AQUAPRINT

A COMMUNITY VISION FOR WATER REFORM IN VICTORIA

June 2016

environment victoria

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Environment Victoria pays respect to Victoria's Traditional Owners and elders past and present. We acknowledge their careful stewardship of land and water over many thousands of years, and we support their right to access and use water for cultural purposes.

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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, the Murray and the Goulburn give up more than half their water on a regular basis, and even more in dry years. 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 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

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.

Above: Cyclists take in the view along the Yarra River.

a leader in environment and climate change".[2] She has also said that "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]

The Andrews Government is now seeking to describe this new approach through the development of a state water plan, *Water for Victoria*. The plan is intended to "manage water to support a healthy environment, a prosperous economy and thriving communities, now and into the future".[4]

"PRESERVING THE FUTURE OF OUR WATER SUPPLIES REQUIRES A NEW VISION AND THAT CALLS FOR A FRESH AND BALANCED APPROACH."

DEVELOPMENT OF THE AQUAPRINT

This *Aquaprint* report presents a community perspective on how that aim could be achieved. It is based on Environment Victoria's *Six Steps to Water Leadership* report which was published in November 2015. Since then we have consulted widely on the content and invited comments, ideas and suggestions. Through workshops in Melbourne and regional centres like Bendigo, discussions with community members and experts in the field, and emails to our supporter base of more than 60,000 Victorians, we have collated detailed and specific feedback from more than 100 people across the state.

From this community consultation, some strong themes have emerged that build on our report and are highly relevant to the state water plan:

STRONG SUPPORT FOR:

- Providing rivers with a reliable share of water, a 'sustainable base flow'
- Strengthening the Water Act to provide better environmental protection and coordinate surface water and groundwater management

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

[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.

[4] Victoria State Government, 2016, *Water for Victoria Discussion Paper*, p.8

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INTRODUCTION

- Greater use of alternative sources of water such as stormwater and recycled water
- Catchments 'living within their means' in terms of water resources.

AREAS NEEDING MORE ATTENTION:

- Education about water at all scales (water cycle, water management, water use)
- The impacts of rapid population growth on water resources and increasing demand for water
- The sustainability and water use of current agricultural practices and a transition plan for agriculture
- Protection of water quality.

LACK OF SUPPORT FOR:

- Pumping water long distances through the water grid and desalination
- Allocating any more water (surface water or groundwater) for consumptive use.

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

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.

STEPS TO WATER REFORM IN VICTORIA

Following the community consultation, the six key steps to water leadership in our original report have become nine steps (see list and icons below). 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. This community vision for water reform provides a path to achieving this.

1. COMMUNITY EDUCATION FOR WATER LITERACY

2. REFORMING THE VICTORIAN WATER ACT TO GIVE OUR RIVERS A FAIR SHARE OF WATER AND TO MANAGE SURFACE AND GROUNDWATER TOGETHER

3. A MURRAY-DARLING BASIN PLAN THAT RESTORES OUR WETLANDS AND NATIONAL PARKS

4. A TRANSITION PLAN FOR AGRICULTURE

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

6. A VICTORIAN ENVIRONMENTAL ASSESSMENT COUNCIL (VEAC) INVESTIGATION INTO THE STATUS AND MANAGEMENT OF FRESHWATER-DEPENDENT ECOSYSTEMS

7. RECONNECTING RIVER CORRIDORS AND RESTORING RIVER BANKS

8. IMPROVING WATER QUALITY

9. SECURE FUNDING FOR SUSTAINABLE WATER MANAGEMENT

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WHY DO WE NEED WATER REFORM?

VICTORIA'S RIVERS ARE THE LIFEBLOOD OF OUR LANDSCAPES

Rivers connect, support and nurture communities of all kinds – animals, plants and people. They give us water to drink, 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.
Photo: Andrew Shannon

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 how investment in environmental restoration will repay itself in increased employment, economic output, liveability and wellbeing.[5] 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[6] reveals that only 23 percent of river reaches are in good or excellent condition while 32 percent are in poor or very poor condition (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.

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

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.

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.

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

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

[6] 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.

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WHY WE NEED WATER REFORM

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

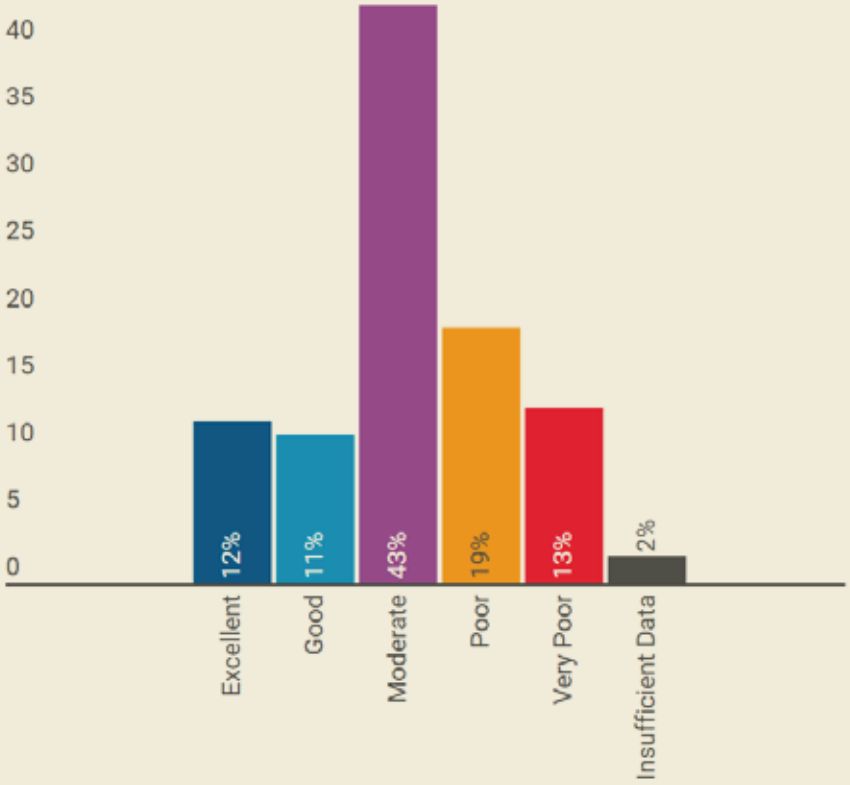
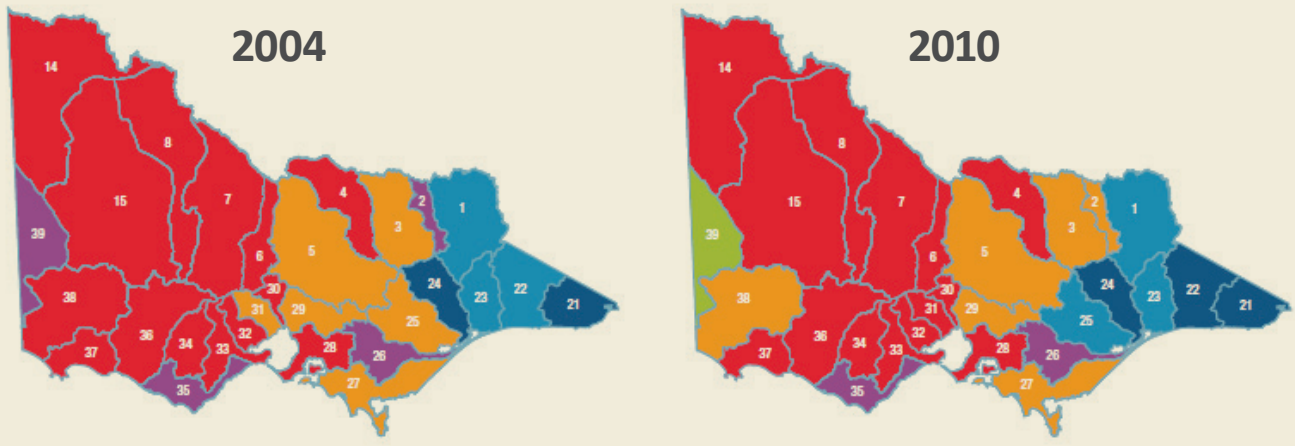


Figure 2. River condition in 2004 and 2010 – little has changed. Red indicates that less than 10 percent of river reaches are in good condition. Source: Third Index of Stream Condition.



