Securing our water future

A State Water Strategy

for Western Australia

GOVERNMENT OF WESTERN AUSTRALIA

February 2003

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The Western Australian Government thanks community members from all walks of life for their input into the State Water Strategy. Particularly, we appreciate the efforts of those who took part in the 2002 Water Forums across the State and delegates to the Water Symposium at Parliament House in October 2002.

1.0 Premier's statement

Western Australia has reached a critical point in the way we use and reuse our precious water resources.

The water shortage we have had to live with in recent times has shown us that the efficient use of water is no longer a response to the current drought but in fact an essential step in learning to live with less water without compromising our way of life.

There are no simple solutions to our water shortage. What is needed is a multi-faceted approach that combines new sources, new efficiency measures and innovative ways of re-using our wastewater.

We all need to contribute to securing our water future. Without the involvement of the community, industry and local government we cannot solve Western Australia's water shortage.

The State Water Strategy is based on a wide range of input from community members, including those who in 2002 took part in a series of Water Forums across our State and delegates to the Water Symposium at Parliament House from October 7-9, 2002.

It addresses key water issues facing us across Western Australia, providing a practical platform from which solutions can be implemented. The Strategy calls for strong community, government and industry partnerships to ensure a sustainable water future for all of us who live in Western Australia and emphasises the vital role we will all play in securing this future.

A prominent feature of this Strategy is that it recognizes the regional diversity of Western Australia and calls for tailor-made measures and targets for different parts of our vast State.

A clear message from the forums and the Water Symposium was that my Government should lead in encouraging the adoption of water efficient appliances and practices.

We have addressed this through the establishment of a $7 million financial incentive package to encourage many more people to buy water efficient everyday products.

And the Government will penalise those people who waste water through higher charges for 'guzzlers'.

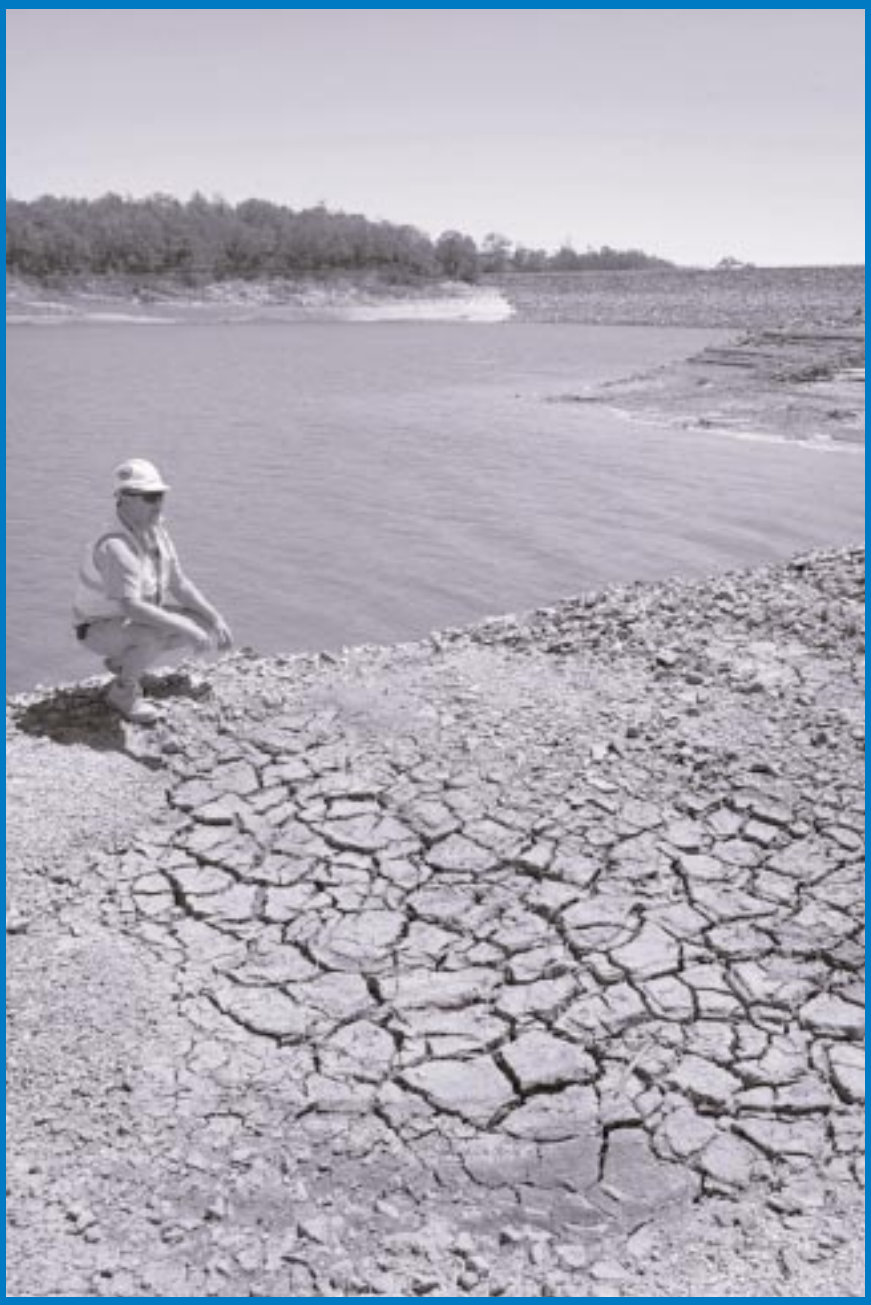
I am aware that we all face a major challenge in the fundamental changes in water use behaviour that will be required in the years ahead.

The State Water Strategy will guide us as we ensure a sustainable water future for Western Australia.

Dr Geoff Gallop MLA
Premier

10 February 2003

Overview



Picture courtesy *The West Australian*

Many of Western Australia's public water supply schemes have been affected by the drought in the past 24 months.

2.0 Overview

2.1 Introduction

Western Australia is currently experiencing its worst drought on record.

Climate change has contributed to a 10-20 per cent reduction in rainfall in the south west of the State alone over the last 28 years, and a subsequent 40-50 per cent reduction in run-off into our dams and reduced recharge of groundwater.

The most recent climate change predictions indicate that the current dry conditions, which extend to many other parts of Australia, are likely to continue. The south west is expected to become increasingly warmer and drier than last century.

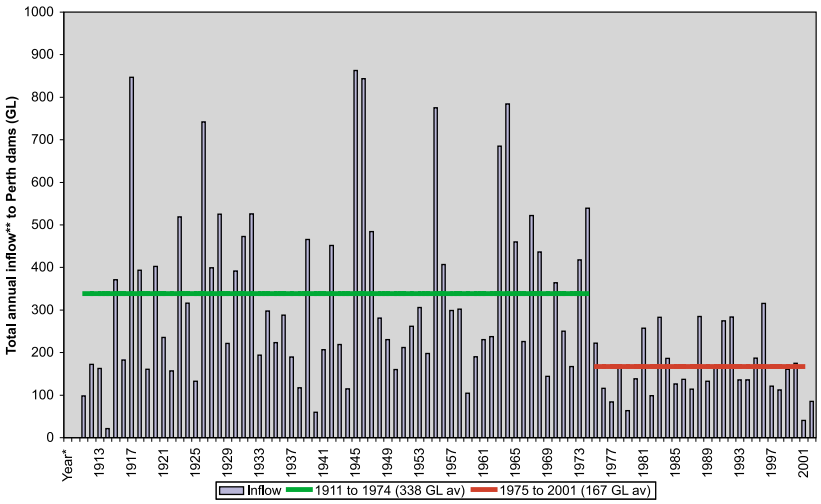
The increase in temperature will result in reduced run-off from water catchments, and it will lead to increased demand for water by humans, animals and vegetation.

Many of Western Australia's public water supply schemes have been affected by the drought in the past 24 months. The impact on the Integrated Water Supply Scheme (IWSS), for example, highlights the seriousness of the drought. The IWSS services 1.5 million of the State's 1.9 million people in Perth, Mandurah, Pinjarra and towns and properties along the Goldfields pipeline to Kalgoorlie-Boulder.

In 2001, the dams in the Perth hills experienced one of the lowest stream inflows over a 12-month period on record. Over the past 28 years the average annual inflow has been 160 gigalitres*. Prior to that the long-term average was 340 gigalitres.

The winter of 2001 inflow, by comparison, was only 40 gigalitres – more than an 80 per cent reduction on what normally would be expected and the second lowest inflow ever recorded. The trend continued into the 2002 winter with 100 gigalitres inflow – making the combined inflow the lowest two-year period on record.

However, it is important to emphasise that even though there have been some extremely low inflow years in the recent past, water supply systems throughout Western Australia have provided enough water to ensure that all Western Australians can maintain a healthy lifestyle.



• *Figure 1: Inflow into dams providing water to the Integrated Water Supply Scheme.*

Note: Year is taken as May to April. Inflow is simulated based on Perth dams in 2001 (Stirling Dam not included).

