gov.au/nwi/objectives.

BACKSLIDING IN THE 2010s

Since the end of the Millennium drought and the return of wetter conditions in 2010, the urgency has gone out of water reform. Liberal-National governments in Victoria, NSW and Queensland fought hard to limit the requirements for environmental water recovery under the Murray-Darling Basin Plan. The final Plan, agreed in 2012, is a political compromise and inadequate to meet its own environmental objectives. The attacks on environmental water recovery have continued, with Victoria and NSW seeking to limit the volume of water recovery, and the Abbott Government placing a cap on water buybacks – the most cost-effective method of recovering water for the environment.[13]

The Napthine Government also attempted to undo much of the positive reform of the Victorian Water Act by proposing to abolish the Environmental Water Reserve and change the framework for long-term review of water resources. Fortunately these changes were not implemented.

The most positive element of the Napthine Government's water agenda was the *Melbourne's Water Future* strategy which emphasised integrated water cycle management in the urban environment and contained proposals for stormwater capture and greater water reuse and recycling. Unfortunately implementation was fatally flawed by the dysfunction of the Office of Living Victoria, which has since been abolished, and the strategy remains in limbo.

The **Environmental Water Reserve (EWR)** is the legal term used in Victoria for water that is set aside for environmental purposes and to protect river health.

[13] Productivity Commission, 2010, *Market Mechanisms for Recovering Water in the Murray-Darling Basin.*

03

WHAT DOES LEADERSHIP LOOK LIKE?

While Victoria went backwards on river restoration, much of the world has been moving forward. For example, the European Union has established a Water Framework Directive for integrated river basin management which requires water management plans to set targets for 'good ecological status' and 'good water quality status'.[14] These plans are now being rolled out across Europe with a six-year timeframe and, while not without challenges, are driving improvements in river health.

In America, the concept of environmental flows is gaining wide acceptance. For example, 130 billion litres (GL) has been returned to the Colorado River for environmental restoration (see image below) and in Wyoming 130 streams now have protected flows.[15] In European and Asian cities water recycling and reuse is commonplace. But the biggest environmental water recovery program in the world is happening in our own backyard.

Right: People enjoying environmental flows in the Colorado River at San Luis Rio Colorado, Mexico, following the return of 130 GL to the river system.

[14] See http://ec.europa.eu/environment/water/water-framework/index_en.html for details.

[15] https://wgfd.wyo.gov/Fishing-and-Boating/Instream-Flow-XStream-Angler.

THE MURRAY-DARLING BASIN PLAN

The Murray-Darling Basin Plan is attempting environmental water recovery and river restoration on a scale that has not been tried anywhere else in the world.[16] Negotiated under the strong leadership of Prime Minister John Howard and his successors Kevin Rudd and Julia Gillard, it aims to recover 3200 GL of environmental water for the rivers of the Murray-Darling Basin. If the Plan is successful, it will secure Australia's place as a world leader in river restoration.

Australian rivers have highly variable flow regimes that create unique environments and habitats. Every component of the flow regime is important. If a component changes, then the habitat changes and this will affect the organisms that live in it. Australia is leading the world in terms of understanding flow regimes and the success of the Murray-Darling Basin Plan is a critical test of that knowledge.

However as the Plan progresses and more than half the proposed water recovery has been achieved, resistance is growing, and there is still a long way to go before the Plan delivers on its environmental objectives. Victoria needs to step up and show leadership to ensure the success of the Plan (see Step 1 on page 24).

While environmental water recovery is not occurring on the same scale internationally as in Australia, there is still much to be learned from experience in other countries, as the following case studies demonstrate.

IF THE MURRAY-DARLING BASIN PLAN IS SUCCESSFUL, IT WILL SECURE AUSTRALIA'S PLACE AS A WORLD LEADER IN RIVER RESTORATION.

[16] http://www.mdba.gov.au/what-we-do/basin-plan.

PROTECTION OF THE WATERS OF THE GREAT LAKES, USA AND CANADA

Key points:

- **The Great Lakes Charter controls water extraction from the Lakes**
- **The agreement allows joint consideration of common issues such as climate change, stormwater capture and groundwater use**
- **Water use by the US states has fallen significantly.**

The Great Lakes Charter was signed in 1955 by the eight US states and the two Canadian provinces that border the Great Lakes. The Charter set up the Great Lakes Commission[17] and stipulates that no state can increase water extractions without consulting and gaining the consent of the other Great Lakes states. The Charter was extended to cover water exports, and in 2008 the states and provinces signed the *Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement* that sets a common standard, based on the ecological integrity of the Lakes, against which new projects can be assessed.

A recent review of the Great Lakes Charter and subsequent agreements show that they have been successful. Water extraction from the Lakes by the US states fell by 13 percent between 2005 and 2010. The Agreement has also allowed joint consideration of issues such as climate change and groundwater use.[18] It is an example of cooperation between jurisdictions to protect a common environment and resource.

The Great Lakes states are now turning their attention to integrated water cycle management and increasing use of stormwater and recycled water. They are beginning to recognise the impact a 'once through' system is having both on their catchments and on the cost of infrastructure and are running pilot projects as a first step towards 'green infrastructure'.[19]

[17] http://glc.org/about/.

[18] Pentland, R and Mayer, A, 2015, *Ten Year Review of the International Joint Commission's report on "Protection of the waters of the Great Lakes".*

[19] http://glc.org/projects/water-resources/greater-lakes/.

WATER EXTRACTION FROM THE GREAT LAKES (PICTURED BELOW) BY THE US STATES FELL BY 13 PERCENT BETWEEN 2005 AND 2010.

THE DANUBE RIVER BASIN

Key points:

- **International coordination of restoration efforts**
- **Focus on integrating former floodplains and wetlands back into the flow regime.**

THE DANUBE RIVER'S SUCCESSFUL FLOODPLAIN RESTORATION PROJECTS COULD SERVE AS A MODEL FOR CONSTRAINTS MANAGEMENT PROJECTS ON THE GOULBURN AND THE MURRAY.

The Danube River is Europe's second-largest river system and flows through 19 different countries. Eighty six million people live in the Danube's basin. It is recognised as a biodiversity hotspot with 115 known different species of freshwater fish. However the Danube River's flow regime has been greatly altered by hydropower and other dams in the upper catchment and by downstream development of the floodplain for towns, industry and agriculture. The river has become disconnected from its floodplain in much the same way as rivers in northern Victoria, including the Murray and the Goulburn. The Basin's biodiversity has been severely compromised and it is also threatened by industrial pollution.