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 dead trees and unusable water that was toxic to stock and wildlife.

Left: The Wimmera River at Jeparit, August 2009.
Photo: Environment Victoria.

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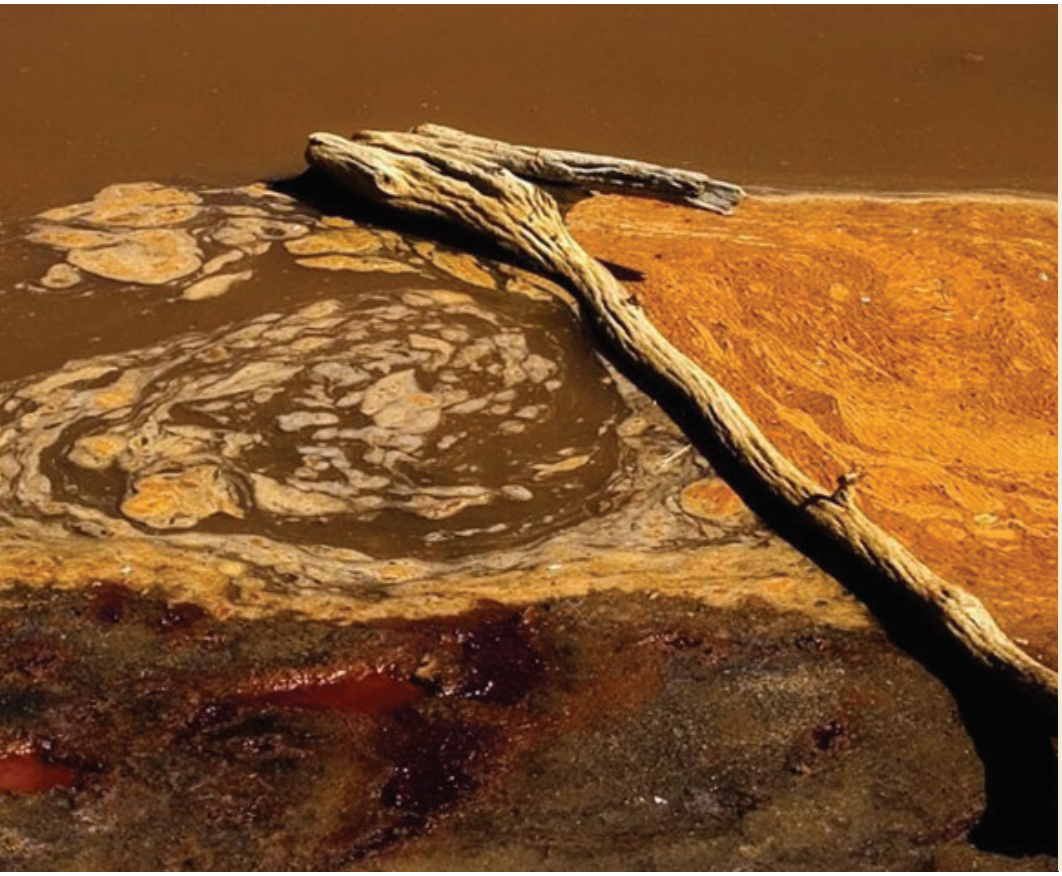

PSYCHE BEND LAGOON NEAR MILDURA IN 2007 – SALINE AND ACIDIC

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 in 2007. The release of iron due to acidic conditions gives the water its red colour. Photo: Steph Tout

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, unusable for any purpose and toxic to livestock.

Left: The Moorabool River near Batesford, January 2007. Photo: Stuart McCallum

WATER USE IN VICTORIA

On average, over five trillion litres (5000 GL) of water is extracted from Victoria's rivers each year. Between 75 and 80 percent of this water is used for irrigated agriculture (Figure 3).[7] 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."[8]

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

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

[8] Department of Sustainability and Environment, 2007, *Why rivers need water.*

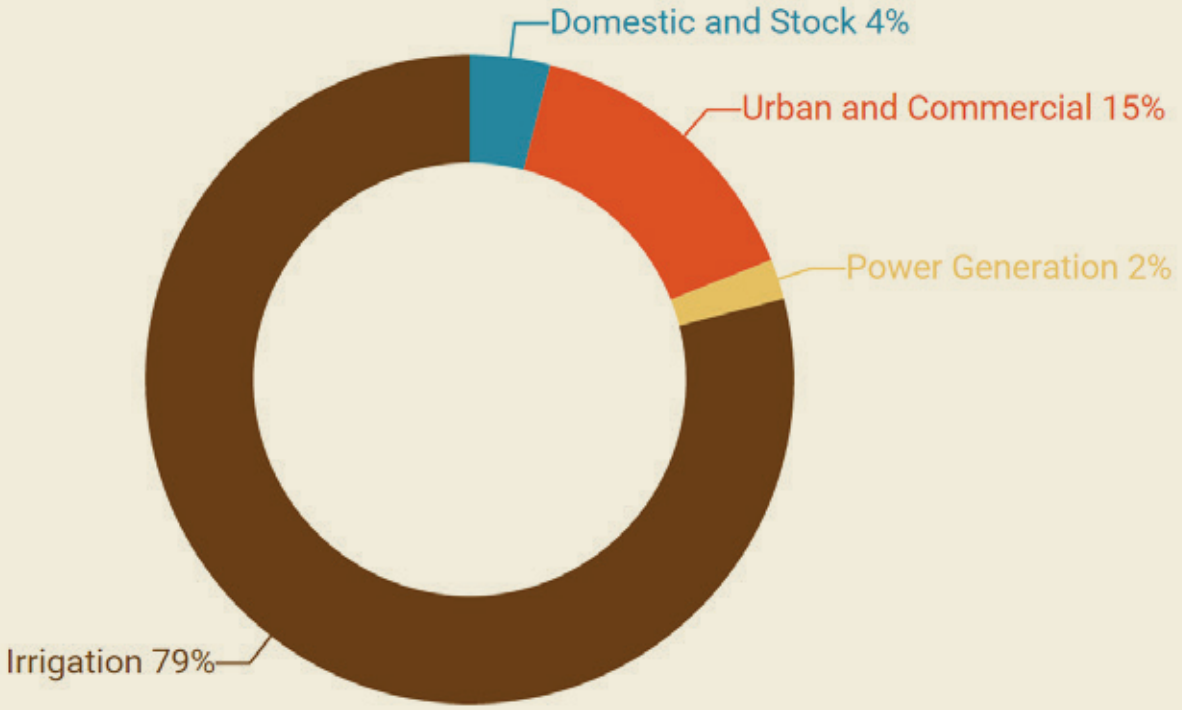

Figure 3. Uses of consumptive water in Victoria. About 80 percent is used for irrigation. Source: Victorian Water Accounts 2013-14.

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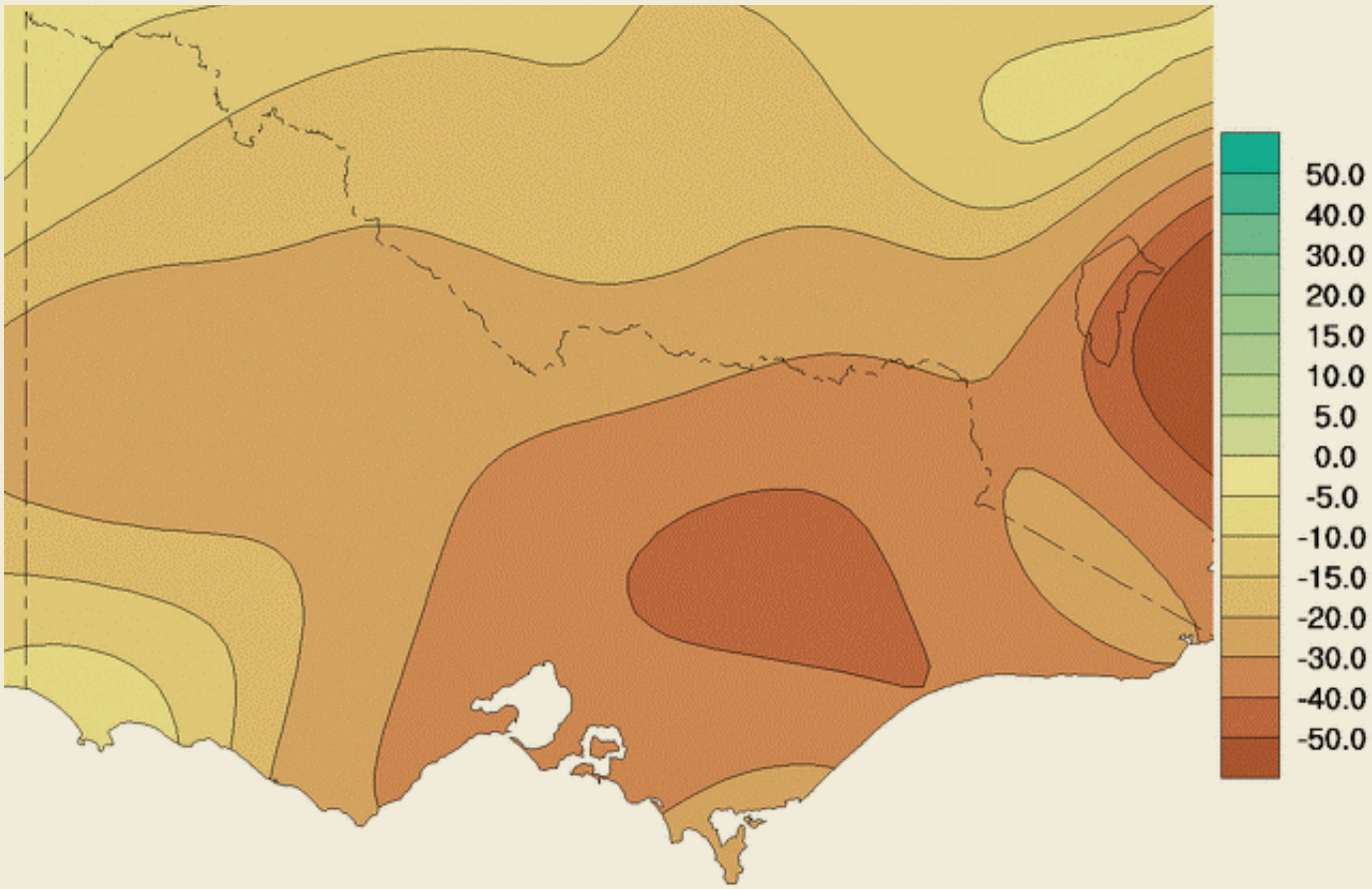


Figure 4. The downward trend in total rainfall in Victoria 1970-2015, shown as the decrease in mm rainfall per 10 year period. Source: Bureau of Meteorology.[9]

THE IMPACT OF CLIMATE CHANGE ON VICTORIA'S RIVERS

Rainfall in Victoria has been declining since the 1970s (see Figure 4 above), 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. Both these factors reduce stream flows and the volume of water in our rivers.

[9] http://www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=trend-maps&tQ[map]=rain&tQ[area]=vic&tQ[season]=0112&tQ[period]=1970

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.[10] Recent research suggests that prolonged drought may influence how catchments function, reducing runoff more than the climate models predict.[11] Coupled with record temperatures in early 2016, this new research suggests that the impacts of climate change may greater than even the worst-case modelled scenarios.[12]

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. 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.[13]

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

POPULATION GROWTH AND MELBOURNE'S WATER CONSUMPTION

Greater Melbourne is adding more people each year than any other city in Australia. In 2013/14 the city's population grew by a staggering 97,000 to a total of 4,400,300 people.[14] This growth is projected to continue unabated and, according to state government predictions, 7.8 million people will be calling Melbourne home in 2051.[15]

This population growth is having a dramatic effect on water consumption. The government has reintroduced the Target 155 campaign to reduce household water use to 155 litres/person/day. Assuming the campaign is successful and Melbourne's residents achieve Target 155, the extra 97,000 people added in 2013/14 would still have boosted Melbourne's water demand by 5.4 billion litres (GL) per year. This rate of growth in demand is only going to accelerate as the absolute number of people added each year increases.

Household demand is just part of the story. Recent research by Foodprint Melbourne has found that it takes more than 475 litres of water/person/day to grow food for the city's residents.[16] That's a total of 758 GL per

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

[11] https://pursuit.unimelb.edu.au/articles/the-rivers-run-but-less-than-we-thought

[12] https://www.climatecouncil.org.au/marchheatreport

[13] DSE, 2009, *Northern Region Sustainable Water Strategy* p.24

[14] Australian Bureau of Statistics, *Regional Population Growth 2013/14* http://www.abs.gov.au/ausstats/abs@.nsf/mf/3218.0

[15] DELWP, 2015, *Victoria in Future* http://www.delwp.vic.gov.au/planning/forward-policy-and-research/victoria-in-future-population-and-household-projections

[16] http://www.ecoinnovationlab.com/project_content/water-needed-to-grow-food-for-melbourne/

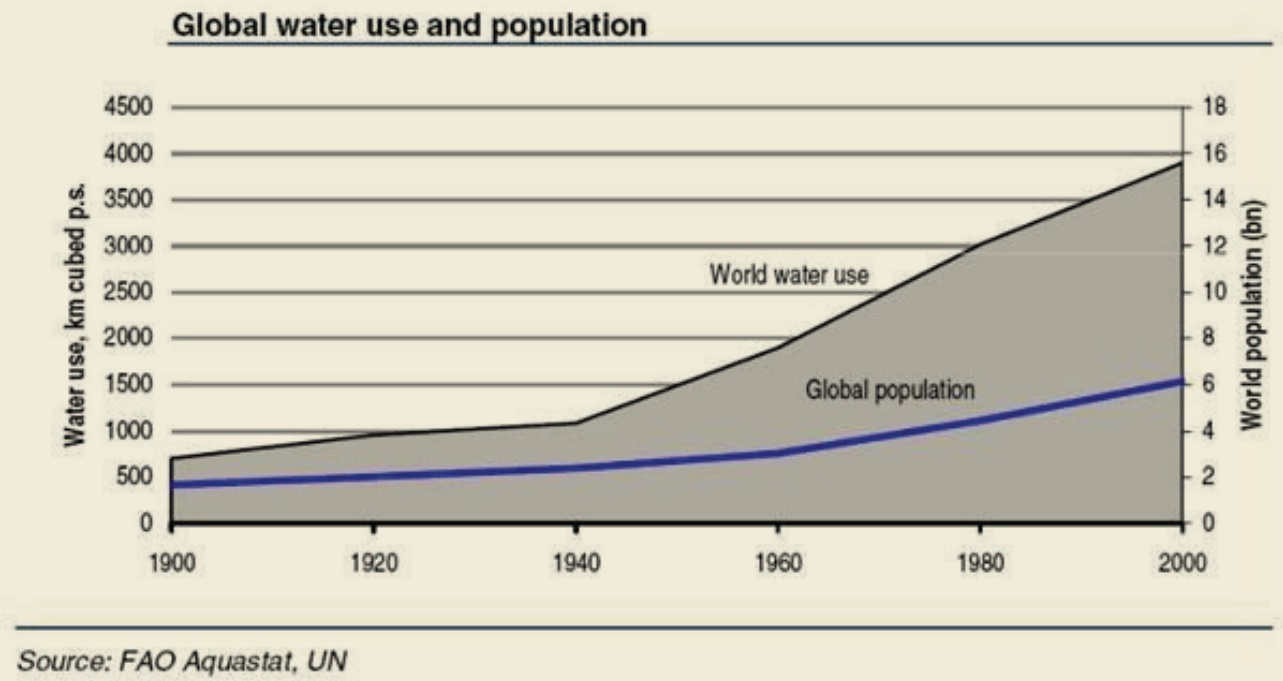


Figure 5. Global water use and population growth. Source: FAO Aquastat database[17]

year, more than three times household consumption. So the impact of population growth on water demand is even greater than household use suggests – those 97,000 people need an extra 16.5 GL of water to grow their food every year.

