Melbourne Water

Melbourne Water is a statutory authority owned by the State Government. Melbourne Water manages the water supply catchments, removes and treats most of Melbourne's sewage, and manages waterways and major drainage systems. The retail water companies provide water and sewerage services to consumers.

www.melbournewater.com.au

THE source

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A RICH AND FERTILE HISTORY

Contents

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Restrictions loom as dry continues

Water restrictions look likely to be introduced in greater Melbourne as early as 1 September as the big dry continues to bite.

It is the city's driest 58 months – since the drought began in October 1996 until the end of July this year – for 85 years.

As at 16 August, storages were 50 per cent full – still above the level of 48 per cent that would trigger Stage 1 restrictions. However, the "trigger point" moves to 51 per cent in September and 52 per cent in October.

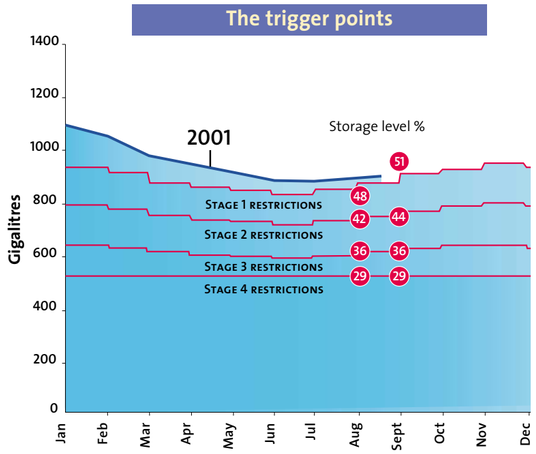
For the seven months to the end of July this year, streamflow into the major harvesting catchments (Thomson, Upper Yarra, O'Shannassy and Maroondah) was the fifth lowest on record, and only 51 per cent of the long-term average.

Under Stage 1 restrictions for private gardens, hand watering is allowed any time, manual sprinklers from 5am to 8am and from 8pm to 11pm and automatic sprinklers from 11pm to 6am. Similar restrictions apply to public gardens, commercial market gardens, plant nurseries and sports grounds.

Topping up of pools and spas is allowed but permits are required to fill or refill. Cars can be washed only by using a watering can or bucket. Hoses can be used for rinsing only. Commercial carwashes are not affected.

Stage 1 restrictions are designed to save 6 per cent of annual metropolitan water consumption.

Premier Steve Bracks, who described the drought as the State's worst since 1916, has called on Melburnians to save 30 litres (or three buckets) of water every day by reducing the length of showers by two minutes, using only full loads in the washing machine and dishwasher, sweeping driveways instead of hosing them, fixing leaking taps and washing cars with buckets.



Melbourne Water Managing Director Brian Bayley also called on the community to save water. He said storage levels had been fairly static in recent months and Melbourne Water relied on the storages filling during winter and spring. Steady rain was needed to wet the catchments and lead to good runoff.

Main source: Thomson Reservoir more than doubled Melbourne's water storage capacity

The last water restrictions in Melbourne were during the 1982/1983 drought. The current drought is the first test of Melbourne's water supply system since the construction of the Thomson Reservoir in the mid-1980s more than doubled Melbourne's water storage capacity.

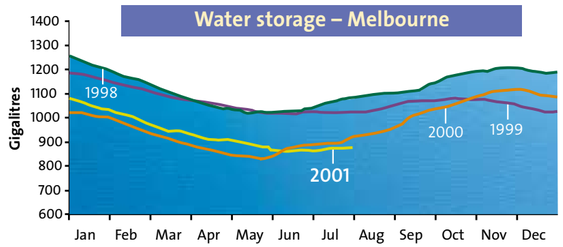
Many rural and regional areas have been affected by water restrictions for up to four years, and restrictions have been applied for Melbourne Water's diversion customers during the past four summers.

Under Drought Response Plans, the retail water companies – City West Water, South East Water and Yarra Valley Water – are responsible for communicating details of how the community will be affected by restrictions, if they are introduced. Newspaper advertisements, other media coverage as well as direct mail to customers are among the options they may consider.

The Drought Response Plans were developed by the retailers in consultation with Melbourne Water and the Department of Natural Resources and Environment.

The plans are based on how much water would be required to get Melbourne through a severe, protracted drought.

Melbourne Water provides water resource planning and management expertise, operates the system and monitors the catchments and streamflows to give the industry an accurate assessment of the state of storages and the likely impact of restrictions.



For the latest water storage report, visit www.melbournewater.com.au

Research gives Gunnamatta Beach a 'good' rating

Surfers or swimmers at Gunnamatta Beach are unlikely to be at increased risk of illness due to faecal microorganisms in the water compared with swimmers at other ocean beaches around Melbourne.

This was among the findings of a year-long microbiological monitoring program conducted by Monash University's Centre for Epidemiology and Preventive Medicine at 13 sites at and around the Boags Rocks outfall, where effluent is discharged from Eastern Treatment Plant.

The researchers also compared levels of faecal microorganisms at Gunnamatta, near the outfall, with those in a study of British beaches.

They found that the health risk of swimming or surfing at Gunnamatta was likely to be lower than that associated with common activities such as eating takeaway food.

The research compared water quality at the sites with draft World Health Organisation guidelines for recreational bathing water.

Under these guidelines, the health risk of bathing in recreational waters is rated, taking into account bacteriological measurements as well as site-specific public health hazards such as sewage outfalls, stormwater discharges and bather density.

The researchers found that, at Gunnamatta, water quality in the swimming zone would be classified as "very good" for the summer season and the entire year under the draft World Health Organisation guidelines.

In the summer season, the surfing zone would be classified as "very good", and "good" for the entire year, due to higher levels of indicator bacteria during winter.

The full report is published on Melbourne Water's website, www.melbournewater.com.au, along with results of regular water quality testing at six sites near St Andrews and Gunnamatta beaches and the outfall.

Community to have its say

Community views: The shoreline discharge at Boags Rocks is at the centre of discussions for the works application

Tertiary treatment is being flagged as consultation begins for a major upgrade of the Eastern Treatment Plant.

Melbourne Water is seeking community input as it begins planning a multi-million dollar upgrade of the Eastern Treatment Plant at Carrum.

The upgrade aims to ensure the best long-term outcome for the environment and the Mornington Peninsula community by improving the quality of effluent and reducing the quantity discharged to Bass Strait.