The International Commission for the Protection of the Danube River (ICPDR)[20] is the main coordinating body for restoration efforts. Some

Right: The Danube Regional Project is restoring wetlands to benefit freshwater species, including frogs.

[20] https://www.icpdr.org/main/.

of its efforts are driven by the EU Water Framework Directive, which requires management plans to set targets for 'good ecological status' and 'good water quality status' as part of a six-year planning cycle.[21]

In the Upper Danube Basin (Germany and Austria) the main focus has been on channel widening, re-connection of sidearms (wetlands and billabongs), shoreline restoration, and reinstating fish passage. In the Middle Danube, reconnecting former sidearms is key. In the Lower Danube, restoration projects focus on the integration of former floodplains and wetlands back into the river flow regime (for example, at the Danube Delta in Bulgaria).[22] These floodplain restoration projects could serve as a model for constraints management projects on the Goulburn and the Murray.

BERLIN – BECOMING A WATER SENSITIVE CITY

Key points:

- **Berlin meets all its water needs from within the city boundaries**
- **It relies on groundwater, recycled water and rainwater collection**
- **Rainwater collection through green roofs is a major feature of the city.**

The German capital Berlin has some surprising similarities to Melbourne – a population of about 4.5 million within its city boundaries and annual rainfall of around 600mm. But it also has some significant differences – although two major rivers run through the city, no water is extracted from them for consumption. Instead the city relies on its groundwater resources, of which about two-thirds is recycled water.[23]

This situation has come about through a combination of necessity and innovation. During its period of Cold War isolation, West Berlin had to rely on water from within the city boundaries. That meant groundwater, and since supply was limited, it also meant investment in wastewater treatment, stormwater harvesting and artificially replenishing the groundwater supplies.

After the fall of the Berlin Wall and reunification of the city, the Senate passed new legislation requiring all water intended for use in Berlin to be sourced within its boundaries and promoting more responsible and sustainable use of water. As a result, domestic water consumption has fallen to 112 litres/person/day, the lowest in Germany.[24]

BERLIN IS JUST ONE EXAMPLE OF EUROPEAN CITIES FROM AMSTERDAM TO ZARAGOZA THAT ARE ON THE PATH TO BECOMING TRULY WATER SENSITIVE.

[21] See http://ec.europa.eu/environment/water/water-framework/index_en.html for details.

[22] Danube Parks, 2010, *Danube River Morphology and Revitalisation Report*, http://www.danubeparks.org/files/855_DanubeRiverMorphologyRevitalization.pdf.

[23] ICLEI European Secretariat, *Making Urban Water Management More Sustainable: Achievements for Berlin. A SWITCH report.*

[24] Ibid.

This approach has required substantial investment and innovation, but Berlin has reaped the rewards. The city invested heavily in wastewater treatment and reinfiltration to groundwater through Berlin's lakes and river beds. It also invested in rainwater collection from roofs and streets, and reinfiltrated it into the groundwater system for reuse. In addition, public demand for more open spaces saw the development of green roofs as a major feature of the city, with benefits for liveability and biodiversity as well as water harvesting.

Berlin is just one example of European cities from Amsterdam to Zaragoza that are on the path to becoming truly water sensitive. It's a worldwide trend, and one which has massive potential for Australian cities where water is even more precious.

Right: Green roof in Berlin.

INTERNATIONAL RECOGNITION OF WATER RISK

Key points:

- **Water supply is a top five global risk**
- **Sustainability experts agree on how the risk should be addressed**
- **Education to change consumption and lifestyles is the number one solution.**

Droughts and water shortages around the world are rapidly elevating water as a risk to both businesses and governments. The 2013 World Economic Forum Global Risks Survey lists the threat of a global water supply crisis among the top five global risks for both 'likelihood' and 'impact'.[25] Many businesses are starting to assess the water risks in their supply chains and are placing more emphasis on sustainability criteria and the concept of water stewardship.

THE 2013 WORLD ECONOMIC FORUM SURVEY LISTS THE THREAT OF A GLOBAL WATER SUPPLY CRISIS AMONG THE TOP FIVE GLOBAL RISKS FOR BOTH 'LIKELIHOOD' AND 'IMPACT'.

Consensus on what needs to be done to address the risk is growing. A recent Sustainability Survey Poll on Water of more than 1200 global sustainability experts established the following top 10 priorities:[26]

1. Educate to change consumption and lifestyles
2. Invent new water conservation technologies
3. Recycle wastewater
4. Improve irrigation and agricultural practices
5. Appropriately price water
6. Develop energy efficient desalination plants
7. Improve water catchment and harvesting
8. Look to community based governance and partnerships
9. Develop and enact better policies and regulations
10. Holistically manage ecosystems.

These are as relevant to Victoria as they are to the rest of the world.

[25] World Economic Forum 2013, *World Economic Forum Global Risks Survey 2013*, http://www.weforum.org/reports/global-risks-2013-eighth-edition.

[26] http://www.circleofblue.org/waternews/2010/.

04
SIX STEPS TO WATER LEADERSHIP FOR VICTORIA

STEP 1. A MURRAY-DARLING BASIN PLAN THAT RESTORES OUR RIVERS, WETLANDS AND NATIONAL PARKS

In 2010 the Brumby Government declared the River Red Gum national parks in northern Victoria – a massive step forward for environmental protection. These parks border the Murray, Goulburn and Ovens Rivers, and protect Ramsar-listed wetlands at Barmah and Gunbower Forests. They are a magnificent legacy, and some are co-managed by Traditional Owners, a first for Victoria.

However the most crucial ingredient of floodplain and wetland health has yet to be addressed. This is an adequate flow regime that includes overbank flows, allowing water to spill out of the river channel and onto the floodplain so that the wetlands and red gums can recieve the water they need. When the parks were established, the Brumby Government rejected VEAC's proposals[27] for environmental watering outright, preferring instead to leave the job of environmental water recovery to the then-embryonic Murray-Darling Basin Plan.

The development of the Basin Plan has reinforced just how important overbank flows are to wetland and floodplain health.[28] While the Plan will not recover enough water to reinstate major flood events, it will allow some managed overbank flooding. Recovering the proposed 3200 GL and relaxing constraints to delivering environmental water will mean that 17 of the Plan's 18 'active management' flow indicators can be achieved, including all the indicators at Barmah and Gunbower Forests. This would make a huge difference to bird breeding at all northern Victoria's internationally recognised Ramsar sites.[29]

Sustainable Diversion Limits (SDL) on how much water can be extracted from rivers will start operating in 2019. All water recovery projects to

Flow regime is the pattern of flows that a river needs to be healthy. It includes high and low flows and changes with the season and from year to year.