** 1 gigalitre = 1 million kilolitres (equivalent to 500 Olympic-sized swimming pools).*

2.2 Climate

The size and regional diversity of Western Australia makes it inevitable that there are large variations in rainfall with significant differences between the 'wet' and 'dry' years. In the south west corner, records show that an unusually dry period began in the mid-1970s. This has resulted in a decrease in rainfall equal to between 10 and 20 per cent of the previous long-term average. The decline in rainfall also coincided with increases in average temperatures.

The situation has reached the point where most climate models now predict that the south west of Western Australia will, as a result of climate change, become drier over the coming 100 years.

A fundamental long-term shift in climate in the south west has significant implications for the determination of sustainable yields, and the allocation and management of water resources. Improved understanding of our climate and the changes taking place will enable water resource managers to make more accurate predictions and better overall decisions.

Water supply planning is now based on the drier rainfall records that have occurred since 1975.

This ensures that current and future developments do not overestimate the amount of water that can be delivered each year from the available resources.

The impact of climate plays an important role in the sustainability of water resources. As climate and environments change, the timing of new water source developments and the community's ability to adopt water efficient behaviours become critical. The development of new water sources must take into account changing climatic conditions and careful management and protection of existing sources is required to ensure that all water sources remain viable.

Changing climatic conditions are taken into account in the development of new water sources.

2.3 Status of our water resources

Western Australia has significant water resources for its future needs. We also have a proven ability to develop technically feasible options, if required, such as much more reuse of treated wastewater and the large scale use of desalination.

The challenge into the future will be to develop and protect these sustainable resources in an economically and environmentally responsible way.

The Water and Rivers Commission (WRC), in 2000, completed an assessment of Western Australia's water resources. This was done as part of a joint State/Commonwealth National Land and Water Resources Audit and has provided very useful information about the status of our water resources and possible future yields.

2.3.1.1 Surface water resources

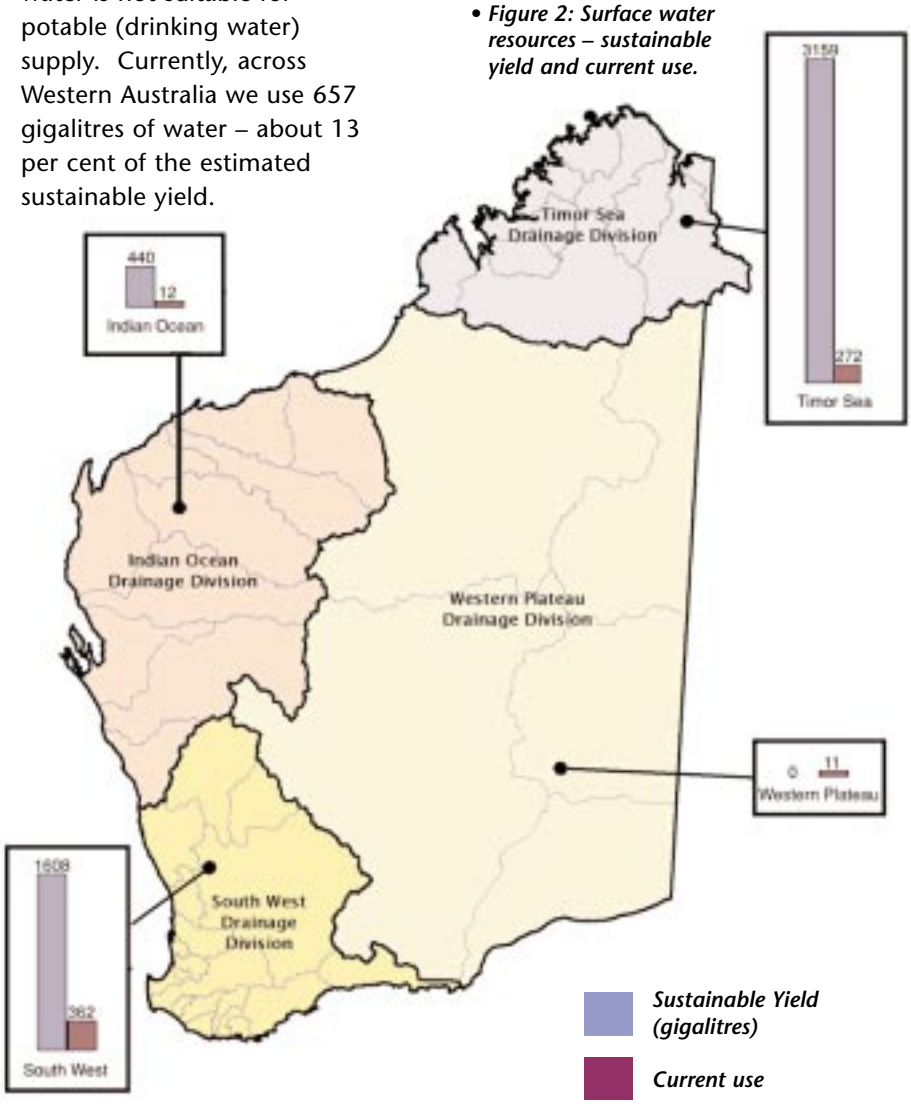
Western Australia has four drainage divisions – the south west, Indian Ocean, Timor Sea and the Western Plateau (See Figure 2).

There are 44 surface water management areas in the divisions dividing the State, for management purposes, into a number of smaller units.

The WRC assessment established that the sustainable surface water yield is estimated to be 5,207 GL/year. This includes both fresh and marginal water resources meaning that much of the water is not suitable for potable (drinking water) supply. Currently, across Western Australia we use 657 gigalitres of water – about 13 per cent of the estimated sustainable yield.

A significant factor is that surface water use has increased 40 per cent since 1985, mainly because of the demand of the Ord River Irrigation Scheme developed at Kununurra in the far north of WA.

• *Figure 2: Surface water resources – sustainable yield and current use.*



2.3.1.2 Groundwater resources

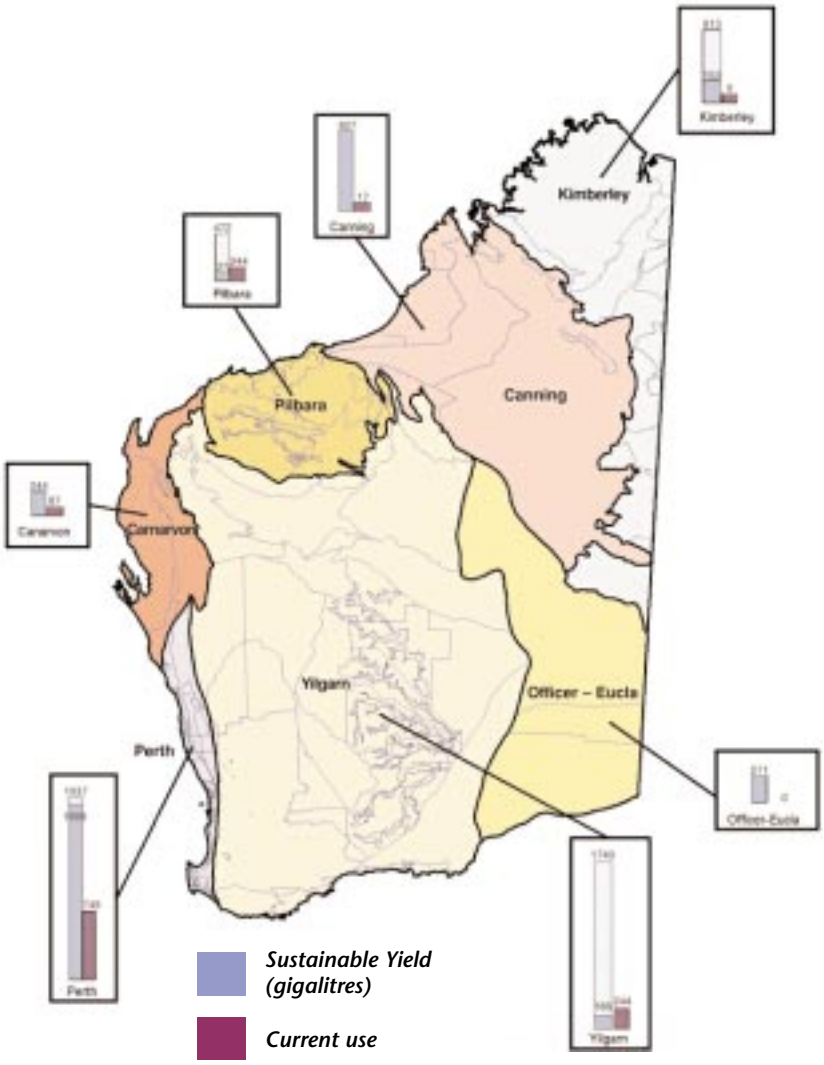
There are seven groundwater divisions in Western Australia (See Figure 3), divided into 174 Groundwater Management Units that are individual aquifers.

The sustainable groundwater yield (fresh through to hypersaline waters – not suitable for potable use) is estimated to be 6,304 GL/yr. Groundwater extraction at the time of the WRC water assessment in 2000 was 1,138 GL/yr.

This is only about 18 per cent of the estimated sustainable yield, however a large proportion of the available water is of a quality that is not suitable for potable use.