When household use and water required to grow food are combined, the impact of population growth on water demand is huge – Melbourne will require at least an extra 21 GL per year every year for the foreseeable future. That's a minimum of 735 GL by 2051 – the equivalent of five more Wonthaggi-sized desalination plants!

A further exacerbating factor is that world water use is growing at a faster rate than world population growth (Figure 5 above). Per capita usage is rising as consumption patterns change and world population becomes increasingly urbanised and dependent on irrigation for food and fibre production.

Any long-term plan for sustainable water use and healthy rivers will need to address population issues. The current paradigm of continuous growth is unsustainable and is causing serious depletion of the natural capital on which all our social and economic capital depends. This is a complex and multifaceted problem, beyond the scope of this report, but our community consultation showed deep and consistent concern about the issue and it cannot be ignored.

[17] http://www.waterclean.ca/Facts&Trends.php

WATER REFORM TO DATE

As water use for irrigation 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 Governments (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 these reform processes.

• The National Water Initiative was agreed between state and federal governments in 2004. They agreed (among 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.[18]

• 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 to allow for the disproportionate impact of climate change on freshwater environments to be addressed.

• 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), the Basin Plan process and the Commonwealth Environmental Water Holder (CEWH).

• 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.

Unfortunately these reforms have not been sufficient to reverse the long-term downward trend in river health and freshwater biodiversity continues to decline at an alarming rate.[19] This report reinvigorates some old ideas and introduces new ones to help address the gaps and set out a pathway to restoring our natural capital.

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.

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

[19] Mantylea-Pringle, C, Rhodes, J, and Martin, M. 2016. 'We all live downstream – it's time to restore our freshwater ecosystems.' The Conversation.

CHAPTER 02
WHY WE NEED WATER REFORM

THIS AQUAPRINT REPORT IS A YARDSTICK TO MEASURE THE AMBITION OF THE GOVERNMENT'S WATER PLAN AND TO HELP SHAPE ITS FINAL VERSION.

WHY WE NEED A NEW VISION FOR WATER REFORM NOW

The Millenium drought that ended in 2009 was followed by one of the strongest La Niña events in history and record-breaking floods across Victoria in 2010/11.[20] These events removed the urgency from national water reform. The election of the Baillieu/Napthine Government in Victoria and the Abbott Government federally took away any environmental focus in water decision making and consumptive use was again prioritised. Even the ground-breaking Murray-Darling Basin Plan has been under constant attack, and environmental water recovery for the Basin's stressed rivers is slowing to a trickle.

At the same time as this policy drought has developed, real drought is appearing in Victoria. Much of western Victoria has had a severe rainfall deficit in the last two years, with some areas receiving the lowest rainfall on record (Figure 6). Coupled with steadily rising temperatures due to climate change and growing population, the pressure is back on for urgent water reform.

Fortunately the Andrews Government has recognised the need for change. The recently released *Water for Victoria* Discussion Paper acknowledges the current and future pressures on water resources and makes useful proposals for change. The commitment to establish an Aboriginal water unit and improve outcomes for Traditional Owners is particularly welcome. However, the government is yet to spell out a coherent plan to rescue our rivers and set Victoria on a course to sustainable water use.

This *Aquaprint* report is a yardstick to measure the ambition of the government's water plan and to help shape its final version.

[20] South East Australian Climate Initiative, 2011, *The Millennium Drought and 2010/11 Floods Factsheet*. www.seaci.org.au

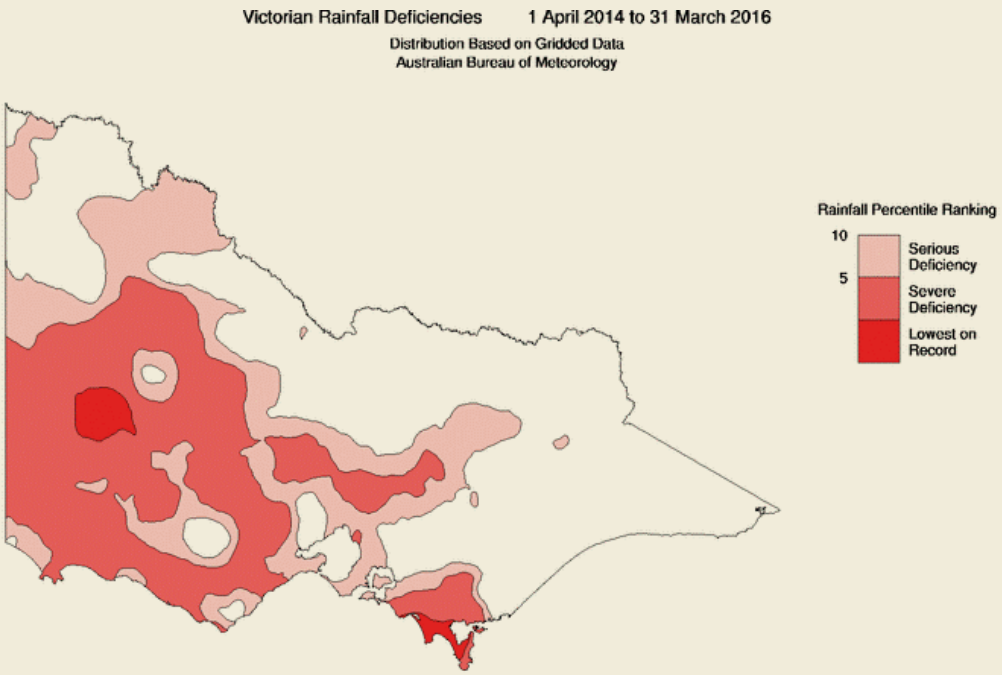


Figure 6. Victorian rainfall deficiencies in the past two years (1 April 2014 to 31 March 2016).
Source: Bureau of Meteorology.[21]

[21] http://www.bom.gov.au/jsp/awap/rain/index.

03
THE AQUAPRINT - A COMMUNITY VISION FOR WATER REFORM

1. COMMUNITY EDUCATION FOR WATER LITERACY

Water literacy has been a dominant theme in all the community discussion while developing the *Aquaprint*. Education has been repeatedly identified as fundamental in building community understanding about how water is managed in Victoria, particularly in catchments where there is competition between water users and the potential for conflict. It was described at our workshops in Frankston and Bendigo as 'step one' for sustainable water management in Victoria.

EDUCATION HAS BEEN REPEATEDLY IDENTIFIED AS FUNDAMENTAL IN BUILDING COMMUNITY UNDERSTANDING ABOUT HOW WATER IS MANAGED IN VICTORIA, PARTICULARLY IN CATCHMENTS WHERE THERE IS COMPETITION BETWEEN WATER USERS AND THE POTENTIAL FOR CONFLICT.

Water education needs to go beyond current schools programs like Resource Smart Schools and citizen science programs such as Waterwatch and Estuarywatch. While these programs are popular, informative and fun, they are not comprehensive water literacy programs. They bring welcome focus to particular aspects of water management but are not designed to provide a comprehensive education.

Education for water literacy needs to cover the water cycle, water management, water entitlements and water use. It should describe the finite nature of freshwater resources and the potential for competition and conflict, and explore potential solutions to the conflict. The concept of natural capital and its preservation should be fundamental. Understanding water use in different sectors, especially in agriculture and food production, is also key.

The establishment of a Water Literacy Unit within the Department of Environment, Land, Water and Planning (DELWP) could help drive the development of new programs and initiatives for adult education, particularly in catchments where demand for water is high and there is competition for a scarce resource. It could expand the work of Waterwatch to educate volunteers more broadly about river health and water management. It could also take a fresh look at the school

Above: Environment Victoria Healthy Rivers Campaigner Juliet Le Feuvre holds a community forum on water leadership.

curriculum and seek opportunities for real-life education such as the 'Schools as Catchments' program pioneered by Environmental Education Victoria.[22] Such an approach fits well within integrated water cycle management and promotes liveability.

2. REFORMING THE VICTORIAN WATER ACT

One of the purposes of the Victorian *Water Act 1989* is "to promote the orderly, equitable and efficient use of water resources".[23] 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, and it does not allow for all the components of the water cycle to be managed as a whole.

A) A FAIR SHARE OF WATER FOR RIVERS AND OTHER FRESHWATER ECOSYSTEMS

The Water Act establishes the Environmental Water Reserve (EWR) "to preserve the environmental values and health of water ecosystems".[24] 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 investment in 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

[22] http://eev.vic.edu.au/resources/school-as-catchment/

[23] Victorian Water Act 1989, s 1(c)

[24] Victorian Water Act 1989, s 4b

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

water and is readily (and frequently) redirected to consumptive use when times get tough.[25] The third – and most reliable – component of the EWR is environmental entitlements, which have similar security and reliability to consumptive entitlements but a much smaller volume (around 650 GL across the state as compared to 6000 GL of consumptive entitlements).

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.[26] 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.[27] The problem is particularly acute in unregulated rivers such as the Hopkins in western Victoria or the Tarwin in South Gippsland where it is difficult to create an environmental entitlement.

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'[28] 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. Another option would be to insert a 'freshwater trigger' in the Flora and Fauna Guarantee Act (which is currently under review) to prevent irreversible damage to freshwater ecosystems.

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,[29] 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 an 'environmentally sustainable level of

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.

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

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

[27] This disproportionate impact is explicitly acknowledged in the Northern Region Sustainable Water Strategy, 2009, p24

[28] 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

[29] National Water Initiative, 2004, clauses 55-57

take'[30] 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 legislated long-term water resource assessments that are due in 2017 would be the ideal vehicle to provide the information needed to establish these caps.[31] The catchment caps could then be implemented through the ensuing review of the balance between the water available for consumption and for the environment. This review is required by law to restore the health of waterways if they have deteriorated for reasons connected to flow.[32]

The Commissioner for Environmental Sustainability has made a series of recommendations to improve the protection of the EWR.[33] The state water plan is a great opportunity to implement them.

These necessary 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 and implemented through the state water plan.

B) MANAGING 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. The Victorian Water Act does not acknowledge the interconnection.

Physical connection between groundwater and surface water takes many different forms (see Figure 7 on the next page). 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, or more passively by building levees to retain floodwaters over known

[30] An environmentally sustainable level of take (ESLT) is defined in the Commonwealth Water Act 2007 as 'the level at which water can be taken from that water resource which, if exceeded, would compromise:
a) Key environmental assets pf the water resource; or
b) Key ecosystem functions of the water resource; or
c) The productive base of the water resource; or
d) Key environmental outcomes of the water resource.'

[31] Victorian Water Act 1989 s22K-O

[32] Victorian Water Act 1989 s22P

[33] Commissioner for Environmental Sustainability Victoria, 2013, *State of the Environment* report. Recommendations 5 & 6

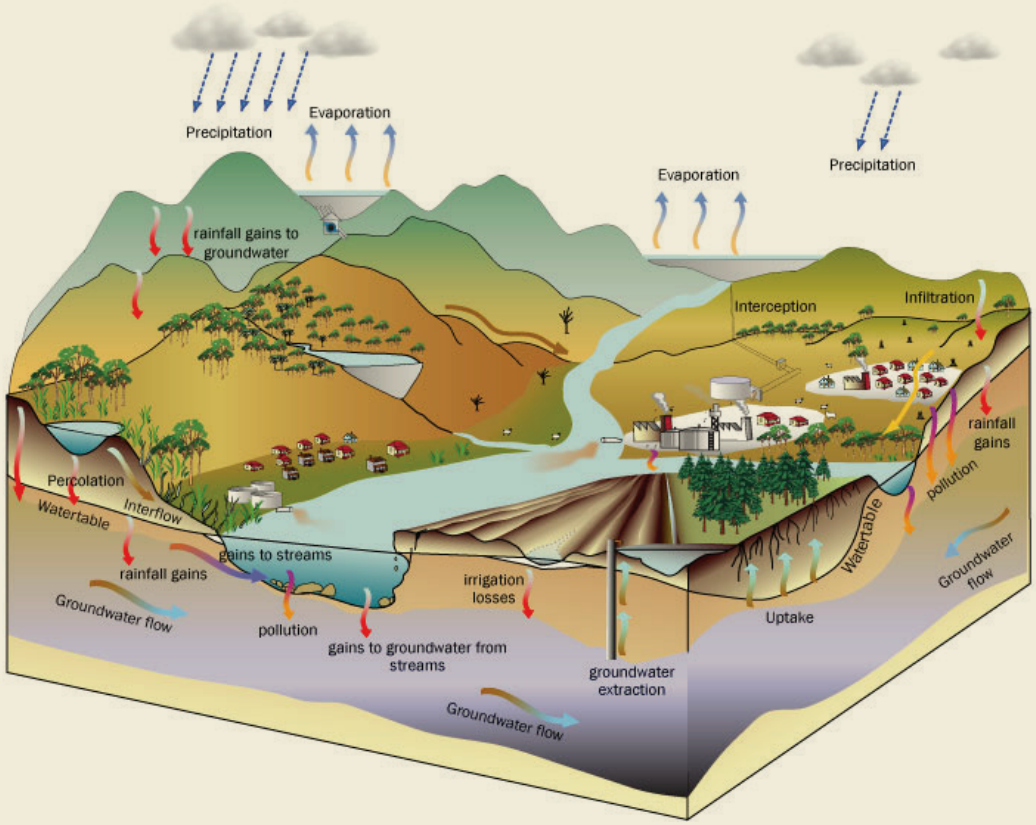


Figure 7. Connections between groundwater and surface water.

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.

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.[34]

Under the National Water Initiative, the Brumby Government agreed to recognise the connectivity between groundwater and surface water and to manage connected systems together.[35] 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 groundwater and surface water licences so that all pumping is reduced when water is in short supply. NSW 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 water licence.[36]

The National Water Commission has come up with a practical first step to integrate surface and groundwater management. It recommends aligning review cycles and timeframes for surface water and groundwater planning to allow consideration of opportunities and cross-impacts.[37] Victoria has an obvious opportunity coming up at the legislated long-term assessment of water resources in 2017 and subsequent review in 2019.[38] 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.[39] 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 groundwater

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

[34] National Water Commission, 2014, *Integrating groundwater and surface water management in Australia*

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

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

[37] NWC, 2014, op cit Finding 1

[38] Victorian Water Act 1989, Division 1c

[39] http://www.srw.com.au/page/page.asp?page_Id=687 viewed 19/10/15

and surface water together at the whole of system level optimises productivity, equity and environmental sustainability.[40] This type of planning should be the default template for all Victorian catchments and embedded in the Victorian Water Act.

3. 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 is still in short supply for the parks. They need enough water for a 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 get the water they need. When the parks were established, the Brumby Government rejected VEAC's proposals[41] 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.[42] 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.[43]

Sustainable Diversion Limits (SDLs) on how much water can be extracted from rivers will start operating in 2019. All water recovery projects to meet the environmental objectives of the Plan are due to be completed by 2024. Despite the Commonwealth government's repeated assurances

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.

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.

[40] National Water Commission, 2014, *Australia's water blueprint: national water reform assessment*

[41] Victorian Environment Assessment Council, 2007, River Red Gum Forests Investigation – Draft Proposals Paper for public comment

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

[43] Murray-Darling Basin Authority, 2012, *Hydrologic modelling of the relaxation of operational constraints in the Southern connected basin*

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 that "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".[44]

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.[45] However a new cap recently written into Commonwealth legislation and supported by the Victorian government limits water recovery by this method to 1500 GL. The rest will have to be recovered by making irrigation infrastructure more efficient. These

Right: Lake Little Yerang receiving the benefits of environmental watering, April 2011. Photo: Environment Victoria

[44] Independent Review Panel, 2014, *SDL Adjustment Ecological Elements Method Development Report – Review of final project report*

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

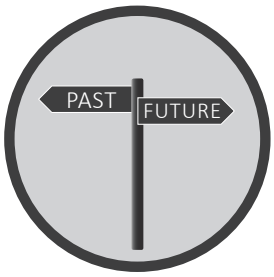
THE CERTAINTY COMMUNITIES NEED IS A PLAN THAT WILL DELIVER LONG-TERM SUSTAINABILITY THROUGH ADEQUATE FLOWS TO PROTECT RIVERS AND WETLANDS.

infrastructure projects are two to seven times more expensive than buybacks[46] and a recent report casts considerable doubt on their effectiveness.[47]

Ensuring the Plan reaches its full potential for environmental restoration requires leadership and commitment. Along with ALP governments in South Australia and Queensland, the Andrews Government has an opportunity to lead by championing a Plan that returns 3200 GL 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." [48]



4. A TRANSITION PLAN FOR VICTORIAN AGRICULTURE

Agriculture in Victoria is big business, worth $12.5 billion a year. It is undergoing rapid change in terms of demographics, number and size of farming enterprises, employment and farming practices. It's also subject to a range of pressures and uncertainties including commodity prices, currency exchange rates and terms of trade. But perhaps the biggest uncertainties of all are weather conditions and water availability, which have a dramatic impact on production and profitability.

ABARE modelling shows that Victorian agricultural production is highly susceptible to climate change (Figure 8). Both irrigated and non-irrigated production is at risk with a significant decline predicted by 2030. This decline mirrors the decline in water availability described earlier.

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

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

[48] Victorian Government (2004) *Securing our water future together* White Paper (OWOF) p 12

Retrofit activity	Approximate decline by 2030 (%)	Approximate decline by 2050 (%)
Wheat	9.8	13.4
Beef	2.4	6.5
Sheep	7.1	12.9
Dairy	4.6	10.0

Figure 8. Estimated decline in agricultural production for Victoria in 2030 and 2050 due to human-induced climate change. Source: ABARE (2007)[49]

Adaptation measures are clearly required to sustain agricultural production.

Workshop discussion while developing this *Aquaprint* revealed significant community concern about the sustainability of current agricultural practice, which was raised in every forum. There was strong concern about the impact of current practice on ecosystem health and the pressure agricultural demand for water is placing on river systems. These concerns echo the findings of every single State of the Environment and Victorian Catchment Management Council catchment condition report, all of which document the impact of agricultural practices on terrestrial and freshwater ecosystems.

A huge amount of work is underway on reforming agricultural policy and practice to include the provision of ecosystem services, carbon sequestration and climate change mitigation.[50] What is marginal today will become mainstream in the future and vice versa, and the choices and income streams available to farmers will be very different in years to come.

The current rate of change in economic, social and environmental conditions demands significant leadership by government to speed up the adaptation process. A detailed transition plan for agriculture is beyond the scope of this report, but resilient communities need diversified opportunities and the knowledge and confidence to make change happen. Government needs to develop the policy framework that will drive the changes required to protect and restore our natural capital.[51]

[49] http://www.environment.gov.au/climate-change/climate-science/impacts/vic

[50] See *Farming in 2050: storing carbon could help meet Australia's climate goals* for a recent example https://theconversation.com/farming-in-2050-storing-carbon-could-help-meet-australias-climate-goals-54899

[51] See for example The Future Economy Group,2014, Bringing Victoria's economy into the 21st Century

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

Victoria's towns and cities were designed on a traditional 'once through' basis. 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 based 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: the socio-political capital for sustainability exists and citizens' decision making and behaviour are water sensitive.[52]

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 9 on page 32.

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 late-1970s, despite having more than a million extra residents. However, the long-term upward trend in water use has reversed since the end of the Millennium drought in 2009. 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 its recent reintroduction will help prevent backsliding. Businesses embraced the EPA's Environment and Resource Efficiency Plan (EREP) program to find cost-effective means of saving water which

Ecosystem services are the benefits provided by natural ecosystems that contribute to making human life both possible and worth living.[53]

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

[52] CRC for Water Sensitive Cities http://watersensitivecities.org.au

[53] Definition from UK National Ecosystem Assessment

encouraged them to seek further savings and efficiencies.[54]

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 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.

The Andrews Government has the opportunity to build on these past achievements and capitalise on the work done by the previous Coalition government to implement Integrated Water Cycle Management (IWCM). The government has committed to a *Yarra Protection Act* intended to control development in the Yarra River corridor. There's 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.[55] We would also achieve the government's objectives for liveability and green spaces in our cities.

Key planks in a new plan should include:

- Capturing stormwater run-off before it enters drains and creeks, increasing water availability and stopping pollution entering and preventing 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[56]
- Embedding water efficiency in new and existing homes and businesses (as discussed in Environment Victoria's report *Six Steps to Efficiency Leadership*)[57]
- 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

Integrated water cycle management (IWCM) 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.

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

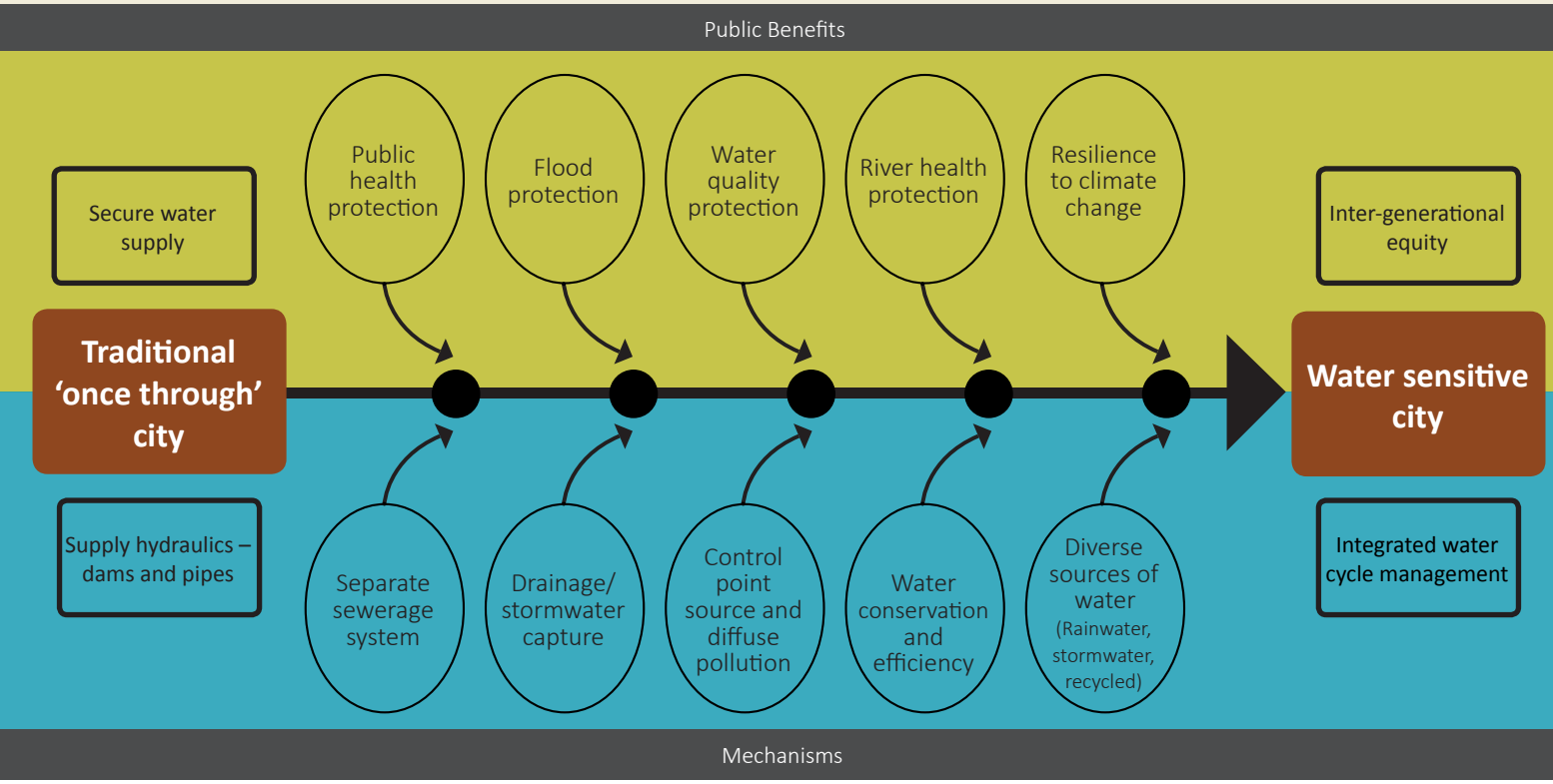
[55] The State of the Environment report 2013 makes a very similar recommendation on IWCM (Recommendation 13)

[56] Victorian Water Accounts 2013/14

[57] http://environmentvictoria.org.au/efficiency-leadership

CAPTURING STORMWATER RUNOFF BEFORE IT ENTERS DRAINS AND CREEKS INCREASES WATER AVAILABILITY AND STOPS POLLUTION ENTERING URBAN CREEKS AND RIVERS.

Figure 9. Features of a water sensitive city.



- 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.[58] 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.

6. 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.[59] This inquiry led to many important measures to protect rivers and streams including the *Heritage Rivers Act 1992* and the establishment of environmental flow recommendations. These were

[58] Environmental Justice Australia and Yarra Riverkeeper Association, 2015, *Let's Act for the Yarra*

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

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 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 appointed a new Victorian Environmental Assessment Council (VEAC) in 2015. 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[60] 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',[61] 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.

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.

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

[61] CMA Statement of Obligations, Part 6

7. 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 & Fauna Guarantee Act.[62] According to the 2010 Index of Stream Condition, more than half of Victoria's river banks are in moderate or poor condition and only eight out of 29 river basins have more than 50 percent of their streamside zone in good condition.[63] 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.

Fortunately it's a straightforward problem 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.

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

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

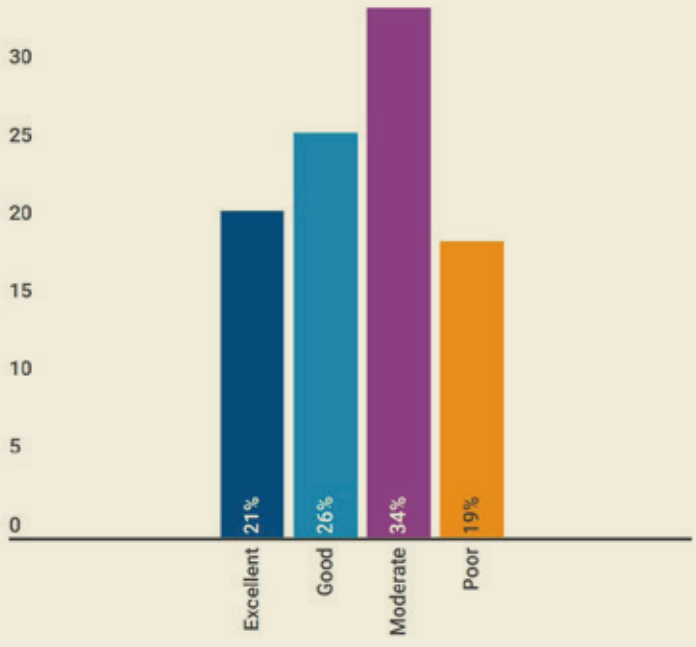


Figure 10. Condition of river banks in Victoria. Less than half are in good or excellent condition. Source: Third Index of Stream Condition. Percentage figures have been rounded up to the nearest whole number.

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[64] and can improve animal welfare by providing shade and shelter.[65]

Successive Victorian state 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 brings a welcome funding boost and means that CMA 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

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

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

[65] 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

Left: Cows accessing the Ovens River, April 2015. Photo: Environment Victoria

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 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.[66] The report found that the agricultural benefits of riparian management licences are higher than grazing licences and that 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. It concludes that public investment in fencing riparian frontages is justified.

The findings of the report make a clear case for accelerating the licence transition from grazing to riparian management. The Andrews Government should aim to transition licences in all priority areas identified in Regional Waterway Management Strategies before the next licence renewal date in October 2019 and to modernise licence conditions to bring them into the twenty-first century. 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 previous 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.
- 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. This action 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.

[66] Aither, 2015, Managing Crown frontages under licence: Investigation of costs and benefits to landholders, the Victorian government and the community. A report to DELWP

8. IMPROVING WATER QUALITY

Freshwater pollution comes from many sources, including:

- Fertilisers that raise nutrient levels and encourage algal growth, including toxic blue-green algae
- Other agricultural chemicals, such as pesticides and herbicides
- Industrial pollution from factories and mines, which can include heavy metals and other toxicants
- Increased sedimentation from land clearing, mining and stock grazing
- Sewage pollution from septic tanks, faulty connections and unsewered properties
- Faecal pollution from stock grazing on river banks and in waterways
- Salt – both in industrial discharge and as a result of dryland and irrigation-induced salinity
- Effluent from waste water treatment plants which generally has raised nutrient and salinity levels
- Stormwater run-off from roads and streets polluted with litter and chemicals.

Industrial pollution is theoretically the easiest to identify and control because it originates from a distinct source and is readily monitored. The Environment Protection Authority (EPA) is the regulatory body and it has made a significant difference –abattoirs and dye plants no longer dump their waste straight into the nearest river. But there is still a long way to go – mines and industrial plants continue to pollute rivers with contaminated water. Polluted water flows into rivers and groundwater from sources as diverse as the coal mines of the Latrobe Valley[67] to arsenic pollution from past gold mining in Bendigo.[68]

The current review of the EPA is the ideal opportunity to give the Authority more power to make polluters take responsibility for their discharge and either re-use it or clean it up before releasing it to the environment.[69] It also needs to be empowered to deal with the cumulative impacts of different types of pollution.

Agricultural pollution is harder to address because it is diffuse and occurs over a broad area. Controlling it requires catchment-scale action to be effective. Farmers need to adopt agricultural practices that reduce inputs

[67] http://www.latrobevalleyexpress.com.au/story/1607641/yallourn-water-discharge-increased/?cs=1462

[68] http://www.bendigoadvertiser.com.au/story/3751388/arsenic-laced-water-threatens-bendigo/

[69] See Environmental Justice Australia submission to EPA Inquiry for suggestions to improve the effectiveness of the EPA https://envirojustice.org.au/submissions-and-issues-papers/inquiry-into-the-environment-protection-authority

– both fertilisers and chemicals – and reduce run-off into rivers and wetlands. Such an approach saves farmers money as well as protecting river systems. There's a wealth of research on this topic[70] – but it still needs to be built into agricultural practice as a duty of care, potentially under the Catchment and Land Protection (CALP) Act, not an optional extra to be funded by government. Restoring riverbanks can have a big impact because intact riparian vegetation acts as a filter to trap pollutants.

[70] For example http://agriculture.vic.gov.au/agriculture/dairy/pastures-management/fertilising-dairy-pastures

[71] DSE, 2003, *Gippsland Lakes Ramsar Site Strategic Management Plan*

[72] Connolly, B & Hylands, P, 2009, *Economic Impact of the 2008 Blue Green Algal Bloom on the Gippsland Lakes Tourism Industry Nexus Consulting* (Aust) Pty Ltd & N.I.E.I.R

[73] EPA Victoria, 2013, *Gippsland Lakes Condition Report 1990-2011*

[74] Climate Commission, 2013, *The Critical Decade – impacts for Gippsland, Victoria*

CASE STUDY: GIPPSLAND LAKES – THE OVERLAPPING PROBLEMS OF POLLUTION AND CLIMATE CHANGE

The Gippsland Lakes make up the largest estuarine lagoon system in Australia. They are fed by seven rivers and were originally a mainly freshwater environment, separated from the sea by a line of dunes that was only breached at times of flood. The Lakes are internationally recognised for the diversity of their wetlands and vegetation and for their bird life – they are home to over 80 species of waterbirds with about 50,000 birds in residence. They are also a magnet for tourists, boaters and recreational fishers, and support commercial fishing valued at $2 million per year.[71]

The Lakes are now significantly degraded. In 1889 a permanent opening to the sea was established at Lakes Entrance which has been continuously dredged ever since. This opening has allowed the Lakes to become much saltier over time, with Lake King most affected. At the same time the catchment has been cleared for agriculture, polluting the lakes with nutrients (especially nitrogen and phosphorus) and sediments. These in turn stimulate algal blooms, which have caused massive damage to the region's economy. A single algal bloom in summer 2007/08 at the height of the tourist season had a direct economic cost of $18.2 million, and a total cost to the region of $26.2 million and 306 jobs.[72]

A recent study by the EPA[73] shows that the Gippsland Lakes are caught in a water quality tug-of-war between salinity and nutrients. In dry years, when freshwater inflows are low, nutrient levels drop but salinity increases, especially in Lake Wellington which is normally quite fresh. The higher salt levels kill off vegetation in the fringing wetlands and encourage invasion by marine species.

In wetter years the opposite occurs – inflows are higher so the water is fresher, but it has a much higher concentration of nutrients, both washed in from the catchments and stirred up from the bottom. These nutrients encourage algal growth, which can quickly develop into algal blooms and affect the oxygen content of the water – enriched at the surface, depleted at depth. Toxic sediments from previous mining in the catchment can also be stirred up. All of this is detrimental to fish and bottom dwellers.

Above: Gippsland Lakes seen from the air. Lake Wellington is on the left and Lake King on the right, with Lakes Entrance at far right.
Image: Gippsland Environment Group

The EPA concludes "the ecological health of the Gippsland Lakes is driven by the quality and quantity of catchment inputs, sediments behaviour (i.e storage and release of nutrients) and oceanic influence. The Lakes would vastly benefit from a more and better integrated monitoring and reporting program, encompassing sediment and catchment impacts, helping improve the effectiveness of management actions undertaken to protect the Lakes".

The EPA is right but we need to go further. The water quality guidelines for the Lakes are out of date and don't reflect the latest scientific knowledge. Catchment programs to control nutrient inputs are at the whim of government priorities and individual farmers – they need to be made a duty of care under the CALP Act and a condition of farming at all levels.

There are even more pressing issues. The 'oceanic influence' identified by the EPA is currently the opening at Lakes Entrance, which lets in seawater, but in future it will be rising sea levels. Climate change poses an inexorable threat to the Gippsland Lakes, with the dune barrier to the sea at Ninety Mile Beach likely to be overwhelmed. Towns like Seaspray and Lakes Entrance could be under water in 50 years. Urgent action to reduce CO_2 emissions and decarbonise the economy is the only way to avert this disaster.[74]

IT'S TIME TO DECIDE ONCE AND FOR ALL WHO IS RESPONSIBLE FOR WATER QUALITY (EPA OR CMAs) AND GIVE THEM THE FUNDING AND TOOLS TO MANAGE IT.

Water quality management is complex and spread across a range of regulators and management agencies. The Victorian Waterway Management Strategy, for example, takes three pages to list the roles and responsibilities of key agencies in water quality management and incident response.[75] This problem has been identified repeatedly, most clearly in the 2005 Environmental Audit which followed a major fish kill in the Goulburn River.[76] It has not been fully resolved and recent government plans still include actions such as "identifying the lead agencies for managing water quality",[77] and "clarify and strengthen roles, responsibilities and accountabilities for agencies involved in managing water quality incidents".[78]

It's time to decide once and for all who is responsible for water quality (EPA or CMAs) and give them the funding and tools to manage it. The Andrews Government has started a review of the State Environmental Protection Policy (SEPP) (Waters of Victoria) but draft policy is not due until 2017. The SEPP provides statewide water quality benchmarks but it is out of date, inaccessible and cumbersome to implement. The new policy should reflect community expectations, set water quality targets and indicators that protect beneficial uses, and establish a framework that actually controls both point source and diffuse pollution of waterways.

9. INCREASED SECURE FUNDING FOR SUSTAINABLE WATER MANAGEMENT AND HEALTHY RIVERS

The Environmental Contribution (EC) is an invaluable source of dedicated funding for sustainable water management and improving waterway health. It has achieved many significant outcomes across a range of programs from environmental water recovery under the Living Murray Initiative to increased investment in riparian restoration. However, the dedicated source of funding has led to a decline in alternate funding streams and the level of investment is not keeping up with the scale of the problem. Despite the best efforts of government and community and some notable local successes, Victoria's rivers remain locked in predominantly poor to moderate condition with little likelihood of improvement as climate change reduces water availability.

[75] DEPI, 2013, *Victorian Waterway Management Strategy p145-7*

[76] EPA Victoria, 2005, Environmental Audit of the Goulburn River – *Lake Eildon to the Murray River*

[77] DSE, 2012, *A cleaner Yarra River and Port Phillip Bay – A plan of action*

[78] Victorian Waterway Management Strategy, Action 10.4

The Water Industry Act defines the obligation of water authorities to pay the levy[79] but does not define the level at which the levy is set. This is currently set at 5% of existing revenue for urban water authorities and 2% for rural authorities. The fourth tranche of the EC is due to start on 1 July 2016 and the State Budget anticipates that it will raise $468 million in total or $117 million per year. A welcome $222 million will be spent on river health actions over the next four years.

However, the Water for Victoria Discussion Paper estimates water authority revenue at $5.6 billion in 2013/14. If the EC were applied at the flat rate of 5% across all water authorities, it would generate $280 million per year and create a very considerable boost to funding for sustainable water management and improving waterway health. There is no logical reason why rural water corporations, which supply around 80% of Victoria's water, should be levied at a lower rate than urban water authorities.

During the lifetime of the fourth tranche of the EC, the levy should be increased for rural water authorities by 1% per year. They would pay at the same level as urban water authorities in the fourth year. This would ensure equity between users and more than double the available source of funds to implement the water plan. Subsequent EC tranches would be set at a flat 5% rate across all water authorities.

[79] Water Industries Act 1994, s192

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CONCLUSION

If Victoria is to have a viable water future, with secure supplies of good quality water, the Andrews Government will have to focus its water plan on restoring, 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. This Aquaprint outlines a practical and achievable path towards that goal.

The Victorian (and Australian) climate poses unique challenges for water managers because it is so variable. Rainfall is either way above or – more often – way 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 and water-literate 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.

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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