[27] Victorian Environmental Assessment Council, 2007, *River Red Gum Forests Investigation – Draft Proposals Paper for Public Comment.*

[28] Murray-Darling Basin Authority, 2012, *Assessment of Environmental Water Requirements for the Proposed Basin Plan.*

[29] Murray-Darling Basin Authority, 2012, *Hydrologic Modelling of the Relaxation of Operational Constraints in the Southern Connected Basin.*

Above: Lake Little Yerang enjoying environmental water April 2011.

meet the environmental objectives of the Plan are due to be completed by 2024. Despite the Commonwealth government's repeated assurances that the Plan will be implemented "on time and in full", there is still considerable doubt as to what a fully implemented Plan will look like.

Successive governments in Victoria and NSW have pushed to reduce water recovery by using the SDL adjustment mechanism which allows for changes to be made to the Plan in mid-2016. They are proposing 'supply measures' or offsets that are intended to provide the same or better environmental outcomes using less water. These include using pumps and regulators to deliver water to isolated sites rather than water being recovered directly for the river. However, these engineering solutions are fraught with uncertainty. The Independent Review Panel charged with assessing the adjustment methodology stated: "the SDL adjustment process described in the Basin Plan is policy operating in 'unchartered waters' from both a scientific and management perspective. No one should assume that adoption of the SDL-EE method is without significant uncertainty or risk." [30]

To put it plainly, unproven environmental engineering solutions are a poor substitute for directly returning real water to our rivers.

The most cost-effective and efficient method of recovering water is to buy it back from willing sellers.[31] Yet a new cap recently written into Commonwealth legislation limits water recovery by this method to 1500 GL. The rest will have to be recovered by making irrigation infrastructure more efficient. This cap will place considerable strain on the budget for water recovery as infrastructure projects are two to seven times more expensive than buybacks[32] and a recent report casts considerable doubt on their effectiveness. [33] Disappointingly, the

THE CERTAINTY COMMUNITIES NEED IS A PLAN THAT WILL DELIVER LONG-TERM SUSTAINABILITY THROUGH ADEQUATE FLOWS TO PROTECT RIVERS AND WETLANDS.

The **Ramsar Convention** is an international treaty for the conservation and wise use of wetlands that recognises their fundamental ecological functions and their cultural, scientific, economic and recreational values. Victoria has 11 sites listed as wetlands of international significance under the Convention.

[30] Independent Review Panel, 2014, *SDL Adjustment Ecological Elements Method Development Report – Review of Final Project Report.*

[31] Productivity Commission, 2010, op cit.

[32] Department of Environment, 2014, *Commonwealth Water Recovery Strategy.*

[33] GHD, 2015, *Goulburn-Murray Water Connections Project Stage 2 Mid-term Review.*

Andrews Government is supporting infrastructure projects rather than buybacks as the principal means of water recovery.

Ensuring the Plan reaches its full potential for environmental restoration will require leadership and commitment. Along with Labor governments in South Australia and Queensland, the Andrews Government has an opportunity to lead by championing a Plan that returns 3200GL of real water to the rivers and wetlands of the Basin. This will involve:

- Reinstating buyback as the principal means of water recovery
- Reducing reliance on untested supply measures and environmental engineering to achieve environmental outcomes
- Dealing with constraints on the delivery of environmental water to areas of the floodplain where it is most needed.

Basin communities, as many people have emphasised, need 'confidence and certainty'. The certainty they need is a plan that will deliver long-term sustainability through adequate flows to protect rivers and wetlands. The Andrews Government should stand up for an undiluted Basin Plan that preserves natural capital and embodies the core principle of the *Our Water Our Future* White Paper: "a healthy society and economy is dependent on a healthy environment."[34]

[34] Victorian Government, 2004, *Securing Our Water Future Together White Paper (OWOF),* p. 12.

STEP 2. A STATE-WIDE PLAN FOR WATER SENSITIVE TOWNS AND CITIES

Victoria's towns and cities were designed on a traditional 'once through' basis for water supply. Water is captured and stored in remote areas, fed or pumped through a series of pipes to properties and businesses and then through a further series of pipes to the waste treatment plant. Ultimately this water is discharged to a river or the ocean.

This is the opposite of a 'water sensitive' city that uses its water resources efficiently and sustainably.

The definition of a water sensitive city is the subject of considerable international research and discussion, but there is strong agreement on three fundamental principles or 'pillars':

- Cities are water supply catchments: the city has access to a range of different water sources which include localised sewage treatment and recycling, stormwater capture and harvesting of rainwater before it enters the stormwater system.
- Cities provide ecosystem services: the city supplements and supports the functions of the natural environment and provides benefits such as clean water and erosion control.
- Cities comprise water sensitive communities: a socio-political capital for sustainability exists and citizens' decision making and behaviour are water sensitive.[35]

Transitioning to a water sensitive city requires multiple approaches and community participation. Some of the differences between a traditional, once-through water management regime and a water sensitive regime are outlined in Figure 6.

Ecosystem services are the benefits provided by natural ecosystems that contribute to making human life both possible and worth living.[36]

[35] Adapted from CRC for Water Sensitive Cities, http://watersensitivecities.org.au/what-is-a-water-sensitive-city/.

[36] Definition from UK National Ecosystem Assessment.