While the 2000 assessment indicated that only about 20 per cent of the State's groundwater was being used, in the heavily populated Perth Basin, the community is using 39 per cent of the available groundwater resulting in some areas now being close to the sustainable limit.

In fact, a number of groundwater 'sub areas' on the Perth coastal plain have no further groundwater allocations available. In these locations it is necessary to improve water use efficiency, find alternative sources (reclaimed water etc) and promote water trading to provide opportunities to free up water for further development.

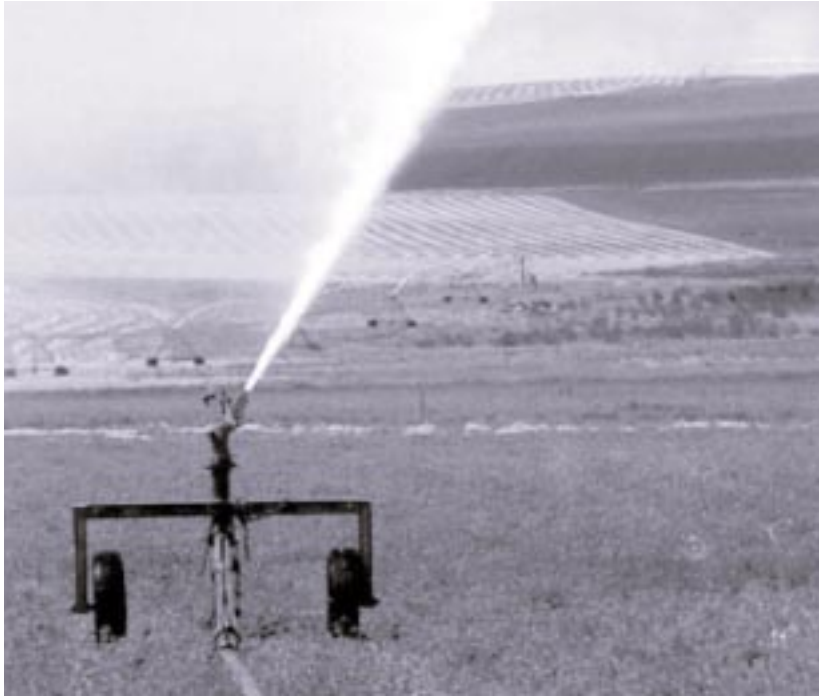


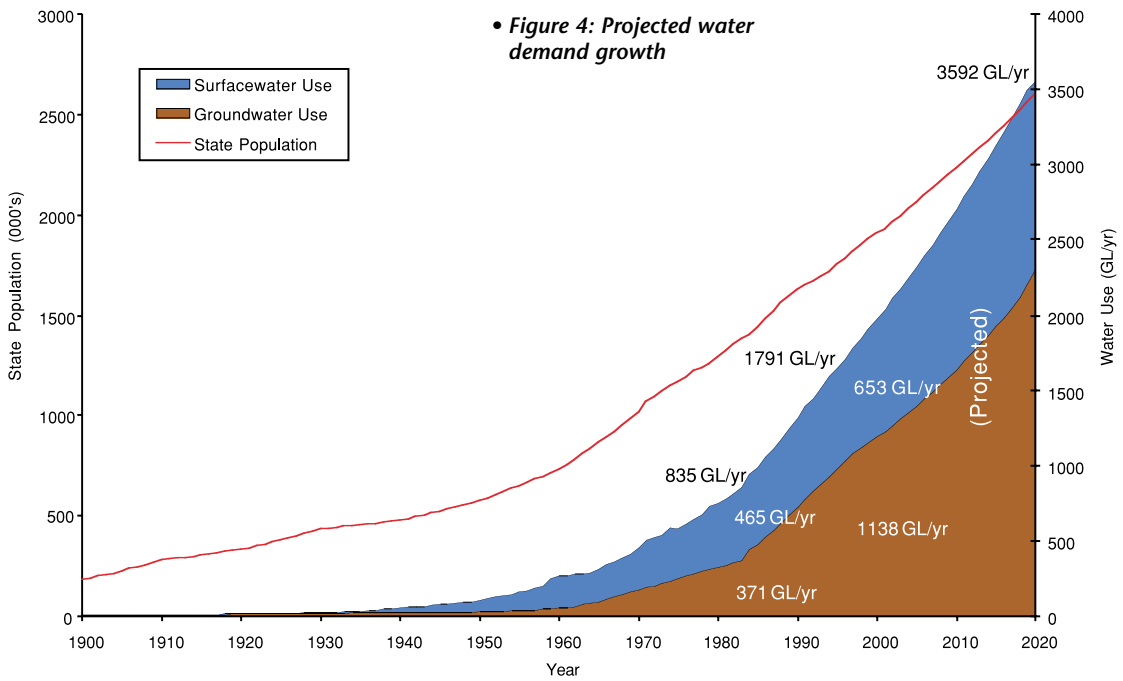
• *Figure 3: Groundwater resources – sustainable yield and current use.*

2.4 Demand and water use trends

Total water use in Western Australia doubled between 1985 and 2000 and is expected to double again by 2020. In 1985, total water use was about 835GL/yr – 15 years later in 2000 this had increased to 1790 GL/yr and by 2020 total water use in Western Australia is predicted to reach 3500 GL/yr.

Licensed users consumed 1,700 gigalitres of water in 2000. The other 90 GL of unlicensed use was primarily small garden bores in Perth.





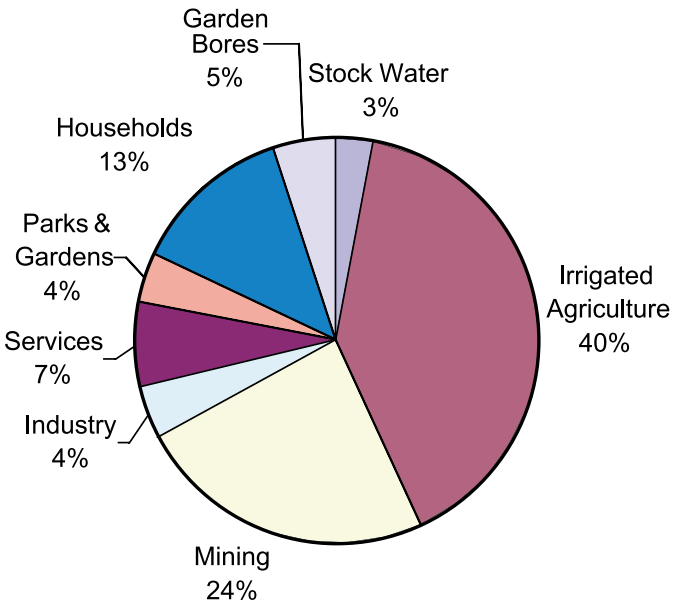
• *Figure 4: Projected water demand growth*

It is often thought that households are the most significant users of water but this is not the case. Overall, households use 18 per cent of the total amount of water used in Western Australia – 13 per cent from scheme supplies and 5 per cent from garden bores. By comparison, irrigated agriculture (40 per cent) and mining (24 per cent) use more water, some of which is low quality and not suitable for potable supplies.

Water use by households, and that used to irrigate sporting and recreational venues, parks and gardens is expected to continue growing at a relatively modest rate,in line with or slightly below population growth.

However, it is expected that water use in the mining, industry and services sectors will grow strongly, while irrigated agricultural use is expected to more than double over the next 20 years. Increases of this magnitude will place increasing pressure on available water resources and more locations will approach the sustainable limit.

Locations across the State where water use is expected to rise sharply include further major expansion of irrigation operations in the Kimberley, more modest expansion in the Gascoyne and Greenough regions, and an increase in mining activities in the Pilbara, Murchison, Goldfields and Eucla regions.



• *Figure 5: Total water use in WA 1999 / 2000.*

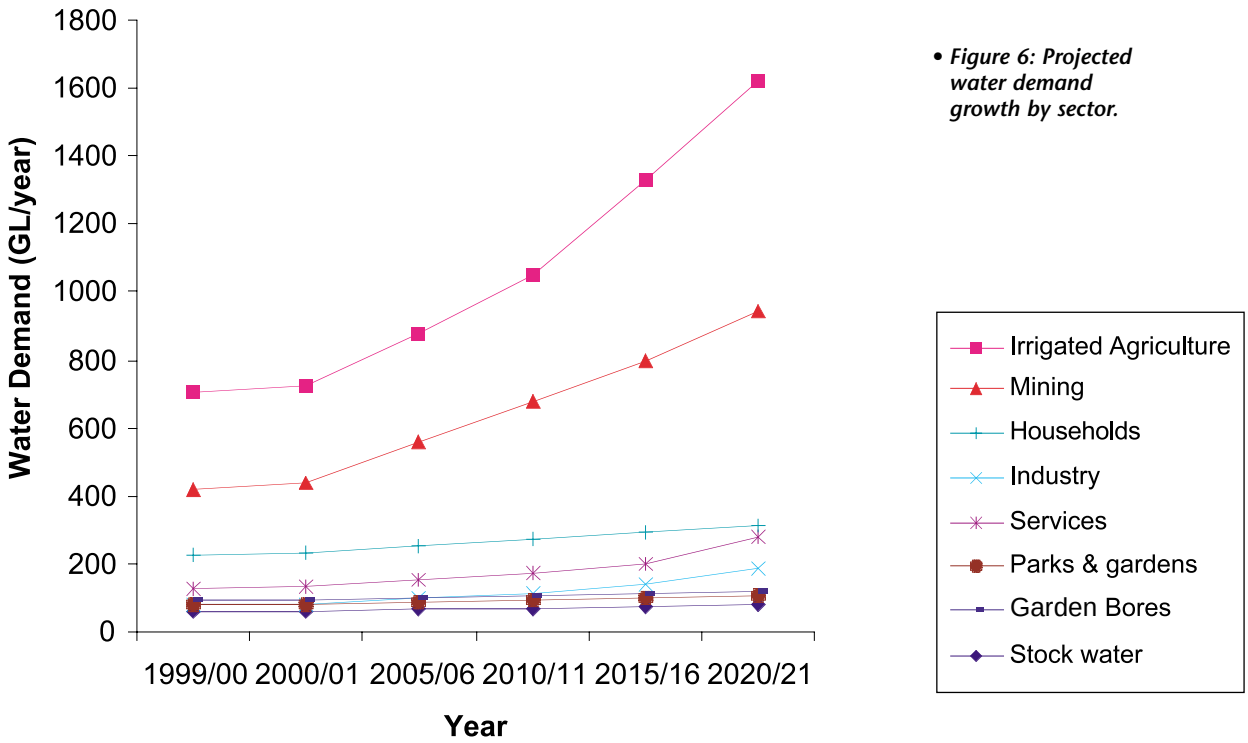
Figure 6 (see page 9) shows the expected growth in demand across all water use sectors, highlighting the relatively rapid growth within mining and irrigated agriculture.

2.5 Community forums and the State Water Symposium

During July, August and September in 2002, nineteen metropolitan and regional community water forums were held in Western Australia, leading to the inaugural State Water Symposium at Parliament House, Perth, on 7-9 October.

The primary objectives of the forums and symposium were to provide information on water planning issues, and to ensure wide and representative public input into new strategies for conserving water and developing new supplies. The Symposium produced 22 recommendations as well as 40 wide-ranging conclusions. These have all been considered in the preparation of this State Water Strategy.

The outcomes from the WA Water Symposium are available from state libraries or online at www.ourwaterfuture.com.au



• *Figure 6: Projected water demand growth by sector.*

2.6 Why we need to change our water use

A long period of dry weather and the more recent drought that has affected large areas of Western Australia (and many other parts of Australia) has demonstrated that we are vulnerable to climate change. There is a need now to become smarter in the way we develop, use and reuse our water resources, while protecting public health and our environment.

Western Australia has reached a point where water efficiency – reducing our use by as much as possible without affecting our lifestyle – is not simply a drought response strategy but an essential part of water resource management. It is important that this approach is taken across all sectors but focusing on areas where the most significant gains can be achieved.

The Government is now asking all water use sectors and the broader community to improve water use efficiency over the next ten years.

The Government is aware this represents a major challenge but believes it can be achieved without affecting lifestyle or the State's economic development. The Government will continue to promote water use efficiency and is committed to more than doubling the reuse of water.

Objective of the State Water Strategy

The State Water Strategy recognises the regional diversity that is part of the make-up of our vast State. Excellent outcomes will require input from all water use sectors.

3.0 Objective of the State Water Strategy

Our objective is to ensure a sustainable water future for all Western Australians by:

- *Improving water use efficiency in all sectors.*
- *Achieving significant advances in water reuse.*
- *Fostering innovation and research.*
- *Planning and developing new sources of water in a timely manner.*
- *Protecting the value of our water resources.*

We will only achieve a sustainable water future through a better understanding of the demands of our natural and built environment, and the changing nature of our climate, population and industrial developments.

Water is a precious resource. Whether it is used for agriculture, industry, recreation, drinking or to maintain the natural environment, good quality water is essential to maintain our quality of life. For this reason it is critical that we improve the way we interact at all stages in the water cycle.

This first Western Australian State Water Strategy establishes the means through which we can all improve the way we use and reuse our precious water resources. An important element of this is maintaining the quality of all water sources.

Parliament House Water Symposium

The Strategy is based on the input from community members from all walks of life who attended the series of Water Forums across WA, and delegates to the Water Symposium at Parliament House in Perth from 7-9 October 2002. Additionally, it includes feedback received during consultation for the Draft State Water Conservation Strategy.

Overall, the results of all this work have been coordinated to take in all water-related activities across Western Australia, providing a practical platform from which solutions to water issues can be developed and implemented.

The Strategy addresses key water issues across the State, outlining a clear position on water resource, supply and demand management.

Delegates – State Water Symposium October 2002.

It calls for strong community, government and industry partnerships to ensure a sustainable water future for all Western Australians, underlining the vital role everyone will play in securing that future.

Further, it recognises the regional diversity that is part of the make up of our vast State. Tailor-made measures and targets for different areas of Western Australia demonstrate clearly that excellent outcomes require input from all regional areas.

To achieve these outcomes, the Government commits to these specific objectives for all Western Australian communities:

The Strategy calls for efficiencies in water consumption within all water use sectors.

Water conservation and efficiency

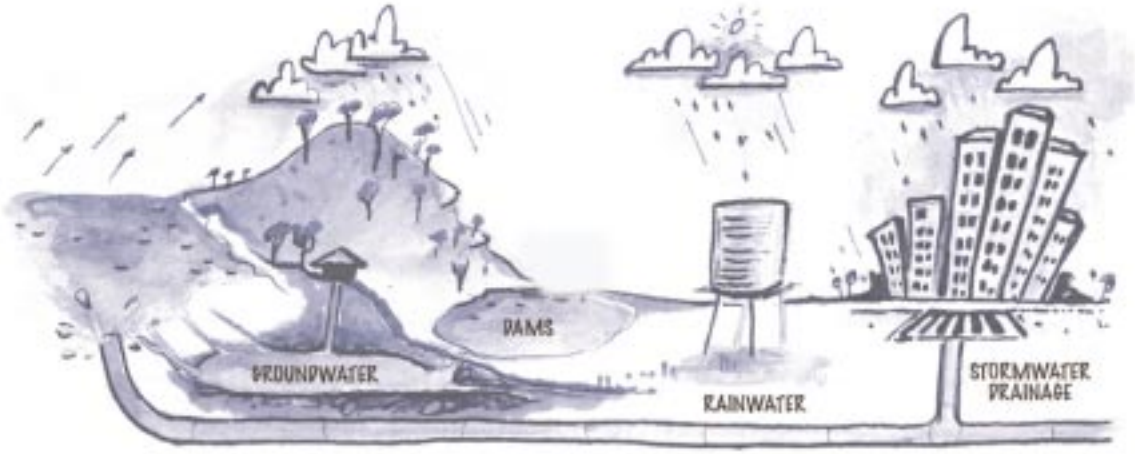
- Make Western Australia one of the most water efficient communities in the world.
- Achieve efficiencies in water consumption within all water use sectors.

Water reuse

- Encourage 'fit for purpose' water consumption in Western Australia, particularly through the substitution of fresh water with reclaimed water.
- Establish and achieve targets for increased water reuse.

New supplies and total water cycle management

- Ensure reliable, cost effective water supplies.
- Balance source development with conservation.
- Establish total water cycle management principles as a requirement within new developments and maximise the recovery of stormwater.

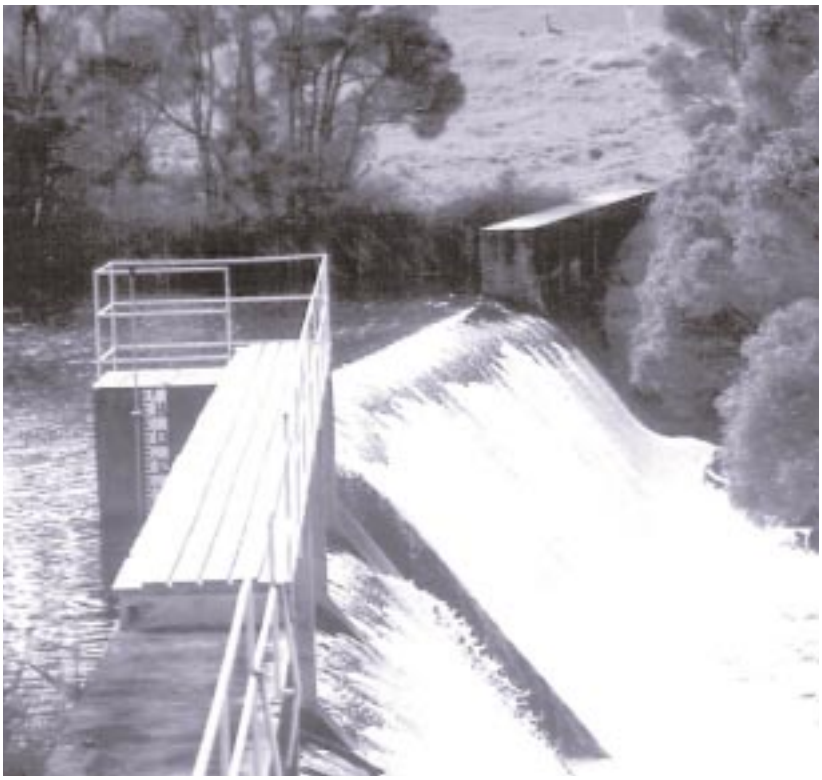


Innovation, research and education

- Foster innovation in water conservation and water use efficiency.
- Encourage ongoing applied research and development to ensure that Western Australia continues to lead in innovative solutions to both supply and demand.
- Provide education programs on a broad range of community issues.

Resource protection and management

- Ensure that the quality of all water resources is maintained or improved.
- Ensure that water resources are managed in the best way possible, taking into account environmental, social and economic needs of current and future generations.



Water resources will be managed taking into account environmental issues.

Water conservation and efficiency

The Government will continue to provide leadership in the implementation of water conservation measures, but recognises that initiatives will only succeed with the cooperation of the community.

4.0 Water conservation and efficiency

Water conservation simply means doing more with less water. This approach helps balance the requirement for new source development and creates a sustainable water future.

The Western Australian Government has long been involved in water conservation initiatives and this involvement has helped create a solid foundation on which new policies can be built. Initiatives include the Domestic Water Use Study; Perth's Water Future Strategy and the Kalgoorlie Boulder Water Efficiency Program, one of the first large-scale water efficiency retrofit programs in Australia.

The State was also the first in Australia to limit the daytime use of sprinkler systems.

As our water use increases, more areas will approach full allocation. If water is not being used effficiently, development opportunities will be lost.

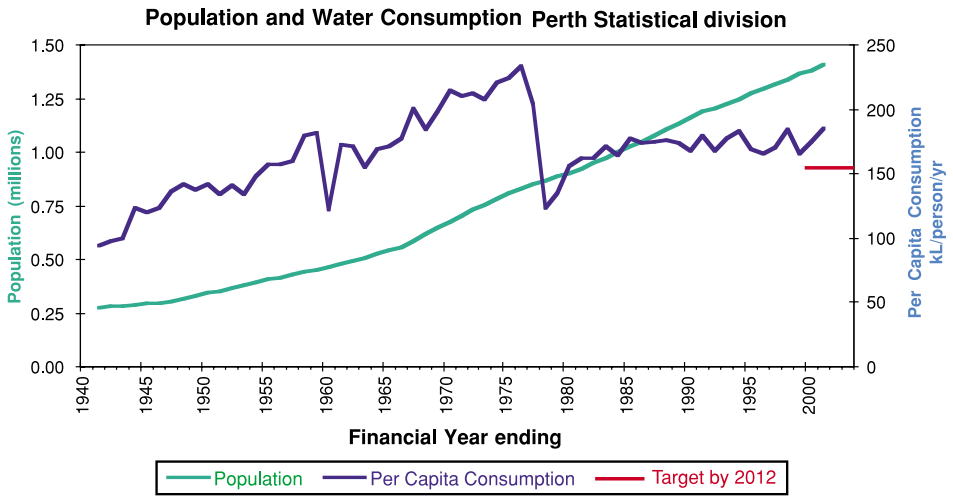
The Government will continue to provide leadership in the implementation of water conservation measures, but recognises that initiatives will only succeed with the cooperation of the community.

In July 2002 a Draft State Water Conservation Strategy was released for public comment. Submissions received during the public comment period provided an excellent insight into the water conservation expectations of the community and that feedback has been recognised in the State Water Strategy.

The inclusion of key elements of the Draft State Water Conservation Strategy into this strategy ensures a coordinated approach to the management of water related issues. Importantly, water supply initiatives and water conservation activities are now found in a single strategy document.

4.1 Conserving our scheme water supplies

The Government has set a target of reducing per capita water use from the current unrestricted level of 180 kilolitres a person per year to 155 kilolitres a person per year by 2012. This target applies to residential customers served through the Integrated Water Supply Scheme connecting Perth, Mandurah, and the Goldfields and Agricultural areas. This target figure comes from a recommendation in the Western Australian State Sustainability Strategy.



• *Figure 7: Per capita water demand for the Integrated Water Supply System.*

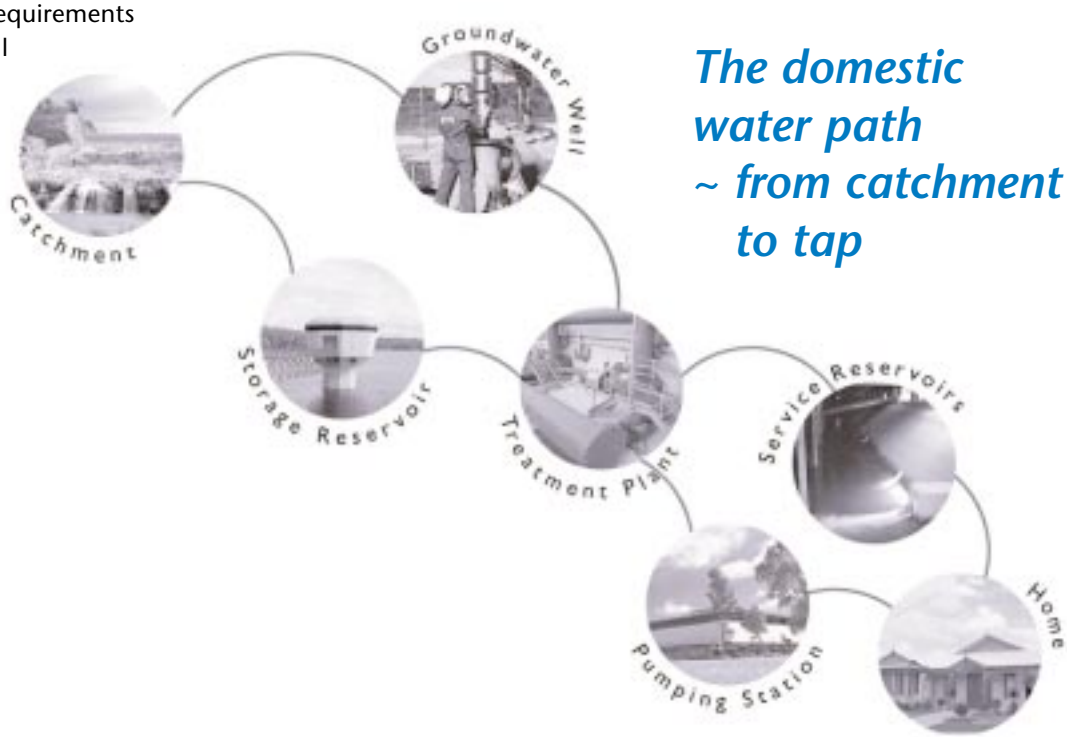
Figure 7 (previous page) shows the per capita consumption trend for the Integrated supply system since 1940. A stand out feature of the graph is the substantial drop in scheme water consumption in the late 1970's in response to strict watering restrictions that were necessary at the time. Many people installed garden bores establishing a permanent shift from scheme water use to an under-utilised groundwater resource for use on gardens.

While the target for the Perth integrated water supply system is formally established in the State Water Strategy it is equally important that all water supply schemes across Western Australia have their own water reduction targets. These targets will reflect local conditions and requirements for water and will help foster improvements in water use efficiency throughout the State.

Response

- **Achieve a consumption level of 155 kL / person / year for consumers served by the Integrated Water Supply System by 2012.**
- **By 2004 all water service providers will establish appropriate targets (comparable to the target on the Integrated system) for all schemes under their control. These targets will be included as a condition of their water allocation licence.**
- **Review all targets no later than 2007 and determine whether or not they should be varied to deliver a lower per capita outcome.**
- **Utilise the Integrated Resource Planning Process* to ensure that all water source development includes consideration of, and appropriate investment in, conservation measures.**

* See Section Six for details



The domestic water path ~ from catchment to tap

4.2 Household water use

In house appliances and fixtures

Everyone purchasing new water consuming products will be encouraged to look for the water efficiency ('A' ratings) applied by Standards Australia. The more 'A's a product has the greater the level of water efficiency and therefore the more water that is saved. Improving the water efficiency of products installed in new and existing homes throughout Western Australia will make an important contribution to our water conservation efforts.

Washing machines account for more than one quarter of in-house water use. Recently, manufacturers have focused on improving the water (and energy) efficiency of their machines. Research has shown that water consumption could be reduced by an average of 40 per cent per wash. The focus within Western Australia is to encourage the use of **AAAA** rated (or better) washing machines.

All new toilets in Western Australia are required to be a water efficient dual flush design. This requirement has helped to significantly reduce the amount of water flushed down the toilet each year. Since 1982, average water use in toilets use has dropped by more than 35 per cent as a result of the mandatory requirement to use dual flush toilets in all new installations and renovations.

Water efficient appliances will make a difference to overall water use. However, it is important that personal water use habits are challenged also as small changes can make a significant difference. Simple examples of this approach are to take shorter showers or only using the washing machine or dishwasher with a full load.

Garden water use

Each year 50 per cent of water supplies to Perth households is used on the garden. Similar figures apply to other schemes across Western Australia. In summer, garden usage climbs to more than 70 per cent of total household water use. Clearly, changes in gardening practices presents the best opportunity for a reduction in household water consumption.

Most of our garden practices are still based on northern European style gardens which are not suited to Western Australian conditions because they demand heavy watering. Western Australia has been slow to embrace new forms of irrigation, plants that are more suited to our climate, and water saving practices such as mulching and the use of soil conditioners and soil wetting agents. However, there is now evidence that our water use behaviour is changing.

In recent years the popularity of local plants and native gardens has grown. Many new housing developments now boast native garden designs and the use of local plants such as Kangaroo Paws, Grass Trees and Eucalypts that are both water efficient and visually attractive. Garden centres now stock a wide variety of local plants, with advice on an appropriate watering regime.

Low water use garden designs will be encouraged throughout Western Australia. New gardens should be properly planned, taking into account the use of windbreaks and shelters to reduce evaporation, paved areas, ground covers and alternatives to lawn. Selection of low water use plants and preparation of watering zones will also be encouraged. Low water use turf should be used if lawn is required, and reticulation systems should be properly designed and operated.

The objective will be to ensure that water is applied as efficiently as possible in gardens – whether from scheme supply or private bores. The correct design, installation and operation of irrigation systems are all critical elements in ensuring efficient water use.

Garden bores

The use of garden bores help maintain a green and healthy garden while helping to conserve scheme water.

Much of Western Australia – particularly the Swan Coastal Plain – has relatively shallow and reliable groundwater that is recharged by rainfall falling in the local area. In urban areas with less vegetation and more hard surfaces areas (roads, pavement, roofs etc) than the natural environment, the amount of water available for recharge into the aquifers is greater. By diverting roof run-off and drainage water back into groundwater,via soak wells and drainage basins, it is possible to 'artificially' increase the amount of water that is returned back into the groundwater system.

Essentially, in these cases the shallow groundwater aquifers act as a large rainwater tank collecting and storing water that is then available for re-use with garden bores.

In areas where groundwater supplies are plentiful, garden bores offer a number of advantages including:

- Reducing the demand on the potable public scheme water supply systems.
- Utilising untreated water to irrigate household gardens, instead of high quality treated scheme water.
- Counteracting the water level rises following urbanisation, thereby limiting consequential environmental impacts.
- Reducing drainage requirements.

There are approximately 130,000 garden bores in Perth alone. Using groundwater to water gardens in places where it is sustainable is a sensible alternative to scheme water, however, garden bore users must be responsible in their use of water and follow Waterwise gardening principles. They have therefore had to comply with daytime watering bans since 2002.

The implementation of the 9am to 6pm watering restriction for garden bores reduces water use when evaporation is highest and serves as a reminder of the need to use our water wisely. The existing by-laws make provision for a $100 infringement penalty for individuals observed watering outside the restricted hours.

Rainwater tanks

Rainwater tanks (in a suburban context) can supplement other household water supplies. It is however vital that the tank is correctly installed and maintained to minimise risks to public health. This includes, installing a first flush device, keeping the roof and gutters clean, minimising entry of light and removing tank sludge every two to three years. Additionally, it is important to ensure that mosquitoes can not enter the tank, as mosquitoes are not only a nuisance but can also carry and spread disease.

Not all of the rainfall that falls on a household roof is available for use. The effectiveness of a tank depends on its size, maintenance, location and the uses of the water. For example, a rainwater tank used to replace scheme water for toilet and laundry requirements will be far more effective than a tank used only to supply garden requirements in summer. It is unlikely that a suburban rainwater tank would be able to supply a household's total water needs and in the majority of situations, would make only a part contribution to a household's annual water needs.

4.3 Waterwise rebate program

Western Australia has reached a critical point in its development. The water shortage we have experienced in recent times has shown us that we must rethink the way we use our most precious resource.

This does not mean we have to allow our lifestyle to be compromised, but one of the key lessons learned from the current restrictions is that we can all use less water and still retain the public amenity we desire.

A clear signal from the Water Symposium was that Government should take the lead in encouraging the adoption of water efficient applications and practices.

Response

- **The Government will establish a $7 million financial incentive package to encourage uptake of water efficiency measures. The package will provide direct financial incentives as follows:**
  - **Garden bores – $300 will be available for all households who connect to a new garden bore installation that is a substitute for scheme water. Cumulative rebates are available for shared bores.**
  - **Rainwater tanks – Householders on scheme water who purchase a new rainwater tank will be provided with a financial incentive based on the size of the tank. The maximum offered will be $150. An additional rebate of $150 will be offered to those households that connect the tank for toilet and/or washing machine use.**
  - **Water efficient shower heads – Householders who purchase and install an AAA rated shower head will be entitled to receive a $10 rebate.**
  - **Washing machines – Purchases of AAAA rated (or better) washing machines will attract a rebate of $150.**
- **This incentive package will run for a period of twelve months or until the funds have been expended. It will then be reviewed and a decision made on any future rebate scheme. Conditions do apply, so consumers will need to confirm eligibility before purchase.**

- The Government is committed to continuation of the daytime sprinkler restrictions for all garden bores and will further develop by-laws to assist in the management of garden bores.
- The Government will not license or meter domestic garden bores. However, it will continue to account for the volume of water used by domestic bores when making allocation decisions.
- The Water and Rivers Commission has organised a 'complaint specific' telephone line for community complaints about misuse of groundwater bores across the State. The number is 6250 8001.
- Establish a partnership with the building industry to facilitate the implementation of regulation of water efficient appliances in new buildings and renovations. In the first instance timeframes and an implementation program for washing machines and shower heads will be developed.
- The Government, through the responsible Minister, will discuss with ministerial counterparts in other states measures required to accelerate the development of national standards and codes relating to water efficiency (including rating and labelling of water efficient appliances).
- Investigate and implement a uniform building approval process for the installation of rainwater tanks across all Local Governments throughout Western Australia.

4.4 The price of scheme water supplies

Consumption (kl)	Metro	Class 1	Class 2	Class 3	Class 4	Class 5
0-150	40.3	40.3	40.3	40.3	40.3	40.3
150-350	65.2	65.2	65.2	65.2	65.2	65.2
350 - 450	88.1	80.6	83.0	83.0	83.0	83.0
450 - 550	88.1	80.6	107.2	117.7	128.6	132.1
550 - 750	100.7	91.7	121.2	139.6	154.4	169.0
750 - 1150	107.1	147.7	200.2	223.2	254.0	284.8
1150 - 1550	119.3	212.3	292.5	338.5	461.9	569.4
1550 - 1950	119.3	244.6	361.8	446.5	554.2	662.0
over 1950 kL	147.2	284.3	461.9	538.8	646.4	738.8

Water Corporation volumetric charges for 2002/03.
Classifications reflect the higher costs of supply in some locations.

The price of water should reflect the fact that water in Western Australia is a precious resource. The Government wants to encourage efficient water use and penalise water wastage, while ensuring that pensioners, large families and low income earners are generally protected from price increases.

There are two basic components to current water charges:

- A fixed service charge.
- A variable consumption charge.

The purpose of the fixed service charge is to recover the fixed costs of water supply provision. The fixed costs associated with the provision of water services are high (generally around 70% of total costs) and relate to the provision of infrastructure such as pipes, dams, pump stations and borefields. The variable charge is based on how much water is consumed and the costs associated with providing water to a given location.

Domestic consumers

In Western Australia the consumption element is split into a series of consumption brackets (tapers). As a consumer uses more water, the amount paid for each additional kilolitre (kL) of water increases. For example, currently consumers serviced by the Water Corporation pay 40.3 cents for each of the first 150kL of water and then 65.2 cents/kL for the next 200 kL of water, increasing to $7.3kL for consumption in excess of 1950 kilolitres in some high cost schemes. This approach extends throughout the State, however the maximum price paid for high consumption is based on the cost of providing water service to the specific town in question.

This tapered system helps to send a clear conservation message to people who consume large quantities of water. The more water used, the greater the payment for each kilolitre of water consumed.

Another important feature of the existing tariff structure is the provision of water at an inexpensive rate for basic needs. In Western Australia this 'water for life' component relates to the first 150kL of consumption that is charged at 40.3 cents/kL. In addition to the provision of 'water for life', all towns throughout Western Australia share a uniform charge up to 350 kL of consumption. This (350kL) is more than the average Perth household uses each year.

Prices for business

For industrial and commercial consumers the fixed charge is based on the size of the water

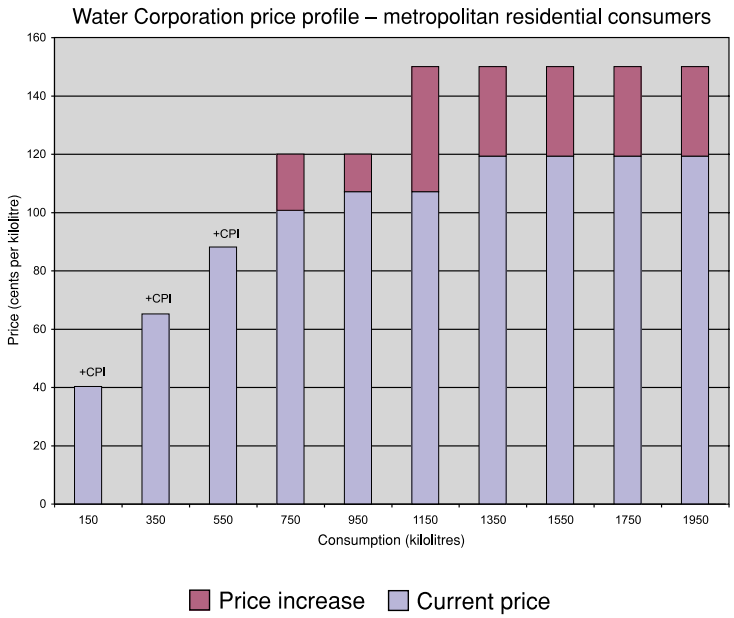
service provided and relates to the flow capacity of the service. By comparison to residential customers, who currently pay a service charge of $144.20 for a standard 20mm service, business customers pay $427.30.

Industrial and commercial users pay a price for their water service that reflects the costs associated with the provision of that service. This ensures that under no circumstances are business customers subsidised by domestic consumers.

Consumption charges vary according to the amount of water used and reflect the cost of increasing the capacity of the supply system. This pricing system provides an appropriate signal to business and represents the true cost associated with provision of water services. Therefore, the pricing structure does not restrict development through artificially increased charges or subsidise the activities of industrial and commercial enterprises.

In country areas, large industrial or mining customers who use more than 50kL per day enter into special agreements with the water service provider.

These agreements include site-specific prices based on cost of service provision to that site.



Response

- **The Government will substantially increase the price paid by Water Corporation domestic customers who consume more than 550kL in excess of general price movements to encourage the adoption of waterwise practices. For metropolitan consumers the price for water consumed between 550-950kL will increase by up to 20 per cent to $1.20 per kilolitre. For water consumed above 950kL the price will increase to $1.50 per kilolitre.**
- **In recognition of the impact on pensioners, large families and low income earners, the Government will limit increases in the price of water for Water Corporation domestic customers consuming less than 550kL to movements in the Consumer Price Index.**

4.5 Water conservation in business

Programs focusing on water efficiency in the commercial and industrial sectors are not well established in Western Australia, or Australia in general. However, a number of international experiences have shown that for scheme-based supplies, the lowest cost opportunities for water efficiency often exist within these sectors.

Industry could also be an important user of reclaimed water. For example, the proposed construction of the Kwinana Water Recycling Plant to supply highly treated wastewater to industry is one example of how industry can work towards reducing demands for high quality scheme or groundwater supplies.

The water allocation process can also be utilised as a tool to encourage improved water use efficiency. A simple step, such as requiring all licensed water users to establish and implement a water conservation plan prior to issuing a licence, could be used to ensure that licensed users of water undertake appropriate conservation measures.

Response

- **Establish a mechanism to assist industry to identify and implement opportunities for water saving by June 2003.**
- **A Water Conservation Plan will be required before a water allocation licence is issued or renewed. The plan will outline water efficiency objectives and timeframes. Licence conditions will require implementation of the plan to an agreed schedule.**

4.6 Dryland agriculture

Significant parts of Western Australia's dryland area are not connected to a scheme water supply, relying instead on small dams and groundwater. The result is that many primary producers remain exposed to the vagaries of climate variability, evaporation losses and climate change as the endless cycle of water collection in winter and increased use in summer fails to deliver sufficient water. Another factor adding to this problem is that already limited groundwater resources in some areas are becoming increasingly saline, threatening the sustainability of many rural water resources.

A Rural Water Plan was established in 1994 to tackle water deficiency, improve drought security and deliver increased water supplies to farmland areas and rural towns. The Plan, based on several initiatives, has served the State well by focusing attention on the issues associated with rural water supplies. However, many opportunities remain to further protect the interests of rural communities and primary industry against the risks of water shortages and water quality problems from encroaching salinity.

Western Australia has a serious salinity problem that brings with it a significantly degraded environment. It is one of the most serious issues facing the State, requiring a multi faceted approach and a whole-of-community effort to make the most of management solutions. Regional management strategies need to be developed as a matter of urgency, incorporating elements of improved water use efficiencies, locally sourced water supplies and salinity control objectives.

This approach may include programs to remove saline water as well as structures to capture, transfer and better use supplies.

The Salinity Action Plan brings together key Government Agencies as part of a 'whole of community' effort to tackle salinity. The Government will continue to fund the Plan.

The Government provided an additional $1.5 million to the Farm Water Grants Scheme as part of its response to the 2001 and 2002 drought. A special grant round was opened, with applications closing in December 2002, targeting areas suffering most from the drought.

Response

- **The Government will approve a revised Rural Water Plan by June 2003. This includes the additional $1.5 million made available through the Farm Water Grants Scheme as part of the Government's $6.8 million drought assistance package that was approved in November 2002.**

  Further opportunities to enhance the self-sufficiency of rural water supplies will also be considered.

- **Increased technical expertise will be provided to enhance the prospects of increasing rural water supplies and contribute to improved land management practices.**

4.7 Irrigated agriculture

The irrigated agriculture sector is a significant water consumer with the four main irrigation schemes – the Ord, Harvey, Preston Valley and Gascoyne – currently accounting for about 50 per cent of all water used for irrigated agriculture. The rest comes from private, on-farm licensed abstraction of groundwater and surface water resources.

The four main schemes, along with a number of smaller schemes, form an important part of the State's economy, contributing more than $500 million annually.

In total the irrigation sector – home, agriculture, parks and recreation – is the single largest water use group in the State (see section 2.4)

Demand for irrigation water is expected to increase more rapidly than in any other sector making it essential that there are further water efficiency improvements in the industry. Many systems are based on open channel distribution networks with substantial water losses through leakage and evaporation.

Significant efforts have been undertaken to improve the water delivery system in the past five years but a number of opportunities remain.

Flood irrigation is an inefficient method of water application and more efficient application methods, such as spray irrigation or drippers, provide a significant opportunity to improve water use efficiency within the industry.

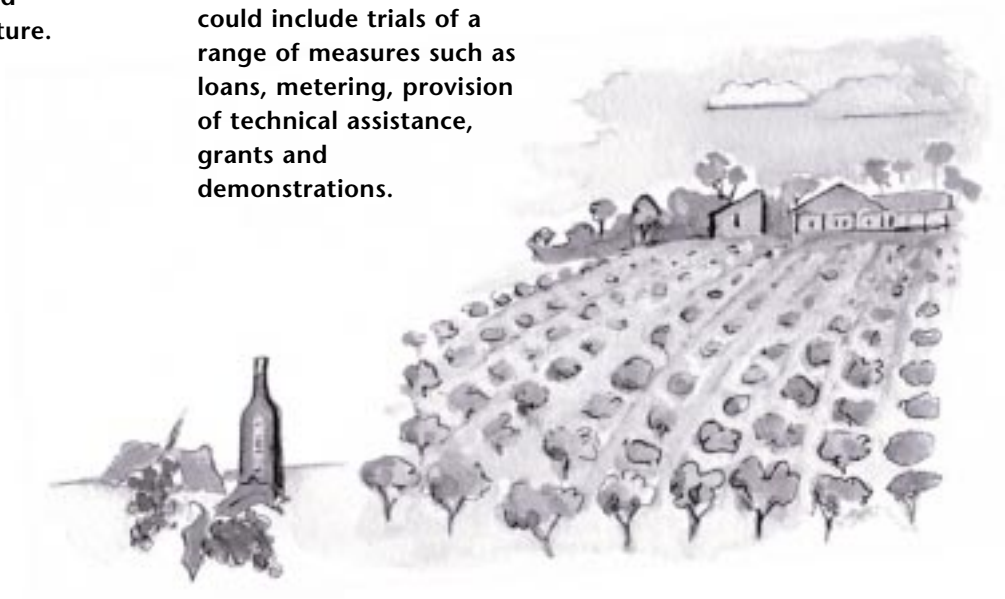
Importantly, improvements in water use efficiency in the irrigation industry can be achieved with no loss in production (higher yields) and reduced environmental impacts.

The irrigation industry is an important Western Australian industry but, as a high water consumer, its prosperous future depends on the widespread adoption of sustainable practices.

The Waterwise on the Farm program in NSW assists irrigators to identify and adopt methods to improve water use efficiency on their farm. NSW Agriculture runs an irrigation education and training program through its Murrumbidgee and Tocal Agricultural Colleges. The program focuses on the delivery of short courses, seminars and field days for farmers and is supplemented by home study material. The Scheme is managed by NSW Agriculture and the Rural Assistance Authority and provides financial incentives to individual irrigators to adopt and monitor best irrigation management practices (DLWC 2000).

Response

- Implement a whole of Government review of irrigation activities throughout the State. The review will focus on large irrigation districts and will consider the many issues currently facing the management of water supplies in those regions. The review will be completed by an independent taskforce and will identify opportunities for efficiency gains, costs associated with improving efficiency, pricing mechanisms, possible trade offs and the identification and establishment of sustainable forms and locations for irrigated agriculture in the future.
- Develop an education package drawing on the experiences of the NSW Waterwise on the Farm initiative (see panel, previous page). This will provide technical assistance and support to farmers in the testing and adoption of water efficient agricultural practices.
- Establish a water use efficiency pilot program focusing on distribution system and water application efficiency in an area with stressed water resources and environmental limitations. An example is the Gnangara Mound north of Perth. This program could include trials of a range of measures such as loans, metering, provision of technical assistance, grants and demonstrations.
- Investigate treated wastewater reuse schemes for irrigated agriculture to promote 'fit for purpose' use of water resources.
- Agree and establish targets for improvements in water use efficiency and set timeframes for implementation. These targets will be established using industry performance and benchmark analysis to encourage further improvements in water use efficiency.



4.8 Mining

The mining industry is also one of Western Australia's largest water users with water use playing an important role in dewatering, processing, dust suppression and construction activities. The biggest concentration of mines is in the Goldfields where most companies use saline or hypersaline groundwater that is not suitable to be used for other purposes. The other major mining region is the State's North West.

Competition for access to the available resources between companies is low overall, but is intense in specific areas. The Government will work with the industry and individual companies to ensure that competition for water does not restrict future development opportunities.

The Government also believes that, because of the large volumes of water used by the industry, it is critical that the water is used as efficiently as possible. This position will be reached only through industry cooperation.

Response

- **A Water Conservation Plan will be required before a water allocation licence is issued or renewed. The plan will outline water efficiency objectives and timeframes. Licence conditions will require implementation of the plan to an agreed schedule.**

4.9 Government

The Government wants to ensure that it is leading by example in the area of water conservation.

Government agencies can make significant water savings in two major areas:

- In the parks, grounds and gardens they own or are responsible for.
- In the buildings and properties they own or are responsible for.

Some Government agencies are already incorporating water efficiency into their operations. For example, the Department of Education imposed a voluntary daytime sprinkler ban on schools for the summer of 2001 and recently announced plans for upgrading watering systems at 44 schools throughout the State.

Response

- **The Premier will write to all Government agencies reminding them of their obligation to adhere to daytime sprinkler restrictions.**
- **Agencies will be encouraged to undertake water efficiency audits of their buildings and properties.**
- **The Government will promote water efficiency in its new land subdivisions as part of its commitment to sustainability.**

4.10 Local Government

Local Government is a significant water user, particularly for watering public open space. In Perth, local government uses around 50 gigalitres of groundwater each year. In regional centres councils are the most important users of treated wastewater, with numerous schemes designed to irrigate parks and ovals. In these locations the use of treated wastewater plays a major role in ensuring that access to high quality recreational and sporting areas is possible.

Many local governments have reduced the amount of water used to irrigate parks and ovals, but there is still an opportunity to further reduce the amount of water used to maintain public open space by upgrading infrastructure to avoid daytime watering and to ensure more appropriate design of water use areas.

Local government plays a significant role in influencing the amount and quality of water within the total water cycle. Through involvement with urban drainage, councils help to manage localised groundwater levels.

Collection of stormwater run off can be harnessed in a way that makes it possible to redirect the water into the groundwater system, essentially making it available for use through garden and council bores.

Response

- **Government will work with local authorities to ensure that by no later than 1 July 2003 watering is limited to the period 6pm to 9am. Where it can be demonstrated that this timeline can not be met because of exceptional circumstances, exemptions can be considered.**
- **A Water Conservation Plan will be required before a water allocation licence is issued or renewed. The plan will outline water efficiency objectives and timeframes. Licence conditions will require implementation of the plan to an agreed schedule.**
- **The State Government will support the establishment of a Local Government Water Campaign, in partnership with WALGA and the International Council for Local Environmental Initiatives (ICLEI). Through this new partnership, the State Government will work with local government to implement a complementary Sustainable Water Management Program, which will assist local government to address local water management issues.**

Treated wastewater plays a major role in ensuring high quality recreational and sporting facilities in many country towns, including Carnarvon in the State's mid west.

Water reuse (reclaimed water)

The Government commits to achieving 20 per cent reuse of treated wastewater by 2012. Significantly increased use of reclaimed water for industry will be required to achieve this target.

5.0 Water reuse (reclaimed water)

The changing climate and recent drought have highlighted the need for the Western Australian community to look closely at how we use and reuse our water resources. In considering all elements of the total water cycle, we must consider the opportunities we have to meet some of our water needs with reclaimed water.

Many countries with similar climates and limited availability of fresh water currently use significant amounts of reclaimed water for growing crops, industrial applications and to even supplement potable supplies.

5.1 Scheme-based reuse

Water reclamation involves recovering treated water from the municipal wastewater system (the sewerage system). It differs from 'greywater recycling' in that it is generally scheme-based, is on a large scale and deals with the total wastewater stream.

Country use of reclaimed water

Regional Western Australia currently reuse about 40 per cent of all municipal wastewater. This is an extremely high level of reuse and compares more than favourably with similar areas elsewhere in Australia. Limited sources of fresh water in country areas and high costs for alternative supplies means that these communities value treated wastewater as an important resource.

Treated wastewater is used for a large range of activities in country areas including:

- Irrigation of parks, gardens, playing fields and other recreational facilities (including golf courses).
- Woodlot irrigation.
- Industrial processing.
- Irrigation water for vineyards.

Treated wastewater irrigating the greens and fairways has in recent years transformed Broome's spectacular golf course.

Perth's biggest wastewater treatment plant, at Woodman Point will be a key facility in the challenge to significantly increase the use of treated wastewater.

Reclaimed water for Perth

The Water Corporation's three major metropolitan wastewater treatment plants treat and return to the marine environment about 100 gigalitres of water each year. This is an important potential water resource and increasingly in the future as much as possible will be used to reduce the use of self supplied groundwater or high quality scheme water.

The total annual demand for water in the Perth metropolitan area is currently almost 600 gigalitres. Half is self supply for irrigation and industrial use and half from scheme supplies.

The 100 gigalitres of water available from the metropolitan treatment plants can be used to provide 'fit for purpose' water to parks, gardens, green space, industry, and irrigated agriculture. Additionally, aquifer recharge to increase water availability within groundwater systems, or to maintain environmental values, is a possibility. Aquifer recharge is internationally proven and pilot studies using potable water undertaken on the Jandakot Groundwater Mound are providing a better picture of how this technique could be more broadly applied in Western Australia.

Treated wastewater has a higher level of nutrients (nitrogen and phosphorous) than most other water sources. This helps plant growth but must be carefully managed to ensure there is no nutrient enrichment of rivers, estuaries or groundwater resources. In many cases, however, it is possible to include the sustainable application of nutrients through the use of reclaimed water as an offset for the use of chemical and other fertilisers.

Reclaimed water for industry

There is a major opportunity in industrial processes involving activities such as mineral processing or chemical manufacturing to use significant quantities of reclaimed water. Kemerton in the south west and Kwinana have been identified as the two main areas where industrial reuse is most likely.

Reclaimed water for parks and gardens

Fifty gigalitres of self-supplied groundwater is used each year for the irrigation of metropolitan Perth's public parks and gardens. This presents an important opportunity for the beneficial use of reclaimed water because, while it may not reduce the overall demand for scheme water, it will reduce the demand on groundwater resources.

Reclaimed water for horticulture

Horticulture is an important water use sector within the Perth area, consuming about 100 gigalitres of water each year. While the use of reclaimed water in this industry has not been used widely in Western Australia, similar options have been very successfully implemented in Israel, Southern California and South Australia.

Reclaimed water for indirect use

This possibility holds significant promise for water reclamation on a large scale within industry, parks, horticulture or potable water supplies. The approach could be similar to an aquifer recharge scheme that has operated successfully in Orange County (in greater Los Angeles) California since the 1950s.

This scheme uses highly treated wastewater to recharge the aquifer system used for potable water supplies.

An opportunity to undertake some Research and Development (R & D) work using reclaimed water from the Kwinana Water Recycling Plant injected into the Jandakot groundwater mound is currently being investigated by the Water Corporation. This R&D is needed to determine and identify technical, chemical, environmental and regulatory issues with aquifer recharge before any major application on the Swan Coastal Plain can be considered.

All of Albany's wastewater is used to irrigate a major tree farm a few kilometres outside the city.

Response

- The Government commits to achieving 20 per cent reuse of treated wastewater by 2012. In view of environmental, economic and public health considerations the priority of Government for the reuse of wastewater will be large-scale, scheme-based reuse options rather than reuse at the household level.
- Establish the Kwinana Water Recycling Plant by 2004 to provide reclaimed water to industrial users in the Kwinana area, reducing the demands on scheme water supplies.
- Establish a steering committee comprising representatives from Department of Health, Water and Rivers Commission, Department of Environmental Protection, Department of Agriculture, Local Government, Department for Planning and Infrastructure, tertiary institutions, industry and the Water Corporation to agree and endorse strategies for reuse of wastewater.
- Commission a trial project at McGillivray Oval in the City of Nedlands to demonstrate the effective use of reclaimed water for the irrigation of community parks and ovals.
- Develop and implement an effective communication / marketing strategy that identifies and addresses community concerns associated with water recycling.
- