



SOUTH AUSTRALIA IN A CHANGING CLIMATE:
A BLUEPRINT FOR A SUSTAINABLE FUTURE

WATER IN A CHANGING CLIMATE

CCSA'S WATER VISION:

CCSA envisages a future where our use of water remains within sustainable limits, we have achieved super-efficiency and it has become standard practice to reuse all available water as many times as possible. We seek to achieve a society that has alleviated the current pressure on natural systems, minimises adverse environmental impacts and recognises the environment as a priority stakeholder with rights to water.

Water: 1. A clear, colourless, odourless, and tasteless liquid, H₂O, essential for most plant and animal life and the most widely used of all solvents.
2. A body of water, like sea, rivers and lakes.

Current water trends

The world is on the verge of water 'bankruptcy', with humanity's water footprint surpassing all other species combined and threatening natural biological processes across the globe. In South Australia, as globally, our approach to water consumption and management is unsustainable²⁸. Environmentally degrading practices include:

- over-extraction from rivers, mostly for the benefit of irrigation and industry. In South Australia our irrigation industry continues to expand unsustainably during one of the worst droughts in recorded history
- pollution of surface and ground waters, rendering them unusable. Flows through the system then contaminate and pollute our coast and marine environment
- over-extraction of groundwater. Of particular concern is the unregulated take from the Great Artesian Basin for use at the Olympic Dam mine, particularly as this take is not regulated under the *NRM Act 2004*
- failure to capture and harvest stormwater, causing problems with excessive nutrients and pollution of coastal outflows

- reducing infiltration and aquifer recharge and maximising run-off through increasingly impervious urban surfaces, roads, carparks, houses, etc.
- relying on major engineering works like dams, regulators and desalination plants to produce, store and manage our water supplies
- undertaking water-intensive and water polluting mining practices
- increasing water demand based on profligate usage and lifestyle choices.



The River Murray is South Australia's primary freshwater resource, underpinning the ecological health, economic wellbeing and social viability of our state. The most recent 2008 State of the Environment Report highlights the need for action as the health of rivers, streams and wetlands of the River Murray floodplain is declining due to

'...over extraction of water from the river system; increasing salt levels; drought; and non-delivery of environmental flows'²⁹.

If current levels of degradation continue, the quality of River Murray water will become unsuitable for most uses, leading to serious, if not catastrophic, environmental, social and economic consequences³⁰.

The Onkaparinga, the state's second largest river, has been subject to a similar pattern of use (and abuse) as the Murray. It is treated primarily as an aqueduct between Hahndorf and Mt. Bold, an engineered 'funnel' for delivering water imported from the Murray Darling Basin into Adelaide's watershed. In the process, its riverine habitats have been grossly degraded, with the annual cycles of high winter flows and low summer flows reversed to satisfy Adelaide's urban consumption. Competing demands from agriculture, industry and urban uses continue to impinge on water quality and flows through the system.

Water in a changing climate

Access to clean water is not only a fundamental human right, it is also fundamental to the existence of all life on Earth. Our modern societies have created new pressures on Earth's finite water resources and our future depends on us learning how to use them in a sustainable manner.

The climate of South East Australia is entering into a long-term hotter and drier phase. What we are facing is not a temporary drought, but a long-term climatic shift in precipitation patterns that will have corresponding impacts on runoff, infiltration and aquifer recharge. The relationship between reduced rainfall and runoff is not linear. A small reduction in rainfall, especially when combined with higher temperatures, leads to significantly larger reductions in available water throughout the system for all users, including the environment.

It is difficult to gauge the long-term impacts of climate change on water availability.

The modelling currently available from the CSIRO only investigates the potential condition of the Murray at around 1°C of warming from climate change. This modelling assumes a certain level of action on climate change in the form of Australia moving toward a less fossil fuel-intensive economy. Modelling that uses a present emission level scenario beyond 2030 is unavailable.

It is therefore entirely possible that the impact of climate change has been underestimated. Without any guarantees of action towards a lower emission future we need to examine the consequences of 2.5-6.5°C of warming by 2100. These scenarios would see the flow of the Murray Darling Basin reduced between 16-48% with devastating consequences³¹.

With the lack of rainfall in the Murray Darling Basin and the record high temperatures, inflows into the River Murray are currently well below average. This is resulting in increased pressure on urban, agricultural and environmental water supplies; a pressure which is likely to only increase in the future³².

South Australia's new water strategy 'Water for Good' is the key mechanism to achieve water security within a changing climate, but unfortunately it fails to drive any great transformation in how we source or use water. For example, the government still refuses to fully grasp the potential offered by stormwater, committing to harvest only 35 GL by 2025 instead of the 106 GL recommended by WaterWise Adelaide³³. The government plans to lift water restrictions despite all the evidence that these measures will be even more necessary in a hotter, drier climate.

Water for Good relies on IPCC projections from the Fourth Assessment of 2007, which are already looking substantially dated as more recent scientific data indicates a rapidly developing and worsening climate emergency.

What are the key water issues in South Australia?

South Australia's historic reliance on the Murray for our water supplies has seen alternative water sources practically ignored. Adelaide currently channels more water out to sea than we use domestically, including treated waste water, where it wreaks havoc with the ecosystem of Gulf St Vincent. While it is quite fitting for natural watercourses to flow out to sea, this quantity of polluted stormwater is a result of our impermeable urban environment, much of it being water that would previously have infiltrated and recharged groundwater supplies. We have an exciting opportunity to harvest this stormwater with the newly-formed Stormwater Management Authority (SMA) adopting a bigger role with a co-ordinated approach to management. Salisbury Council's innovative success of its

stormwater harvesting, reedbed filtration and purification and aquifer storage and recharge (AS&R) programs have much to teach us. By maximising our rainwater and stormwater harvesting, increasing the efficiency with which we use water and making the most of the creative technology that has been developed and put into practice right on our doorstep, we can move into a new era of water security without relying on energy intensive and polluting desalination plants.

Exploring these alternative methods of water harvesting, storage and use allows us to reassess large-scale projects that are currently on the drawing board for our state government. If alternative proposals can meet our needs, while simultaneously easing our dependence on Murray water, they will have substantial benefits for the environment and economy. Watersheds need to be managed on a whole-of-shed basis, so that all human interferences with natural flows are factored in.

There over 65 major storages and 600 000 private dams throughout the Murray Darling Basin capable of diverting one and a half times the average flow of every river in the basin, and over 25 560 km of irrigation supply and drainage channels³⁴. Clearly we needed to change the dysfunctional governance arrangements that have bedevilled the system to date. Whether the newly-created Murray Darling Basin Authority (MDBA) has sufficient powers to tackle self-serving state and local authorities head-on remains to be seen.



Currently Australia is trading off its long-term ecological capital (water resources) for short term economic gains. Ultimately however, in the long term such actions will exact a heavy ecological and economic toll. South Australia's environment is already paying the price as the disastrous breakdown of the Coorong and Lower Lakes' environment highlights.

The national shift towards privatisation of water in a national water market will exacerbate the commoditising of water supplies. Privatisation inevitably results in higher prices to cover the profit margins required by the private sector and markets. There is a concerning conflict of interest by the government, where United Water is making a profit and SA Water is making a dividend. SA Water's role needs to return to a not-for-profit public entity. There are also concerns that contract provisions may be affecting the government's water policy. Key examples of this are:

- Adelaide's water restrictions are minimal in comparison to other states. Recent suggestions that water restrictions will be lifted at the end of 2012 as a result of desalination plants coming on-line are inappropriate and send the wrong message about how we should live when we are in the driest state on the driest continent.

- commercial businesses do not have water restrictions on the use of water for their operations.
- the government has now decided to double the size of the desalination plant at Port Stanvac, without going back for further public consultation.
- uncertainties exist surrounding whether we are locked into accepting and paying for water under 'design, build, maintain and operate' contract provisions.

The government should be responsible for the complete cycle of all water it supplies and for any damage caused. It also must be accountable to the public and the future health of the state's environment. We need to address these critical issues in order to secure Adelaide's water supply and fair access to water for all in the future.

Changing the future - new ways forward

South Australia is standing at a crossroads when it comes to our future with water.

Historically, we have relied heavily on the Murray River to supply our needs. The River and dependent ecosystems are now seriously ailing, suffering from over-extraction and the impact of reduced inflows across the basin. We need to shift focus to other viable domestic water sources and, importantly, focus on changing our behaviour to practice sustainable water usage across all sectors of society. Stormwater harvesting should have been the first cab off the rank - yet with the exception of the far sighted work of Salisbury Council, remains a huge underutilised resource we must address immediately.

In South Australia, we are planning to increase our population, our mining activity and our exports. All will inevitably increase our water consumption, unless dramatic measures are taken to reduce consumption elsewhere. CCSA remain concerned about the impacts of climate change, population growth, and peak oil and how they intersect with planning and projections for water supply and demand.



Ultimately, Australia must declare its water to be a public trust. There should be no private ownership of South Australia's surface and groundwater supplies; rather, they belong to all South Australians, the ecosystem, and the future, and must be preserved in law and practice as a public good.

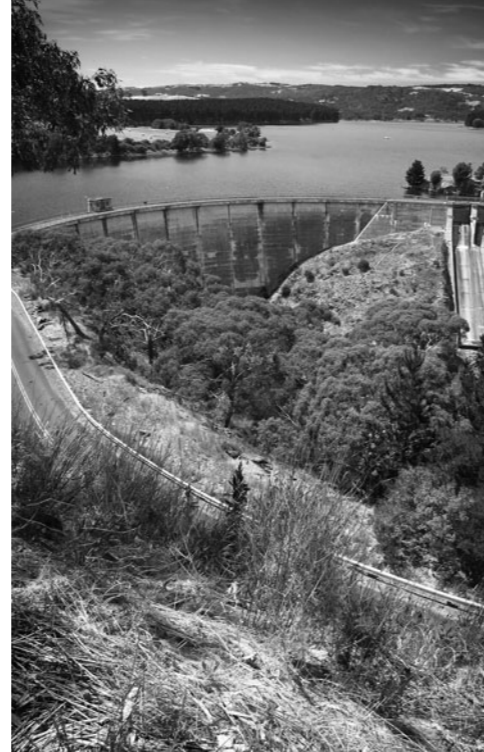
A comprehensive assessment of our rivers, streams and aquifers should be undertaken to inform government policy to guarantee the water needed for ecosystem health as top priority. This will require a dramatic reduction in extractions from the Murray Darling and other over-allocated systems. Soil vegetation, riparian zones, wetlands, and estuaries must be restored and protected. The Precautionary Principle of ecosystem protection must take precedence over commercial demands on water supplies.

Managing watersheds on a whole-of-shed basis will mean that both upstream extractions (farm dams) and downstream collection (household tanks in Adelaide) are properly evaluated against the maintenance of health of the hydrologic cycle from rainfall to river to groundwater to sea. Restoring the integrity of watersheds and rivers is essential.



The first priority for water use should be maintaining ecological processes and for environmental and transportation flows. Trading should be restricted to any excess, once these basic needs have been catered for. Over-extraction must be reversed and buybacks undertaken (with structural adjustment packages if appropriate) to restore environmental flows and enable communities dependent on unsustainable exploitation of water to develop new efficiencies, new industries or ultimately relocate if necessary.

Currently BHP Billiton is licensed to extract 35 million litres of Great Artesian Basin (GAB) water per day for the Olympic Dam uranium/copper mine at Roxby Downs. The planned expansion of the Olympic Dam mine will increase the draw of water from the GAB to 120 million litres per day. BHP Billiton pays nothing for this water as a consequence of The *Roxby Downs (Indenture Ratification) Act 1982* which takes precedence over the *SA Water Resources Act 1997* and the *Natural Resource Management Act 2004*. This level of ground water extraction is inflicting significant environmental impacts on Mound Spring ecosystems, damaging these unique habitats, which support rare and often endemic flora and fauna species. With the proposed massive expansion of the mine, now is a perfect opportunity to remove these unfair legal privileges. It is also the right time to make sure all water use is monitored and charges applied consistently to all water users.



Groundwater should be protected from industrial pollution, regardless of its location. The movement of water underground is poorly understood and the remoteness or unsuitability of groundwater for human or stock consumption should not be used to justify its contamination.

Desalination as a strategy is not supported in the first instance, especially when other options with a lower environmental and economic cost have not been fully utilised such as stormwater harvesting and AS&R. Concerns remain around desalination plants especially when poorly sited. Environmental impacts around the brine and chemical discharges remain unanswered and require ongoing monitoring and research. Further impacts are inevitable given the high energy demand of the process. The use of accredited 100% GreenPower would go a long way towards overcoming the carbon footprint and energy intensity of this process.

South Australia's population targets must be compatible with our state's resource capacity, and the current targets being what they are, if this is possible at all, it will only be via highly efficient use of water by agriculture, industry and the community.

As a community we are slowly becoming aware that water is an invaluable and limited resource. Just as we are striving to reduce our carbon footprint, we are also becoming mindful of the water intensity of our lifestyles. South Australia has an opportunity to take the lead in fostering

consumer-driven change. We must research and develop methods to help consumers reduce their water footprint, while encouraging producers to improve their irrigation practices and rewarding those irrigators who are already efficient.

The South Australian community needs to embrace a new philosophy of water-respect and water-use, where we cease to take the supply of water for granted, and instead become 'water wise' and sustainable in our usage and consumption, recycling when appropriate and minimising waste and profligacy. A cultural shift away from unsuitable landscaping, lush green lawns and hosing down the drive is underway – we need to ensure it continues.

We have come a long way since the days of considering water to be a limitless resource. We need to continue to move forward by looking at problems as potential prospects. Water self-sufficiency and security need not be distant objectives; South Australia's total water demand must be addressed, with population and industrial growth targets compatible with the state's resource capacity. We have the means and the capability to make these goals a reality in the near future. CCSA considers the time has come for an urgent declaration of a national water emergency and for the federal government to over-ride individual states to take control of the Murray Darling basin to create a comprehensive, lasting and sustainable plan for Australia's water future.

RECOMMENDATIONS

Water as a public trust

28. There needs to be informed public debate on the privatisation of water resources to ensure that basic human and environmental rights to water are legally protected and prioritised over commercial interests.

29. The state government should strengthen its *Statutes Amendment (Water Conservation Target and Sustainable Water Resources) Bill 2008* by:

- establishing a government water management authority to manage water for the benefit of the community and the environment, and relegating any commercial operations to a body such as SA Water
- making all contracts for SA Water and United Water public and transparent
- mandating what the proposed Authority and SA Water are required to do in the area of water conservation and including the setting of water conservation targets
- requiring SA Water to ensure that its infrastructure development is ecologically sustainable
- revise SA Water's charter to include comprehensive water conservation functions and to prioritise low-tech, low-cost, low-environmental impact water harvesting technologies such as stormwater harvesting, wetland purification and storage and water recycling.

29.1. The relevant sections of the *Waterworks Act 1932* should be amended to require SA Water to ensure the sustainability of water resources before the boundaries of a water district are expanded and before new developments are approved.

Targets and Policies to Achieve a Water Balance

30. State government targets, policies and programs focusing on water must address and respond to climate change.

30.1. Specific targets for future water consumption should be established in South Strategic Plan to reduce per capita water consumption by 40% by 2015. CCSA supports the following 2020 targets recommended by WaterWise Adelaide for the SA Water Security Plan.

- 106 GL per annum to be sourced from urban stormwater.
- 50 GL per annum from increased re-use of waste water.
- Remove reliance on the River Murray as a primary source of Adelaide's water with the aim of achieving nil dependence in average years.
- Reduce stormwater and waste water discharge to the Gulf to under 150 GL per annum.
- Adopt open access rules for the water distribution network to allow for stormwater (at a quality comparable to Murray River water) to be included in the reticulation network.

Water for Good targets should also be upgraded accordingly.

30.2. The harvesting and use of rainwater should increase from 1 GL per year to at least 20 GL per year, with incentives for householders, businesses, schools and industry to install rainwater tanks of larger sizes.

30.3. There is a need for better co-ordination between all the agencies, projects, programs and strategies dealing with water (e.g. *Water for Good*, Adelaide Coastal Waters Quality Improvement Plan, NRM Boards, the Office for Water Security, SA Water, and the EPA). The South Australian Government should establish an overarching body to co-ordinate water actions and targets.



Valuing, Allocating and Pricing Water Appropriately

31. The intrinsic value of water for non-human use must be recognised and reflected in greater protection of water resources. All water must be priced to discourage waste and misuse.

- 31.1. The South Australian Government should implement a user-pays water pricing system for commercial and domestic use that reflects the true value of water and increases conservation.
- 31.2. Dumping of waste into groundwater should be made illegal, with no exemptions.
- 31.3. All bores must be metered. Users of groundwater should pay a levy under the *Natural Resource Management Act 2004*, with the income to be used to monitor and manage water appropriately. At present some water users pay a levy to fund water management, but the rates vary and the establishment of such levies is at the discretion of Regional NRM Boards.
- 31.4. All non-prescribed water resources in South Australia should be prescribed under the *Natural Resource Management Act 2004* so we do not wait until a water resource is under stress before prescribing it. Prescribing would lead to a Water Allocation Plan being developed to ensure the resource is not overused.



Incentives

32. Incentives should be used to drive more efficient water use in existing houses and businesses and prevent wasteful water use in new developments.

- 32.1. The state government should institute programs to recognise and reward water-efficiency achievements by households, schools and community groups, small businesses and industries.
- 32.2. The federal and state governments should fund the installation of water saving devices such as dual flush toilets for low-income households and increase the rebates and incentives for such devices in other households.
- 32.3. The three levels of government should provide incentives for all developments to be as sustainable as possible, utilising world's best practice where possible. These may include the use of:
 - dual reticulation systems
 - waste water re-use
 - grey water re-use (may require law reform)
 - rainwater harvesting both on a residential, commercial and industrial level
 - harvest, storage and purification of runoff (stormwater) and/or AS&R
 - permeable paved surfaces
 - looped and solar hot water systems
 - water-wise landscaping.

Note that regulation to require more efficient water use in the built environment is covered in the Planning & Development recommendations.



Stormwater Harvesting, Aquifer Storage & Recovery

33. A South Australian Stormwater Strategy must be developed to meet stormwater harvesting targets, protect seagrass beds offshore and assist in flood mitigation.

- 33.1. Appropriate legislation and other mechanisms should be developed to improve the legal rights of operators of aquifer storage and recovery schemes to remove impediments to the harvesting of this resource.
- 33.2. State and local governments must increase the permeability of urban environments to increase infiltration, slow and decrease runoff and stormwater. This should be combined with reedbed filtration to remove gross pollutants and purify water supplies.

Engineering Solutions for Water Delivery

34. Large-scale engineering solutions to the water crisis should not proceed, without a full cost-benefit analysis that assumes best environmental practice, and includes a comparison with de-centralised water harvesting and recycling options.

- 34.1. This should include analysis of small-scale renewably-powered desalination of brackish aquifers and stormwater to establish which of these offers the best fit solution environmentally and economically.
- 34.2. Any desalination plants must be world's best practice and use 100% accredited GreenPower, preferably generated onsite. Negative environmental impacts on South Australia's marine ecosystems must be minimised or eliminated through appropriate design.



Protecting the River Murray System and Other Surface Water in SA

35. The state government needs to lobby through COAG for the following key elements to return the Murray-Darling Basin to health:

- Amendment to the federal *Water Act* 2007 to clearly mandate environmental water flows.
- A strategic approach to water buyback that is based on the viability of different irrigation regions in the face of climate change, and infrastructure investment in areas that will remain viable.
- Accounting for all water in the basin and consistent metering across jurisdictions.
- Structural adjustment support for communities to diversify their economies.
- A market for ecosystem services so that restoration of the land and environmentally beneficial practices such as organic agriculture can be recognised and generate income for farming communities.

35.1. CCSA supports the proposal from the Wentworth Group of Concerned Scientists to establish a Commission of Inquiry with the powers of a Royal Commission to independently audit all public and private sources of water throughout the basin to determine the answers to specific questions about environmental needs, potential additional water sources, costing for water, usage and allocation, downsizing and decommissioning of areas and industries.

35.2. Changes to the *Murray Darling Basin Act* 2008 need to be incorporated to ensure that contracting governments will observe and abide by any resolution of the Ministerial Council.

36. The state government must demonstrate that it is taking all possible steps to protect the natural assets in its own backyard, with the most critical response being to accelerate the acquisition of environmental water recovery to tackle over-allocation and over-use, including the immediate and urgent return of 1500 GL to the Murray River at the South Australian state border.

- 36.1. A guaranteed annual water entitlement should be purchased for the Lower Lakes and Coorong and released into the Ramsar site immediately. The size of this entitlement would be based on the best available science, and serve to maintain the ecological health, function and integrity of the Ramsar site. The approach to environmental problems such as the Lower Lakes and Coorong should be dealt with on a holistic level. Currently, piecemeal solutions are being proposed for this region.
- 36.2. The potential to re-direct water from the South-Eastern Drainage scheme back into the Coorong should be investigated as a matter of high priority.
- 36.3. The state government should implement a moratorium on any further wetlands being cut off from the Murray. Critical ecological functions must be maintained through environmental flows being prioritised.
- 36.4. Seawater must not be allowed to free flow into the Lower Lakes.
- 36.5. All the state's watercourses require protection from efforts to interfere with natural flows, and those that have already been degraded need restoration plans to be put in place.
- 36.6. The Management Plan for the Estuary and Lower Onkaparinga needs to be immediately reinstated with regard to the 4 GL of annual flows required to restore it to a healthy condition.
- 36.7. Urban drains, which have concreted over natural watercourses, such as the Patawalonga and Sturt River, should be dismantled to reinstate natural conditions and utilise natural landforms and processes for harvesting and cleaning stormwater.

²⁸ Barlow, M. (2009) *Notes for Opening Keynote at the Australian Water Summit*, 1 April 2009

²⁹ Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide

³⁰ Environment Protection Agency (2003) *State of the Environment Report*, Government of South Australia, Adelaide

³¹ CSIRO (2008) *Water Availability in the Murray-Darling Basin Report*, Accessed online <<http://www.csiro.au/resources/WaterAvailabilityInMurray-DarlingBasinMDBSY.html>>

³² Environmental Defenders Office (2008), *Submission to the Legislative Council Select Committee into SA Water*, 1 April 2008

³³ City of Salisbury and Water Proofing Northern Adelaide (2008) *WaterWise Adelaide: The Stormwater Resource*, Accessed online <<http://www.civictrust.net.au/WaterWise/ExecutiveSummary.pdf>>

³⁴ Personal comment, John Caldecott, July 2009