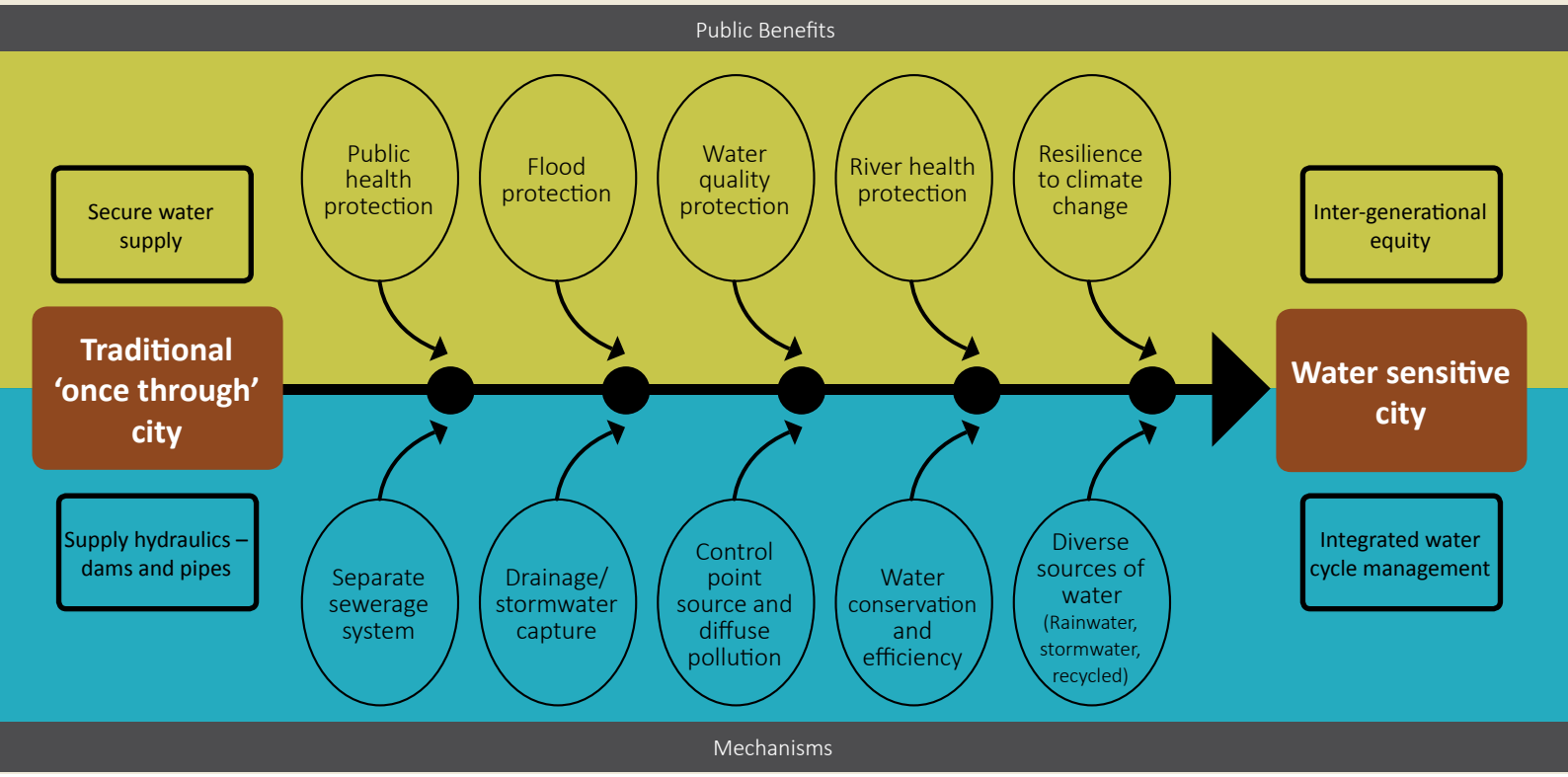


Figure 6. Steps in the transition to a water sensitive city.

Victorians have made huge efforts to conserve water in their homes and businesses. Melbourne today consumes about the same volume of water as it did in the mid-1970s, despite having more than one million extra residents. The community strongly supports better use of our precious and limited water supplies and more recycling and stormwater capture. The Target 155 campaign to limit water use to 155 litres/person/day was a huge success and encouraged householders to reduce their water use even further. Businesses embraced the EPA's Environment and Resource Efficiency Plan (EREP) program to find cost-effective means of saving water, which encouraged them to seek further savings and efficiencies.[37]

The Brumby Government's *Central Region Sustainable Water Strategy* of 2006 broke new ground by assessing the potential impacts of climate change on water resources. It took a highly innovative approach, using water conservation and efficiency measures as its starting point. It discussed integrating urban and water planning and supported local-scale recycling projects, at the same time as creating environmental entitlements for the region's stressed rivers. It set in train an upgrade for the Eastern Treatment Plant which now produces about 120 GL of Class A recycled water per year. The challenge now is to find a use for this valuable recycled water resource beyond the existing Eastern Irrigation Scheme (that uses about 6 GL) and isolated examples of third pipe systems in new housing developments.

[37] http://www.epa.vic.gov.au/business-and-industry/lower-your-impact/ereps/erep-case-studies.

MELBOURNE TODAY CONSUMES ABOUT THE SAME VOLUME OF WATER AS IT DID IN THE MID-1970S, DESPITE HAVING MORE THAN A MILLION EXTRA INHABITANTS.

Above: A community raingarden installed as part of Melbourne Water's Healthy Waterways Raingarden program.

The previous Coalition government attempted to implement Integrated Water Cycle Management (IWCM) through the Office of Living Victoria (OLV). Unfortunately good policy became the victim of bad process and the OLV was closed down following a scathing Ombudsman's report. Leadership now would mean reigniting this concept with better governance and a renewed mandate.

The Andrews Government has the opportunity to build on these past achievements and capitalise on the work done by the OLV in developing the *Melbourne's Water Future* strategy. The government has committed to a *Yarra Protection Act* intended to control development in the Yarra River corridor. There is a great opportunity to build on that foundation to create an Act that embeds IWCM into the planning framework and then extend the provisions state-wide. With parallel changes to the Water Act, we would be well on the way to being world leaders in making our cities water sensitive. [38]

Integrated water cycle management considers the water cycle as a whole and how planning for each element of water services (drinking water, sewerage, stormwater, rivers and groundwater) can merge to provide more sustainable environmental, economic and social outcomes.

[38] Commissioner for Environmental Sustainability Victoria, 2013, *State of the Environment Report* makes a very similar recommendation on IWCM (Recommendation 13).

Key planks in a new plan should include:

- Capturing stormwater runoff to increase water availability and reduce damage to urban creeks and rivers
- Improving rates of water recycling in urban areas – currently only 16 percent of treated wastewater is reused in Victoria (the same proportion as 10 years ago), mostly for irrigated agriculture[39]
- Embedding water efficiency in new and existing homes and businesses (as discussed in Environment Victoria's report *Six Steps to Efficiency Leadership*)
- Establishing a domestic drinking water consumption target of 100 litres/person/day. Households should be able to consume as much recycled water or stormwater as required
- Comprehensively integrating IWCM and Water Sensitive Urban Design in the planning framework at a variety of scales.

The *Yarra Protection Act* also offers an opportunity to untangle the complex web of agencies with responsibility for the Yarra River.[40] The establishment of a Yarra River Protection Trust to integrate land use planning, water resource management and environmental management would be a great step forward.

[39] Victorian Water Accounts 2013/14.

[40] Environmental Justice Australia and Yarra Riverkeepers Association, 2015, *Let's Act for the Yarra*, https://envirojustice.org.au/major-reports/lets-act-for-the-yarra.

STEP 3. A VICTORIAN ENVIRONMENT ASSESSMENT COUNCIL (VEAC) INVESTIGATION INTO FRESHWATER ECOSYSTEMS

The last comprehensive examination of freshwater ecosystems in Victoria was the Land Conservation Council (LCC) inquiry into rivers and streams in 1991.[41] This inquiry led to many important measures to protect rivers and streams including the *Heritage Rivers Act 1992*, identifying representative rivers as examples of different stream types and the establishment of environmental flow recommendations. These were vital steps in the development of the first Victorian River Health Strategy in 2002.

While the investigation made important recommendations, there has been no follow-up and many have been forgotten over time. The river health strategy has morphed into a Waterway Management Strategy with a focus on social, cultural and economic values, and weak environmental goals. The Heritage Rivers Act is a toothless tiger and environmental flow recommendations have not been fully implemented. The investigation did not cover wetlands, estuaries or groundwater dependent ecosystems and the management of these remains

Left: Dry wetland at Nyah-Vinifera forest on the Murray River.

[41] Land Conservation Council, 1991, *Rivers and Streams Special Investigation,* http://www.veac.vic.gov.au/documents/376-RiversandStreamsSpecialInvestigationReport.pdf.

VEAC SHOULD LOOK AT THE ADEQUACY OF BOTH LAND BASED RESERVES AND THE ENVIRONMENTAL WATER RESERVE TO PROTECT AND RESTORE THE HEALTH OF THESE NEGLECTED ECOSYSTEMS.

fragmented across multiple Acts and authorities. As a result, most of our rivers and wetlands are locked into moderate to poor health.

It's time for a fresh look at freshwater.

The government recently appointed a new Victorian Environmental Assessment Council (VEAC). The Council is currently engaged in a state-wide assessment of public land in Victoria. Its next assignment should be a state-wide investigation into freshwater dependent ecosystems, including rivers, wetlands, estuaries and groundwater. The investigation should assess the management and level of protection afforded to freshwater dependent ecosystems and make recommendations for improvements. It should look at the adequacy of both land-based reserves and the Environmental Water Reserve to protect and restore the health of these neglected ecosystems.

Freshwater dependent ecosystems are grossly underrepresented in the national system of ecological reserves. Only about three percent of wetland area is within the land reserve system[42] and many existing reserves are too small to mitigate the impacts of poor land management on wetland and river health. Even internationally recognised wetlands such as Westernport Bay and Port Phillip Bay remain poorly protected. Water and land management still lack coordination despite decades of 'integrated catchment management'. Responsibilities remain fragmented and Catchment Management Authorities, the 'caretakers of river health',[43] are starved of long-term funding and lack capacity to fulfil their obligations.

The Andrews Government should commission a VEAC inquiry to examine these and other issues. The inquiry should provide recommendations for ecologically sustainable management of freshwater dependent ecosystems and any additions to land or water reserves necessary for their protection.

[42] http://piku.org.au/reprints/2005_Kingsford_etal_call_for_protected_areas.pdf.

[43] CMA Statement of Obligations, Part 6.

STEP 4. REFORMING THE VICTORIAN WATER ACT TO GIVE OUR RIVERS A FAIR SHARE OF WATER

One of the purposes of the Victorian *Water Act 1989* is "to promote the orderly, equitable and efficient use of water resources".[44] For consumptive use, the Act sets out the framework for entitlements and licences to extract water. It gives the holders of these entitlements considerable rights and security and provides them with water-sharing arrangements that are orderly and equitable. However, it does not provide the same security for the freshwater ecosystems that provide the water.

The Water Act establishes the Environmental Water Reserve (EWR) "to preserve the environmental values and health of water ecosystems".[45] However the Act does not require the Water Minister to set aside a secure supply of water to meet this objective. Even after more than a decade of water recovery for rivers, the EWR is still largely composed of 'above cap' water, which is water left over after consumptive demand has been met. It is highly susceptible to the impacts of drought and climate change and is often non-existent. The second largest component of the EWR is 'rules based' or 'planned' environmental water, which depends on the delivery of consumptive water and is readily (and frequently) redirected to consumptive use when times get tough.[46] The third – and best – component of the EWR is environmental entitlements, which have similar security and reliability to consumptive entitlements but a much smaller volume at around 650 GL as compared to 6000 GL.

When water availability is low, the Water Act prioritises consumptive use over the environment. Stock and domestic use has the highest priority and in some catchments private dams can capture virtually all the available run-off, leaving little water for public dams and even less for the environment.[47] Entitlements and licences have the next priority, and while allocations may be reduced or restrictions put in place at least some water will be supplied. Apart from environmental entitlements, rivers have no reliable right to water.[48]

RIVERS NEED A GUARANTEED SHARE OF THEIR OWN WATER, A 'SUSTAINABLE BASEFLOW' THAT IS SECURE UNDER ALL CLIMATIC CONDITIONS.

[44] *Water Act 1989*, s 1(c).

[45] *Water Act 1989*, s 4b.

[46] Victorian Auditor-General's Office, 2010, *Restricting Environmental Flows during Water Shortages*.

[47] In 2006, small dams in the Campaspe catchment captured 96 percent of in inflows.

[48] This disproportionate impact is explicitly acknowledged in the *Northern Region Sustainable Water Strategy*, 2009, p. 24.

Arrangements for water sharing in Victoria are essentially inequitable and rivers and wetlands come off worst. To resolve this inequity, four things need to change:

1. Rivers need a guaranteed share of their own water, a 'sustainable baseflow'[49] that is secure under all climatic conditions.
2. The environment's share of available water should be protected from temporary qualification (redirection by the Minister during times of water shortage) to prevent damage to freshwater ecosystems. The Water Act should be amended to prioritise critical human and environmental needs over other consumptive uses.
3. All water use, including stock and domestic use and water use by deep-rooted crops and plantations, should be licenced under the Water Act and brought under a catchment cap. The Victorian government committed to including all water interceptions in its planning framework as part of the National Water Initiative in 2004,[50] but has not yet implemented the commitment. This action is required to end inequities between users and to allow fair sharing of the risks of water shortage and climate change.
4. Catchment caps based on sustainability criteria (similar to the Sustainable Diversion Limits established under the Commonwealth Water Act) should be established for all Victorian river basins. These caps would play a key role in providing the sustainable baseflows our rivers so desperately need.