In a display being exhibited at public libraries on the Mornington Peninsula, Melbourne Water flags the option of increasing effluent reuse by upgrading the sewage treatment level to tertiary, which would make the recycled water suitable for most crops.

The display says that when the Eastern Treatment Plant opened in 1975, it was a world leader in sewage treatment.

"Improvements have continued to be made, but Melbourne Water believes it is time to review the plant's operations to ensure effluent is managed in a sustainable manner for the long term," it says. "To achieve a truly sustainable solution, we need the community's understanding and input."

Community views will form an important part of an application to EPA Victoria to undertake the upgrade. The application is due in November, and a draft will be available for public comment in September.

Melbourne Water is briefing community groups on treatment options, water recycling and environmental issues, and organising the displays at public libraries.

Advertising in the local and metropolitan press is emphasising the importance of the upgrade to Melburnians, given that the plant treats almost half the city's sewage.

In September, Melbourne Water will also begin community research on the Peninsula and in the suburbs to inform people about the issues and identify attitudes, including those on the expenditure of public money that would be required for tertiary treatment.

The proposed upgrade of Eastern Treatment Plant goes beyond the recommendations of a major CSIRO study on the effect of effluent on the marine environment at Boags Rocks. The study, completed in 1999, recommended reducing the level of ammonia in the effluent, undertaking long-term microbiological testing at Boags Rocks and reducing the volume of freshwater discharged. All these recommendations are being acted on.

A $5 million pilot project to significantly reduce ammonia levels in the effluent began in May at Eastern Treatment Plant.

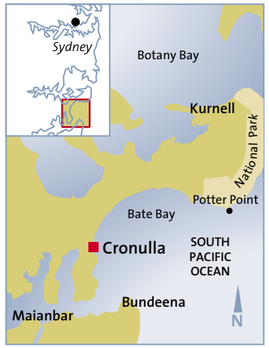
Melbourne Water recently commissioned a long-term environmental monitoring program for the marine environment around Boags Rocks. The program, being carried out by the CSIRO, will enable Melbourne Water to gauge the effectiveness of process improvements at Eastern Treatment Plant.

Melbourne Water also aims to maximise water recycling and is involved in talks with a private company, Aquaforte, to develop a pipeline to supply recycled water to rich market gardening areas around Koo-wee-rup, Clyde and Dalmore.

For more information on the upgrade plans for Eastern Treatment Plant, e-mail Melbourne Water's Community Relations Coordinator, Michael Birt, at michael.birt@melbournewater.com.au , call 131 722 or write to Melbourne Water, PO Box 4342, Melbourne 3001.

A $90m transformation

What implications are there for Melbourne Water in the upgrade of a Sydney sewage treatment plant to tertiary effluent?



Sydney's fourth largest sewage treatment plant, at Cronulla, has been upgraded to tertiary treatment, increasing the potential to attract water recycling from local industry.

The $90 million upgrade is the result of a major shift over the past 10 years in the city's sewage treatment standards and in the quality of effluent discharged to the environment.

Sydney's main sewage treatment facilities, at Malabar, North Head and Bondi, use high rate primary treatment standards and deepwater outfalls, which were commissioned in the early 1990s.

Sydney Water plans to upgrade the deepwater ocean outfall plants over the next 10 years to increase reliability and ensure grease and floatables are not discharged.

The Cronulla upgrade, commissioned by Premier Bob Carr in April, involves adding secondary and tertiary treatment processes and ultraviolet disinfection to the primary treatment facilities that previously existed.

It is believed to be the largest ocean plant of its kind to discharge such high quality effluent.

Melbourne Water is examining the implications of the Cronulla improvements as it prepares a works application for a major upgrade to its Eastern Treatment Plant.

The Cronulla plant discharges 54 megalitres a day via a 6.6-kilometre pipeline that travels through the Botany Bay National Park and opens on to Bate Bay and the Cronulla beaches. The ocean discharge is at the shoreline, at Potter Point.

The discharge point is a sheer cliff-face, with the nearest beach, known as Voodoo, about 1000 metres away. Potter Point is not easily accessible, although a public walkway does exist.

Melbourne's Eastern Treatment Plant also has a shoreline ocean discharge, at Boags Rocks, between Gunnamatta and St Andrews beaches. Some 370 megalitres a day of secondary effluent is discharged into Bass Strait.

Sydney Water estimates that up to 25 per cent of the discharge from Cronulla can be recycled mainly at a future cogeneration plant and an existing oil refinery at nearby Kurnell. Few opportunities are available for agricultural reuse.

Melbourne Water is seeking opportunities for major effluent recycling schemes from the Carrum plant, to reduce the amount of effluent discharged. A feasibility study has estimated that a $50 million agribusiness scheme could use up to 6 per cent of effluent produced by the plant, or 15 per cent of summer flows.

Recycling from Eastern Treatment Plant occurs on a small scale already, with customers including nurseries and golf courses using about 1 per cent of effluent produced from the plant. However, tertiary effluent would increase the opportunities to produce high value crops, such as asparagus.

ABOVE **Setting a new benchmark:** The Cronulla sewage treatment plant, which is believed to be the largest plant of its kind to discharge such high quality effluent to the ocean

TOP RIGHT **Point of discharge:** The shoreline discharge at Potter Point

Both Cronulla and the Mornington Peninsula are expanding rapidly, and pressure to protect the environment continues to increase.

At Cronulla, effluent quality has improved, according to initial results from the New South Wales Environment Protection Authority's Beachwatch program for June.

"The last time that all the Cronulla beaches passed the assessment criteria in two consecutive months was four years ago," it said.

"The recently completed upgrade of the Cronulla sewage treatment plant is so far showing very positive results for the beaches in this area."

Water quality testing at six sites near Gunnamatta Beach and the Eastern Treatment Plant outfall is undertaken by an independent laboratory. The results are updated weekly on the Melbourne Water website, www.melbournewater.com.au , and show that Gunnamatta is well within EPA Victoria standards for recreational water quality.

DEFINITIONS

Primary treatment

Initial treatment of sewage involving screening and sedimentation to remove solids

High rate primary treatment

A form of primary treatment that operates at higher flows and removes fewer solids

Secondary treatment

Generally a level of treatment that removes 85 per cent of suspended solids and biochemical oxygen demand usually by biological or chemical treatment processes (hence secondary effluent)

Tertiary treatment

Treatment processes beyond secondary that further improve effluent quality, usually in the context of nutrient reduction (hence tertiary effluent)

Chlorination

Most commonly, the application of chlorine to water or wastewater for the purpose of reducing pathogens. Chlorination is only one of several means of disinfecting wastewater. UV radiation is considered the most environmentally friendly method but is much more expensive.

Setting the standards for ocean discharge

In Australia, environmental regulators operating under individual state and territory legislation set and monitor treatment standards and discharges of treated effluent to the environment.

This is usually done through a licensing system with appropriate environmental conditions and limits on pollutants in discharges.

The major marine or ocean discharge plants treat to high rate primary, primary or secondary standard.

The high rate and primary plants usually discharge effluent through outfalls that may extend up to five kilometres from the shoreline.

Disinfection, for example by chlorination, is not required where extended outfalls exist.

Melbourne plants

Eastern Treatment Plant, Carrum

Treatment is to a secondary standard, followed by chlorination.

Some 370 megalitres a day of secondary effluent travels via a 56-kilometre pipeline to Boags Rocks, near Cape Schanck, where it is discharged to Bass Strait.

It is the largest single shoreline discharge in Australia.

Western Treatment Plant, Werribee

Treatment process is mainly lagooning, providing secondary treatment with some nutrient reduction and a level of natural disinfection by sunlight and long detention times.

The lagoon system is being upgraded to further reduce nutrient loads to Port Phillip Bay.

About 450 megalitres a day is discharged through four shoreline outlets to Port Phillip Bay.

Malabar, North Head and Bondi sewage treatment plants, Sydney

The three major facilities serving Sydney are high rate primary plants with deepwater outfalls three to five kilometres long.

Malabar, the largest of these plants, discharges a normal dry weather flow of 480 megalitres a day. North Head discharges 313 megalitres a day and Bondi discharges 130 megalitres a day.

What is happening in the United States of America?

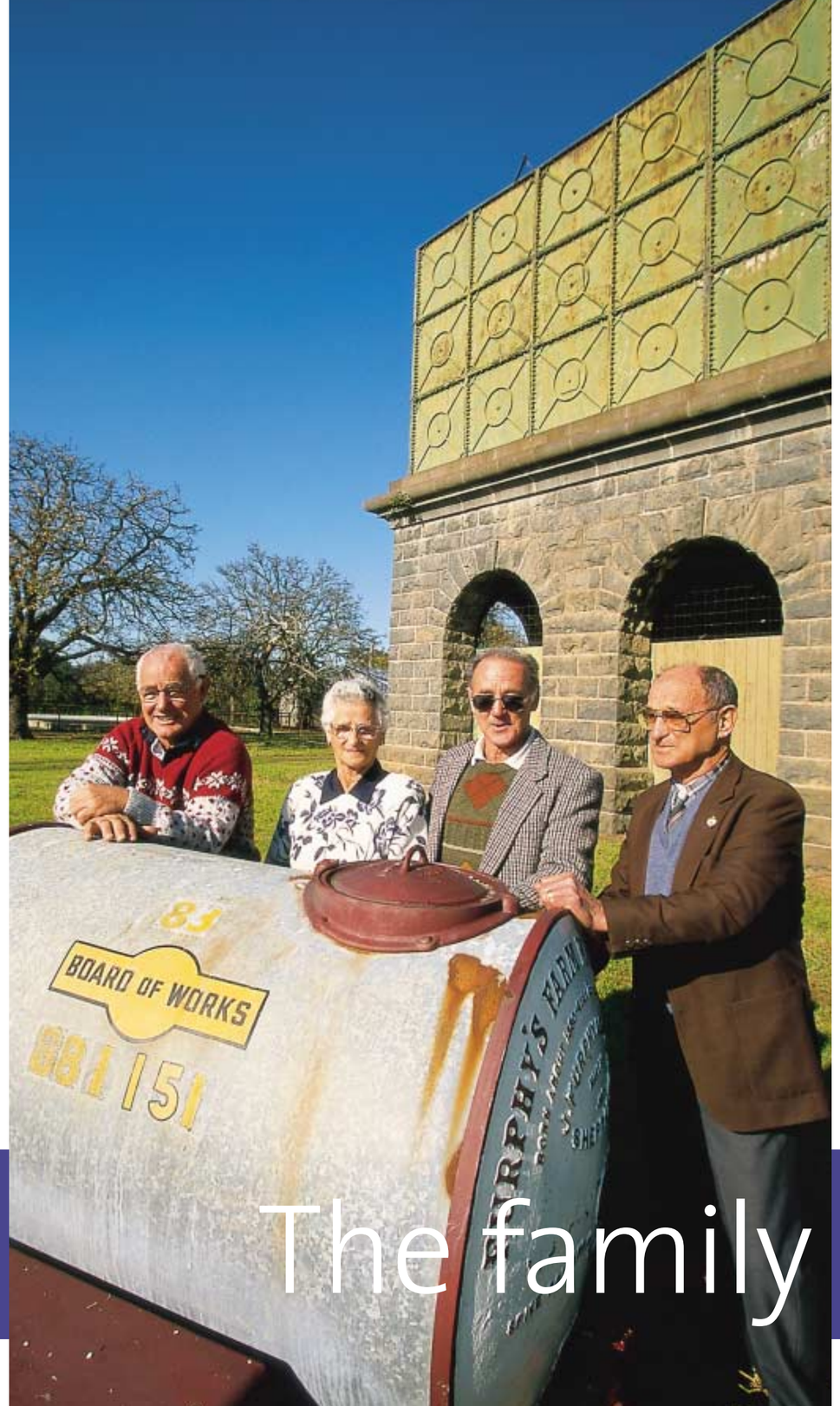
The general standard for wastewater plants discharging to the ocean in the US remains at secondary treatment. Waivers to secondary treatment requirements can be obtained subject to certain strict criteria.

What is happening in Europe?

By the end of 2000, all medium to large treatment plants should have been of secondary standard. This has not fully eventuated in continental Europe or England even for treatment plants discharging to inland waterways. Standards can be varied depending on the sensitivity of the receiving environment.

The family comes home

Keith Dunstan meets some of the "farmhands" who helped forge the vibrant history of what is now known as the Western Treatment Plant.



Vitis Steinbergs pointed across to a lush paddock, as green as a cucumber, and said: "That's where it was. Our little house was over there."

He was pointing past the Temporary Water Tank, which has to be one of Victoria's greatest, yet unheralded treasures. Back in 1854, this water tank was Melbourne's water supply and it was on the corner of Gisborne and Albert Streets, Eastern Hill.

Massive, it held 682,000 litres and it was made of cast iron plates mounted on a splendid bluestone base. It looked, and still does, like a mini-castle, a fort designed to protect the coast of Ireland. Yan Yean Reservoir made it redundant in town. Shifting it out to Western Treatment Plant in 1893 must have been like moving the Pyramids.

Mr Steinbergs looked at it wistfully. In the old days there was a stair up the outside. Kids used to climb right inside.

It was 4 July, not just Independence Day, but also a very special day at the Western Treatment Plant. The Governor of Victoria, John Landy, was there to launch *Werribee Farm: A History 1892-2000*, by Helen Penrose. So there was an invitation to all the old hands to come home. All the people, the families who lived on the Farm, turned up to remember, to chat, to turn back the years.

Oddly enough, they seemed like one big family, very closely knit, the Gilletts, the Sadlers, the Kings, the Warfes, the Pengellys, the Smiths, the Watts, the Lockes, the Wallaces...

They had been there for generations, grandfather, to son, to grandson. Particularly they talked with extraordinary affection about Cocoroc, the little town that was actually on the Farm. Yes, Cocoroc, a wonderful, evocative name that Helen Penrose said was Aboriginal for frog.

There was lots of *How was it whens?*

"Hey Bill, how was it when we found those two city slickers drinking water out of the butts where the effluent comes out. And they were saying: 'Ain't it wonderful? Crystal clear'. I said to 'em go back half a mile and have a look where it comes from."

"And George, how was it when we set those traps, got all the rabbits in one hit. When we came back in the morning, there were only ankles left. Foxes got 'em."

Les Pengelly told of Cocoroc in the 1940s and 1950s, a beaut little place. It had its own swimming pool, tennis court, church, footy ground, post office, hall and no less than four schools.

The Pengellys were quite a family. Les had eight brothers, almost a footy team on their own.

There was no gas, no electricity, no water laid on. Judy Watt said: "We used kerosene lamps and candles. My daughter one day was bending over the candle, set alight to her bow and burnt her hair. Hot water service? No. We used to boil up the copper to have a bath."

Harry Warfe was there with his brothers, Keith and Ray. Harry said: "You got your house for a shilling a week rent and the Board gave you two cows for milking." Ray said: "We used to go to school in bare feet. Used to go and fetch in the cows for milking, bare feet, even on frosty mornings. Didn't feel the cold in those days."

Evelyn Pengelly had a job as a dressmaker in Melbourne from 1948 to 1956. She left home, on her bike at 10 past six, rode four miles to Werribee, and caught the 10 to seven train to town. Then she caught the 5.05pm train home, back in Werribee at 10 to six, then rode the four miles home.

Colin King said that when he was five, his brother Rupert used to dink him two miles to school, five of them on the one bike: Colin over the back wheel, another on the saddle, Rupert standing up, another on the bar and the fifth on the handlebars. They should have been in a circus.

They was no end to the tales of how the Farm was a paradise for everything that grew, swam, flew or crawled. The fishing was splendid, flounder in the shallows of the Bay and eels in the canals.

They all caught rabbits and sold them with mushrooms on the Geelong Road. Gwen Steinbergs said the rabbits were wonderful. "I used to boil them, cut them up and curry them. Delicious. The kids would say: 'Not rabbit again, Mum'. I'd say: 'Not rabbit, dear. Chicken this time'."

The days of Cocoroc came to an end in the late Fifties. The 'family' gave various reasons. "The houses were in disrepair with few modern facilities and the Board felt it wasn't worthwhile to bring them up-to-date."... "Cocoroc was in the way, holding up other activities at the plant"... "The motor car changed everything. Before we moved around by bike, horse and cart. So most people preferred to live in Werribee."

But everybody agreed. They loved the little town and it was sad seeing the houses being carted away. One of the schools went off to be the Scout Hall in Werribee.

So John Landy launched the history. He said Melbourne was incredibly up-to-date in the 1880s. It had its own telephone exchange and in 1879 there was even a football match on the MCG under electric light.

However, Melbourne was in crisis, with typhoid and diphtheria endemic. There was no sewerage system and the city was known as Smelbourne. Indeed the Smelbourne Yarra even wended its way past Government House.

A British engineer, James Mansergh, recommended the construction of a deep sewerage and irrigation system at Werribee. Work began in 1892 and the first property was connected in 1897. There was an immediate decline of disease in Melbourne.

Copies of the book are available from Melbourne Water.

Facing Page **Family matters:** The Warfe family, from left, Keith, Mavis, Henry and Ray, was one of many that enjoyed the reunion at Werribee

Top Right **Author, author:** Helen Penrose is welcomed by Governor John Landy, Melbourne Water Managing Director Brian Bayley (right) and the Western Region Environment Centre's Harry van Moorst (left) at the launch

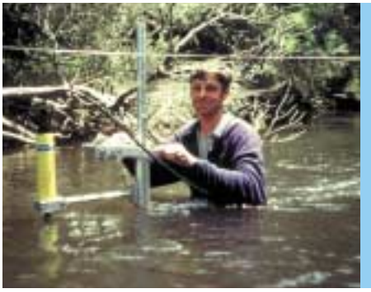
Preserving significant local history

When the thousands of documents, photographs and slides that form the Western Treatment Plant's archives were due to be transferred to Public Record Office Victoria, Melbourne Water decided it was an appropriate time to commission a history of the plant.

In consultation with Public Record Office Victoria, it was decided that some records would be transferred to the Public Record Office because of their Statewide significance, but others would be held by the Werribee Historical Society so that their local significance was not lost. The Werribee Historical Society also agreed to manage production of the history.

"I think it's fabulous especially for family history researchers that these records will be retained locally," Penrose says. "This history means a huge amount to hundreds of people who are proud of the Farm – and rightly so."

Projects undertaken by Cooperative Research Centres provide the water industry with a basis for future management plans and capital works.



Leading the way

There are a total of 64 Cooperative Research Centres, which bring together scientists and researchers from a range of backgrounds and organisations.

The centres, a Federal Government initiative funded by government and industry, utilise the expertise of industry, the CSIRO and other government laboratories, universities and public sector agencies.

Here we examine five of the centres, known as the Water Forum Cooperative Research Centres, which investigate environmental and social issues relating to water.

CRC for Catchment Hydrology

From the sky to the rivers and reservoirs...

This Cooperative Research Centre aims to provide catchment and water managers with a method of predicting the movement of water that links climate variability, vegetation, soil and water management.

Research areas include efficient and sustainable water use, the consequences of past land clearing, the risks of climate variability to water supplies, improving rivers and bays by increasing the quality of urban runoff, and halting and reversing the degradation of rivers and streams.

The objective is to help catchment and water managers predict catchment behaviour, so that they can be in an improved position to achieve:

- More efficient water use, with potentially large economic and environmental gains.
- Sustainable catchment management.
- Reduced risk from drought and floods.
- Cleaner urban streams, beaches and bays.
- Healthier rivers.

CRC for Freshwater Ecology

In the rivers and streams...

Streamlined: Brushy Creek after restoration

This team of researchers examines the ecological health of Australia's rivers and streams. It looks at ways of improving freshwater systems through innovative research and education, and shares knowledge with other interested organisations.

Research areas include working to restore flows to depleted rivers, biodiversity conservation, the decline of native fish stocks, blue-green algal blooms and river rehabilitation.

Current projects include:

- Monitoring and assessing ecological improvements over five years of placing artificial riffles along the beds of six degraded urban streams, including Brushy Creek, Croydon.
- Assessing, with the Cooperative Research Centre for Catchment Hydrology, the effects of urban land use on how nitrogen is transported and processed in streams (including Mullum Mullum Creek in Ringwood), and relating these effects to more commonly used indicators of stream health.

CRC for Water Quality and Treatment

Out of the tap...

This research centre is studying water quality issues along the journey from the catchment to consumption. It helps the water industry provide high quality, affordable water to communities, focusing on the relationship between public health and water quality.

The Australian landscape, climate and population distribution present a number of water quality challenges arising from natural processes in rivers and storage areas, naturally occurring organic matter in water from surrounding vegetation, and the need to pipe water over long distances, sometimes at high temperatures.

Research projects include:

- Better ways of managing catchments and other water sources to improve water quality.
- Water treatment technology to reduce risks from naturally occurring and artificial contaminants, such as organic matter, pathogens, nutrients, blue-green algae and salinity.
- Improved methods of maintaining water quality as it flows through mains and pipes.

Top Left **Flow chart:** Mike Stewardson of the Cooperative Research Centre for Catchment Hydrology measures the flow of the Acheron River, central Victoria, as part of a river restoration program

Left **Bug's life:** A laboratory technician with the Waste Management and Pollution Control Cooperative Research Centre examines nutrients in biosolids

CRC for Coastal Zone, Estuary and Waterway Management

Around our coastline...

These researchers are concerned with the management and health of ecosystems of the coastal zone, estuaries and waterways around Australia's 36,700 kilometres of immensely diverse coastline.

In one study, they are auditing most of the 1000 estuaries around Australia. This research will result in a comprehensive map of estuary habitats and an understanding of how each estuary functions. Information and resources on the outcomes will be published on the Internet.

This research centre is also studying the agricultural catchment of the Fitzroy Basin near Rockhampton, the industrial catchment of Port Curtis in central Queensland and the urban catchment of the Brisbane River and Moreton Bay. These catchments have been chosen because issues there are similar to those in other Australian catchments.

The work will include monitoring environmental health and will improve understanding of ecosystem processes and planning and management of coastal zones.

Coast guards: The Whitsunday Islands is among the regions being studied by the Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management

CRC for Waste Management and Pollution Control

Improving treatment of used water...

This team of researchers is developing innovative methods of treating wastewater and sewage that increase the effectiveness of treatment plants, reduce costs and improve the environment.

The research centre brings together the expertise of major public and private sector water and waste management organisations and the scientific resources of university and government laboratories. It aims to develop commercially viable products and processes for the environmental industry that benefit the community.

An example of this work is an electro-dewatering process developed to extract water from biosolids produced during the treatment of sewage. The process has the potential to cut costs significantly by reducing the volume of biosolids, making it cheaper to transport and manage.

This research centre also studies solid waste management, contaminated site remediation and hazardous waste treatment, and assesses the environmental impact of products and processes over their entire lifetime.

How to contact the Cooperative Research Centres

CRC for Catchment Hydrology
Department of Civil Engineering
PO Box 60
Monash University Vic 3800
http://www.catchment.crc.org.au

CRC for Freshwater Ecology
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http://freshwater.canberra.edu.au

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CRC for Coastal Zone, Estuary and Waterway Management
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http://www.coastal.crc.org.au

CRC for Waste Management and Pollution Control
University of New South Wales
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Kensington NSW 2033
http://www.crcwmpc.com.au

What price is right?

Robert Dumsday, senior lecturer in the Department of Economics and Finance at La Trobe University, has worked with government departments on many resource and environmental projects. Here he argues that there is no reason to expect increases in real water prices in future.

Water is an essential input for irrigation and many industrial and domestic uses, and so it often takes quite an increase in water prices to achieve a given reduction in demand.

This is why water authorities have resorted to the use of restrictions, and encouraged a conservation ethic rather than relying solely on price to do the rationing.

The use of infrequent restrictions is a successful way of avoiding the excessive costs of building storages that would withstand, say, a once in 100-year drought.

But it is more difficult to rely on voluntary systems to restrict demand on a year-to-year basis. So water price has an important role in the socially optimal allocation of water to various uses.

Other things being equal, if nominal water prices rise, several activities are stimulated, including:

- An assessment of whether new sources of water should be developed.
- Improved technology in the use of water.
- Reduction in consumption for existing uses.
- Transfer of water from low-value to high-value uses.

These types of responses ultimately dampen further increases in prices and also ensure that the resource is managed for the long-term benefit of society.

It is necessary to distinguish between nominal water prices, as seen in our water bills, and real water prices, which is the nominal price adjusted for inflation. If the market price for water in 1995 was $600 a megalitre and the inflation rate was 2 per cent a year, a market price of $660 in 2000 would imply no increase in real water price over the period.

Nominal water prices can be expected to rise over time, but that doesn't necessarily hurt us so long as our incomes are also rising with inflation.

Real price rises do hurt us. Whether or not real water prices will rise depends on several counteracting forces.

Forces leading to lower real water prices include competition policy, improved water markets and opportunities for trade, productivity increases and improved institutional arrangements.

Forces leading to higher real water prices include uncompetitive practices by water companies and government agencies in order to increase profits and revenues, removal of cross-subsidisation of water use in some sectors and increased costs of meeting rising environmental standards.

Consumers have benefited from national competition policy, which has led to lower real water prices on average. But it is not yet clear whether this is partly because water companies have been under-investing in infrastructure.

What is clear is that the major beneficiary has been government revenue in the form of dividends from water companies.

The Productivity Commission estimated that while real water prices fell 9 per cent between 1991/92 and 1996/97, government dividends increased more than 200 per cent. There is clearly scope for reducing water prices at the expense of government dividends.

Trading is essential for efficient water use. It exposes the value of water in its alternative uses, to all users, whether they trade or not.

I support the Council of Australian Governments' Water Reform Agenda, which aims in part at removing cross-subsidisation of water use so that efficient sectors of the economy can become more internationally competitive.

But the agenda is creating some problems for rural Australia. Historically, irrigation water prices were based on the running costs of supply, with capital costs of water infrastructure funded out of the general revenue of governments.

This is commonly (and wrongly) viewed today as being undesirable and there is emphasis on "full cost recovery". This emphasis is misdirected.

Prices should be based on the scarcity value of water, as determined by the market forces of supply and demand, not on a cost-plus basis, which among other things may allow water companies to inflate costs in order to inflate profits. In addition, costs are not always recovered from all users; for example recreational users of water may be able to avoid paying their share.

And there is no economic justification for recovering the sunk costs of irrigation infrastructure.

Once the market has allocated water for a few years, ideas like cost recovery should go out the window.

Environmental custodians should participate in water markets. In the absence of introducing market concepts to environmental issues, we are often left with unworkable or unacceptable implicit valuations that suggest that the environment has infinitely large value or none at all.

The argument that water prices should rise to meet environmental objectives is simplistic. Increases in water prices may do nothing for the environment.

It would be better to use more direct interventions, such as charges on drainage water, to address environmental concerns.

The Australian Academy of Technological Sciences and Engineering report of 1999, *Water and the Australian Economy*, suggested that unless there is a mechanism for farmers to be compensated for transferring water for environmental purposes, water savings from improved efficiency would tend to be distributed to other farmers, rather than the environment.

Or, as appears to have happened in New South Wales, if governments simply transfer water savings from farmers to the environment without compensation, the incentive for irrigators to cooperate in further water-saving activities is diminished.

In other words, environmental agencies should be in there bidding for water, based on rational assessments of the value of the water to the environment.

Water pricing and water allocation are extremely complex matters, so complex that it is even possible that water reforms will founder because they do not deliver the benefits promised.

However, we should not have to see any future increases in real water prices. In fact, if our performance is good enough, it may be possible to see falling real prices for water at the same time as environmental improvements.

Environmental projects given the green light

A price increase announced recently by the State Government for water authorities throughout the State will enable Melbourne Water to fund major environmental works this financial year.

The 4.9 per cent increase will be used for water recycling schemes, to upgrade sewage treatment plants and for education programs focusing on water conservation and sustainability.

Melbourne Water will also use the money to protect the long-term health of waterways and Port Phillip Bay by reducing nitrogen loads in degraded urban waterways, stabilising stream beds and banks, and reducing litter in waterways.

The increase follows the release of a new framework for water pricing in Victoria to 2004.

The Minister for Environment and Conservation, Ms Sherryl Garbutt, said the framework capped prices that Victorians would pay for water from their local water businesses over the next three years.

She said that Victorian households would pay an average of 45 cents a week more for water and sewerage services. The current average metropolitan household water bill of $459 a year would rise to $482.

Under the new framework, the pricing cap is:

- 2001/2002: CPI plus 2 per cent (4.9 per cent).
- 2002/2003: CPI plus 1 per cent.
- 2003/2004: CPI only.

Ms Garbutt said she expected metropolitan retail water companies to step up infrastructure programs, such as sewering outer metropolitan areas.

Below & Right **Corn flowers:** Irrigators like these corn farmers on the Darling Downs in Queensland require incentives to save water

Q&A

Why farmers should be offered a dignified exit

Professor Russell Mein, the Director of the Cooperative Research Centre for Catchment Hydrology, believes that salinity is one of many factors driving farmers off the land.

Is salinity the major problem facing Australian farmers?

It's one of several major problems. There are many others, including the long-running decline in the terms of trade for commodities, climate variability particularly in marginal agricultural areas and better employment opportunities elsewhere.

Numbers of farmers are reducing as neighbours and corporations buy up farms to make larger, more viable enterprises.

How serious is salinity in Australia?

It is serious now, and will get worse whatever we do for a while because there is so much momentum in the system. A problem that has taken 100 years or so to develop will not be turned around in just a few years.

Are many areas around Australia beyond repair?

I think that is right. It takes a lot of time and effort to desalinise land and in some cases that effort may not be worthwhile. Most of our energy and resources should be directed to land that can be saved. Recognising where that land is, and deciding what we need to do to save it is the challenge.

Is the problem partly due to using too much water in our irrigation?

Irrigation has indeed caused salinity problems, and important steps are being taken to address these. Water use practices on irrigated areas have improved greatly, and are continuing to improve.

Perhaps the biggest threat in Australia is from dryland salinity. The clearing of land, which began after white settlement, has changed the water balance of large regions. Where trees were taken out, there is more recharge to the underground watertable and up to 20 per cent more water running into streams.

There are moves now to replace a lot of the grassland with tree plantations to help restore the balance. However, that will reduce the freshwater inflows and hence, in the short term, the dilution of saline seeps into streams like the Murray.

A further problem is that the extra runoff water from clearing has been allocated as water rights, so there are important socio-economic issues involved from any reduction in streamflow.

Can changing land practices solve the problem?

Ultimately, we do need to change land practices to tackle salinity issues, but change is not easy to implement. We are asking, say, a farmer to change a practice that causes a problem on someone else's land 100 kilometres away in 75 years time.

Establishing the scientific link to show this is difficult because there are many uncertainties in flow underground – and then what do we do about it? If we use traditional economic discounting, we wouldn't do anything.

What do you mean by that?

When we look at the value of a land-clearing benefit now, against an environmental loss down the track, economists discount that loss back to the present to make the figures comparable.

When discounting is done over 25 years or more, the environmental damage figure diminishes to nothing. So if we had done the economics of land clearing 100 years ago, we would probably still have cleared the land.

That is why we need the "triple bottom line", to bring environment and social factors into consideration, as well as the economics.

Is it true to say that traditional catchment management practices have had only a financial imperative?

We have tended to concentrate on the financial until now, but we are moving into an era where environmental and social factors are coming into their own.

You might think that, but do all stakeholders agree?

Well, there are some massive issues in farming, particularly on marginal land; we have come to a stage where we should pay farmers to stop farming activities or to manage the land in a different way.

Are you saying it may be necessary to pay farmers to leave their land – like a redundancy?

For the greater good, yes. We have done that in cities where we pay people to leave their properties so a freeway can go through, and in flood-prone areas, we've bought back land at risk.

So people who perhaps haven't been trained for anything else must take a payout and leave land that has been in their family for generations?

That is happening in places now. The water reform that enables water to be traded away from irrigated land gives a way out for some whose land has become so poor that it is not economic to farm it.

A generation of farmers is about to leave the land, or finish farming.

What happens after a farmer leaves salinised land?

The land in question can be managed for conservation values. Perhaps salt-tolerant plants can be introduced to build up an ecosystem. This would best be managed at a regional or government level.

But would anyone live there?

The land would need to be managed, but fewer people might be living there. There are major socio-economic issues when people start leaving country areas; the departures affect the rest of the people living there, and you lose that critical mass of people needed for a community. These issues need to be faced.

But if the farms are uneconomic, it is going to happen anyway.

The problem with salinity is that it is an insidious thing. The loss in production is gradual, a little bit less on average each year. It is not an absolute decline because there are some good years and poorer years, influenced by variability of climate and market conditions.

But the trend is there that a growing area of land is becoming salinised or more salinised, and will carry less production.

To what extent is water trading changing land and catchment management practices?

The fixed connection between irrigation water rights and land has been removed so that landowners can sell their water rights temporarily – for example, one year's allocation – or permanently. The permanent water trading has brought quite high prices.

What impact is it having?

One impact is more pressure on the environment, because people are selling water that they didn't use previously; water that used to be available to someone else or help environmental flows. Now when people sell their water, the purchasers buy it to use and less is left to run down a stream.

Isn't this another case of overlooking or failing to understand the "triple bottom line"?

I think perhaps it is. It is still early days as far as water trading goes, but the issue of environmental flows in streams remains a massive challenge.

So why is water trading a positive initiative?

Because it is getting water away from some irrigated land that was quite marginal and putting it where it adds more value, to activities such as horticulture and vines, and away from the traditional irrigated pasture.

Your Cooperative Research Centre recently won a national award for its water-sensitive design work at Lynbrook Estate, an outer Melbourne residential development. Is this a model of what can be achieved to improve stormwater quality?

Lynbrook has challenged the "kerb and gutter mentality" that has dominated urban drainage for decades. Kerb and guttering is the hard engineering approach, and an easy design approach. You know it is going to work.

It is not necessarily the cheapest option, but one that minimises the roof drainage water running from one property to another – that is why house roofs are generally connected to the kerb in the street.

However, this approach has a high impact on our urban creeks because the water gets there far quicker than it did on the natural catchment, and in such volumes that it scours out the creeks. The aesthetics of the creeks are spoiled by such erosion, not to mention litter.

Because the water flows so fast into the streams and bays, treatment (self-purification) is not possible on the way.

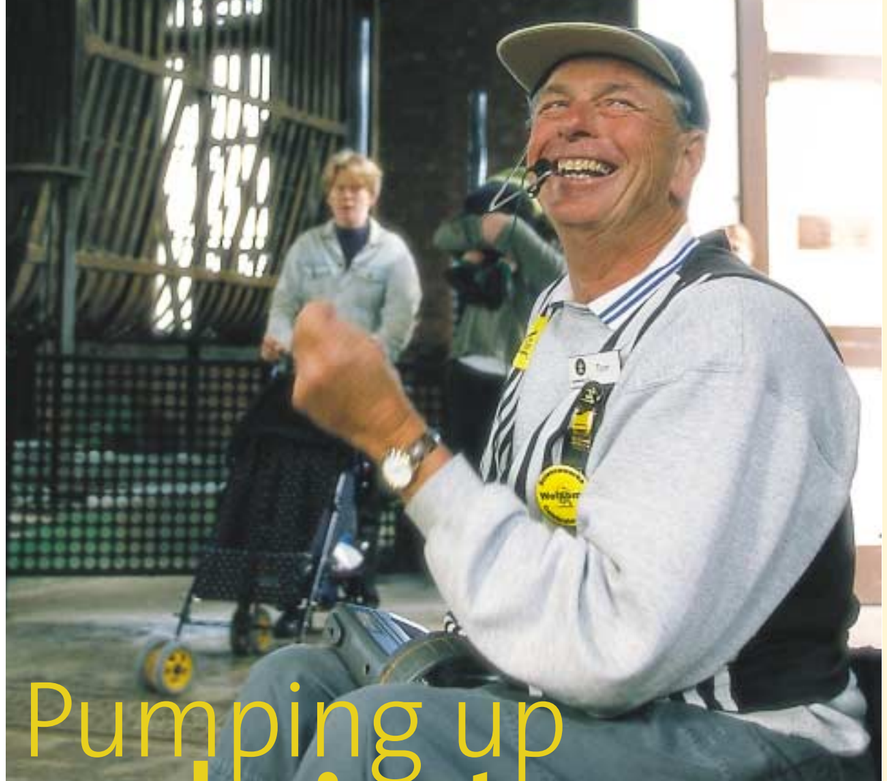
With Lynbrook, we are taking runoff from the road and the house roofs, running it through swales across grass into infiltration trenches, and then slowly to a wetland and ultimately the Bay.

How does this water quality compare with other stormwater around Melbourne?

Our research shows that there has been a dramatic improvement in water quality with a significant reduction of nutrients – up to
80 per cent of phosphorus,
60 per cent of nitrogen and
90 per cent of suspended solids.

But this and other similar developments are merely scratching the surface, aren't they?

Very much so, but they indicate some of what is possible with changed thinking. We need to take a holistic approach and consider all the options for water management in urban catchments, including reuse.



Pumping up history

Meet Tom Brereton, who never tires of telling the story of why Melbourne has one of the world's best sewerage systems.

As volunteer guide Tom Brereton wound up his tour of the Spotswood pumping station at Scienceworks Museum, the visitors burst into spontaneous applause.

The reaction was not surprising because the tour had been full of social, industrial and political insights that helped build up a picture of another time in the same place.

Mr Brereton reckons he has shown the historic buildings and machinery to more than 30,000 people. He began taking the tours in 1992, only months after Scienceworks opened.

There is no doubt that for him, the tours are a labour of love. He has lived in the inner west all his life, he used to work for a company that made pipes and other stormwater equipment and his father was a local plumber.

But more than all this, he is fascinated by the story of how Melbourne came to have one of the best sewerage systems in the world.

Mr Brereton points out in his tours that before the system was built, raw sewage running into open street channels caused outbreaks of disease such as cholera, typhoid and diphtheria. Something had to be done, but he still marvels at the far-sighted thinking of the city's leaders.

"Can you believe that way back in the 1880s, when the population was only 500,000, the Government had such amazing foresight to come up with the idea of building a sewerage system for a city of five million?" he says.

"Can you imagine the intestinal fortitude needed to commit that sort of money – about five million pounds – on a sewerage system?

"This system made such a dramatic change to Melbourne's health and wellbeing. It is a very important part of Melbourne's history."

The Government of the day insisted that the system, which is the basis for that used now, be built using only Victorian materials, equipment and workers.

At the time, Victoria was suffering from a recession and the construction provided a much-needed boost to local industry and employment.

The pumping station is quite a sight, with its grand facade and imposing mansard roof, although the French classical revival architecture was apparently regarded as modest at the time.

The stately buildings and intact equipment are a reminder of another age, when up to 90 employees worked around the clock tending to large steam pumping engines powered by coal-fired boilers.

Sewage from the northern and eastern suburbs was pumped up to Brooklyn before its gravity-led journey to Werribee. Essentially, nothing much has changed, although the Spotswood facility was closed in 1965 and replaced by larger pumping stations at Brooklyn and Hoppers Crossing.

Mr Brereton regularly refreshes his knowledge by speaking to the other eight volunteer guides, especially Anne Miller – who has interviewed past employees as part of her extensive research on the pumping station – and curator Matthew Churchward.

Mr Brereton takes 10 tours of the pumping station a month, and also runs children's programs including *Where does the water go?*

He is a self-confessed fan of old technology, such as pocket watches, and enjoys the challenge of explaining to visitors how steam engines work.

"In those days, the computer people used was behind their eyes and between their ears," he says.

Mr Brereton thrives on telling the tales of false teeth, clothing, animals and even human body parts being caught in those early litter traps in the sewage, which can still be viewed today flowing under the pumping station.

He says about half the visitors cannot wait to catch a glimpse of the sewage and the other half can't bear to look.

For Mr Brereton, who was seriously injured when he was knocked from his bicycle in 1989, every tour is like a performance.

"Just before the tours are about to start, I say to the staff here: 'Five minutes to showtime'," he says. "The tours are something I enjoy and hopefully the visitors do, too – and they go home a little bit wiser."

On the right track

An eye-catching tram was conveying the water conservation message to passengers, passing traffic and city office workers.

The so-called Megatram, which is based at Essendon Depot, is travelling through the city on the Airport West and West Coburg routes until July 2002.

As well as its strong exterior message, the tram features four inside panels with water conservation tips and themes and general information about Melbourne Water.

The artwork was digitally printed on to self-adhesive vinyl, and signwriters took three days to apply it to the tram.

Sending a clear message: The striking Melbourne Water tram heads into Essendon Depot. A similar theme is being used on billboards, the first of which has been erected in Punt Road, Richmond

For young trainee, stepping up to new position is just the job

When Nick Stuart gained a water supply operator traineeship with Melbourne Water in June 2000, he could only have imagined that a full-time job would be around the corner.

But that is exactly what happened. In April 2001, a water supply operator's job at Silvan became available and after internal advertising, Mr Stuart gained the position.

The 20-year-old is happy about the way things have worked out for him, but he is the first to admit that it hasn't been easy.

"At the start of the traineeship, the learning curve was steep and I felt like I was being thrown in at the deep end, but the guys helped me a lot," he says.

Mr Stuart has learned to manage chlorination and fluoridation plants, and water supply at Silvan and Cardinia reservoirs, and says that every day is different in his new job.

"Working on call has been great – when things go wrong, you learn how to fix them and that has given me the confidence to make decisions," he says. "There's a bit of freedom in the job and you get a chance to show initiative."

The trainees, who were employed under the State Government's Apprenticeships Victoria scheme, gain experience by working in the field with water supply teams together with classroom study of 18 modules including water treatment and storage, flood routing, structural surveillance, environmental principles, chemical dosing, manual handling and confined space training.

The modules are part of Certificate II in Water Industry Operations, which the trainees completed at the end of June 2001.

Melbourne Water will continue to employ the other trainees for another year, and is considering extending the scheme to other parts of the business.

The National Utilities and Electrotechnology Industry Training Advisory Board, and the Department of Education, Training and Youth Affairs developed the training program. Qualifications are recognised nationally.

Career path: Water supply operator Nick Stuart at Silvan Reservoir

Drink to that: Young visitors enjoy a break during Open Day at Devilbend Reservoir

Hundreds visit Devilbend

About 350 people took advantage of free guided bus tours as part of an Open Day at Devilbend Reservoir last month.

Melbourne Water organised the event to encourage further community involvement in the future of the 1057-hectare site on the Mornington Peninsula.

Most visitors were from the Peninsula but others came from as far afield as Werribee, Brunswick and Wattle Glen. The event included a three-kilometre walk at the West Hastings site.

Until recently, Devilbend Reservoir formed part of the water supply system for the Mornington Peninsula, and was used mainly for reserve drinking water during peak summer demand.

A $46 million pipeline from Cardinia Reservoir to Pearcedale commissioned last December is supplying high quality drinking water to the Peninsula and Devilbend is no longer required. A community reference group is helping develop a master plan for the future use of the site.

As part of this process, the community has been invited to submit Expressions of Interest for access to and use of the site. Possible uses might include conservation, recreation and education. Ring 1800 655 702 for further information.

For a comprehensive new feature on the Yarra, the river that shaped Melbourne, visit www.melbournewater.com.au