The Commissioner for Environmental Sustainability has made a series of recommendations to improve the protection of the EWR. Implementing these would be highly beneficial.[51]

These changes have been avoided so far because they involve disturbing entrenched rights to water, but they are essential if our rivers and wetlands, and our natural capital, are to survive and thrive in a drying climate. They could be part of the 'fresh and balanced approach' envisaged by Minister Neville.

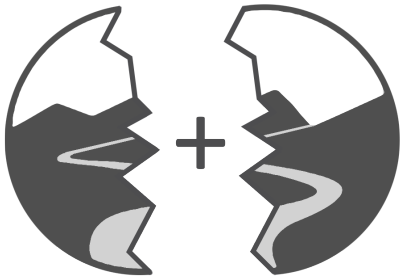
Stock and domestic use: Under the Water Act, water can be taken, used and stored free of charge and without a licence for household use, watering stock, pets and a kitchen garden, and for fire suppression. In practice this category of use covers everything from a groundwater bore for garden watering in inner-city Melbourne to dams for aesthetic or recreational purposes on rural residential properties to the watering of large numbers of cattle and sheep, and can be quite a significant volume of water that is unaccounted for.

[49] Environment Victoria and Environment Defenders Office have made recommendations on how this may be achieved in our report *Bringing the Victorian Water Act into the 21st century,* 2010.

[50] National Water Initiative, 2004, clauses 55-57.

[51] Commissioner for Environmental Sustainability Victoria, 2013, *State of the Environment report*. Reccommendation 5 and 6.

STEP 5. RECONNECTING RIVER CORRIDORS AND RESTORING RIVER BANKS



Degradation of native vegetation along Victoria's rivers and streams has been listed as a threatening process under the *Flora and Fauna Guarantee Act 1988*.[52] According to the 2010 Index of Stream Condition, 21 out of 29 river basins in Victoria have less than 50 percent of their streamside zone in good condition (see Figure 7).[53] The principal cause of this degradation is stock access to waterways, which damages rivers, decreases water quality, causes erosion, impacts upon threatened species and poses a risk to human health.

[52] http://www.depi.vic.gov.au/__data/assets/pdf_file/0019/204391/201207-FFG-processes-list.pdf.

[53] Commissioner for Environmental Sustainability Victoria, 2013, *State of the Environmet Report*, p. 136.

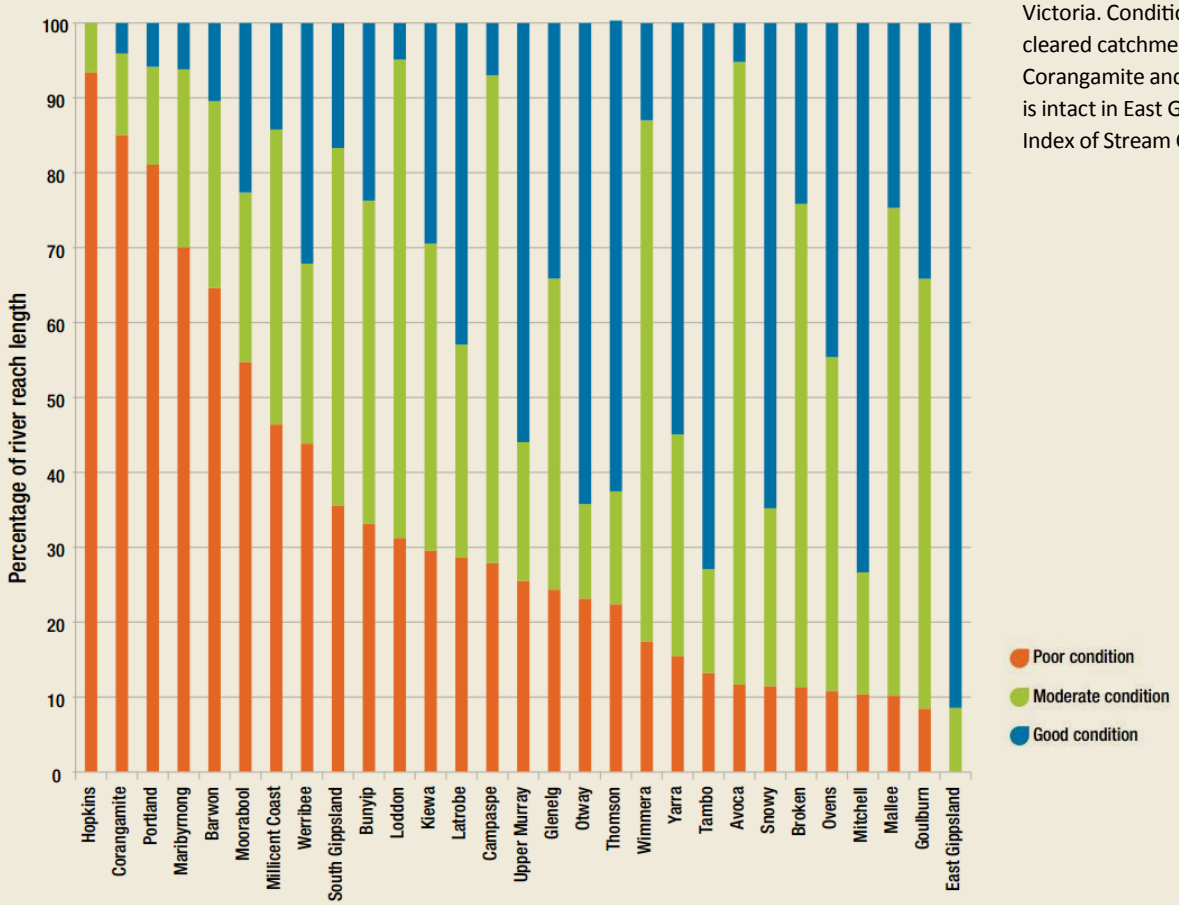


Figure 7. Condition of river banks in Victoria. Condition is worst in heavily cleared catchments like the Hopkins and Corangamite and best where vegetation is intact in East Gippsland. Source: 2010 Index of Stream Condition.

FENCING OUT LIVESTOCK FROM RIVER BANKS AND REPLANTING NATIVE VEGETATION IS GOOD FOR BIODIVERSITY, THREATENED SPECIES, WATER QUALITY AND HUMAN HEALTH.

Fortunately it's a straight forwardproblem to fix. Fencing out livestock from river banks and replanting native vegetation is good for biodiversity, threatened species, water quality and human health. Fencing is also good for farmers – it reduces stock losses and erosion, mitigates flood impacts and saves millions of dollars in flood restoration works.

Vegetation along river corridors reconnects landscape fragments and is particularly important as an adaptation to climate change. Its role in protecting waterways and increasing productivity, connectivity and amenity was well recognised in *Securing Our Natural Future*, the Brumby Government's biodiversity white paper. In addition, increased native vegetation cover increases property values[54] and can improve animal welfare by providing shade and shelter.[55]

Successive Victorian governments have recognised the importance of improving the management of river banks and many farmers and landholders have enthusiastically participated in river bank restoration and enjoyed its many benefits. The major issue has always been a lack of investment in livestock exclusion and the slow rate of progress in fencing off river banks. While the Andrews Government's Regional Riparian Action Plan means that Catchment Management Authorities priorities will be achieved more quickly, much more needs to be done if we are to make a significant difference at the landscape scale.

CROWN WATER FRONTAGES

Victoria is unique among Australian states in having Crown land on river banks, about 30,000 km in all. Around 17,000 km is managed under licence by the adjoining landholder. Traditionally licences have been for grazing purposes, but in recent years some grazing licences have been converted to riparian management licences. A riparian management licence has additional conditions relating to stock management, native revegetation and fencing requirements and results in a big improvement in the condition of river banks.

A recent report to the Victorian Department of Environment, Land, Water and Planning about managing Crown water frontages under licence has investigated the costs and benefits.[56] The report makes some important findings:

The agricultural benefits of riparian management licences are higher than grazing licences.

- There are substantial public benefits (particularly reduced soil

[54] http://decision-point.com.au/?article=the-value-of-native-bush-to-landholders.

[55] Peter Austin (Landtech Consulting) 2015, *The Economic Benefits of Native Shelter Belts,* The Basalt to Bay Landcare Network, http://basalttobay.org.au/index.php/download-reports.

[56] Aither, 2015, *Managing Crown frontages Under Licence: Investigation of Costs and Benefits to Landholders, the Victorian Government and the Community. A report to the DELWP.*

Above: Cows accessing the Ovens River, April 2015.

erosion and improved river health) and some private costs in transitioning from a grazing licence to a riparian management licence.

- The benefit-cost ratio of converting from grazing to riparian management is strongly positive, with benefits ranging from 1.6 to 4.1, depending on the region.
- "The potentially large public benefits that are associated with fencing riparian frontages are likely to justify the considerable investment that government makes to encourage these areas to be fenced, and the prevention of uncontrolled stock access."[57]

[57] Aither, Op Cit. p. xi.

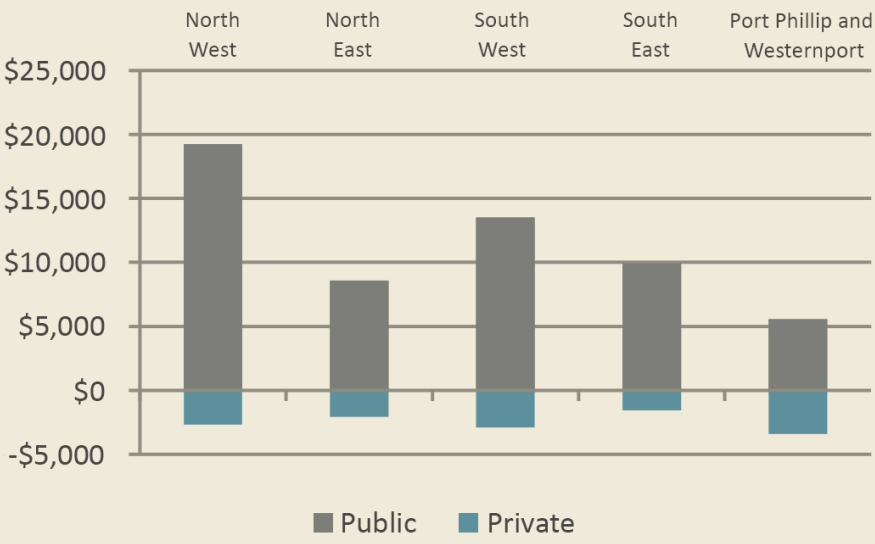
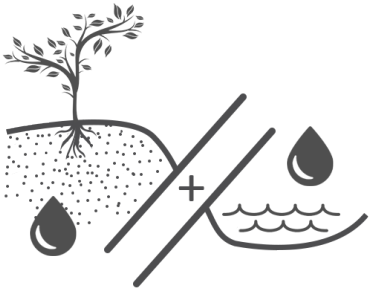


Figure 8. Public and private costs and benefits of transitioning Crown frontage licences from grazing to riparian management. The benefit-cost ratio is positive in all regions. Source: Aither, 2015, *Managing Crown Frontages Under Licence.*

The findings of the report make a clear case for accelerating the licence transition from grazing to riparian management. The next state budget should include funding to transition licences in all priority areas identified in Regional Waterway Strategies before the next licence renewal date in October 2019. Other specific actions include:

- Declare the Murray River Park. Around 200 licences covering about 500 km river frontage along the Murray were legislated to be phased out in 2014 but were instead renewed by the Coalition government. The park should be declared when the majority of licences expire in 2017.
- Identify Crown frontages that have already been fenced but without a change in licence conditions, along with those that are not currently being used for grazing, and convert them to riparian management licences.
- Ask VEAC to identify high priority areas where the quality of existing vegetation warrants the establishment of linear parks, such as was achieved in the Broken-Boosey state park, or additions to existing conservation areas, as part of its current state-wide assessment of public land. Recommendations would complement the Andrews Government's commitment to a state-wide biodiversity strategy and biolink approach.
- Require landholders in occupation of unlicensed frontages to either negotiate a riparian management licence to access subsidies or to fence off the frontage at their own expense, which is the default position.

STEP 6. MANAGE SURFACE AND GROUNDWATER TOGETHER



Surface water and groundwater are part of the same water cycle and are closely connected. What at this point of time is classified as groundwater may become surface water in the future, and vice versa. As a consequence, making use of one component of the water cycle can have unforeseen consequences for the other. Yet historically groundwater and surface water have been managed as separate resources as if they were not connected.

Physical connection between ground and surface water takes many different forms. There may be a natural connection through the stream bed, so that streams either gain water from or lose water to groundwater. Groundwater can be recharged by infiltration of rainfall, or it can discharge to the surface through springs, seeps and wetlands. Many rivers and wetlands depend on groundwater for their flows. Artificial connection can be engineered by installing injection wells or building infiltration basins (as occurs in Berlin, see page 21), or more passively by building levees to retain floodwaters over known groundwater recharge areas. Land management practices such as clearing or planting deep-rooted vegetation can have a big impact on water tables and groundwater recharge.

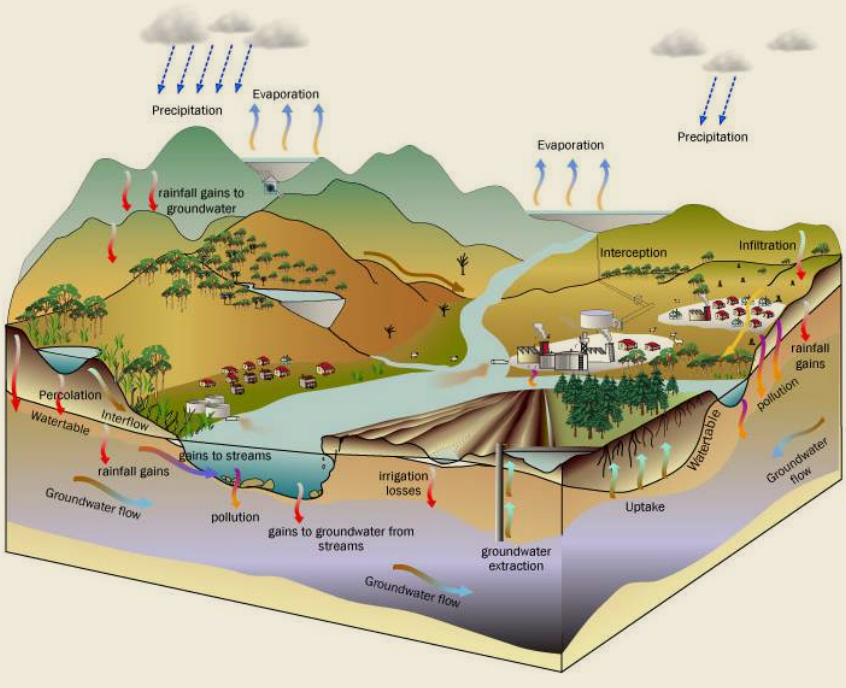


Figure 9. Connections between groundwater and surface water.

ALIGNING REVIEW CYCLES AND TIME FRAMES FOR SURFACE WATER AND GROUNDWATER PLANNING WILL ALLOW CONSIDERATION OF OPPORTUNITIES AND CROSS-IMPACTS.

Given the two are highly interconnected, groundwater and surface water should be managed as a single resource. Even when the connection is not immediate, managing them together makes sense because of their complementary properties. For example groundwater can be used as a drought reserve when surface water is in short supply.[58]

Under the National Water Initiative, the Brumby Government agreed to recognise the connectivity between ground and surface water and to manage connected systems together.[59] Since then much progress has been made in mapping groundwater and groundwater-dependent ecosystems and assessing the degree of connectivity, but, so far, Victoria has only one integrated water management plan. This plan for the Upper Ovens Valley applies the same rules to both ground and surface water licences so that all pumping is reduced when water is in short supply. New South Wales goes one step further in its proposed management plans for the Clyde, Deua and Tuross Rivers. Surface water and shallow groundwater will be considered part of the same resource pool and covered by a single type of licence.[60]

The National Water Commission has come up with a practical first step to integrate surface and groundwater management. It recommends aligning review cycles and time frames for surface water and groundwater planning to allow consideration of opportunities and cross-impacts.[61] Victoria has an obvious opportunity coming up at the legislated long-term assessment of water resources and subsequent review in 2019.[62] This review could allow a reset of the planning cycle to better coordinate groundwater and surface water management across the state.

Some obvious candidates for integrated management plans have already been identified, particularly in Southern Rural Water's excellent series of Groundwater Atlases.[63] These include the Avon and Mitchell Rivers in Gippsland and the Wandin Yallock Groundwater Management Area in the Yarra Valley, which are prime candidates for integrated or 'planned conjunctive' management that takes account of the whole water cycle. As research continues and knowledge of groundwater and the degree of interconnection with surface water improves, more catchments will be added to the priority list.

According to the National Water Commission, managing ground and surface water together at the whole of system level optimises productivity, equity and environmental sustainability.[64] This type of planning should be the default template for all Victorian catchments.

[58] National Water Commission, 2014, *Integrating Groundwater and Surface Water Management in Australia.*

[59] National Water Initiative, 2004, Para 23(x).

[60] http://www.water.nsw.gov.au/water-management/water-sharing/plans-on-exhibition.

[61] National Water Commission, 2014, Op Cit, Finding 1.

[62] *Victorian Water Act 1989,* Division 1(c).

[63] http://www.srw.com.au/page/page.asp?page_Id=687.

[64] National Water Commission, 2014, *Australia's Water Blueprint: National Water Reform Assessment.*

05
CONCLUSION

The Andrews Government has recently started work on a state water plan, which is intended to set the strategic direction for water in Victoria for decades to come. The government has committed to engaging widely with the community before establishing this direction, yet the preliminary focus of the plan is on water as a resource for human use rather than as natural capital on which all our social and economic capital depends. Ongoing access to good quality water is vital for a prosperous society.

If Victoria is to have a viable water future, with secure supplies of good quality water, the government and the water plan will need to focus on sustaining and improving our natural capital. That means maintaining and improving the environmental condition of our freshwater-dependent ecosystems, especially our rivers and wetlands, and protecting them from the worst impacts of climate change. The six steps in this report outline a path towards that goal.

The Victorian (and Australian) climate poses unique challenges for water managers because it is so variable. Rainfall is generally either far above or – more often – far below average. Climate change will make this variability even more extreme and managing our water resources even more difficult.

The Andrews Government aspires to be a leader in environmental policy, and water management presents it with both a great challenge and a huge opportunity. To realise this opportunity we need the right tools – an environmentally focused Water Act, a robust Murray-Darling Basin Plan and integrated water cycle management across all our catchments – and strong leadership. We need an engaged community that contributes to setting the benchmark for catchment and river condition required to sustain our natural capital. And we need innovation to make our cities and our agriculture truly water smart.

CHAPTER 05
CONCLUSION

Victorians care deeply about their rivers and wetlands, and their water resources, and they expect their government to work hard to protect them. They also want their cities to be water smart and the produce they consume to be sustainably farmed. In other words, they want their natural capital preserved.

As Water Minister Lisa Neville has said, freshwater is an essential part of our social fabric. In fact it is more than that: we are part of the water cycle and we cannot live without it. Freshwater is truly our lifeblood. We need to manage it well so that it remains fresh. This means treasuring our rivers and wetlands as if they were the most precious and essential parts of our landscape and society, for in many ways they are.

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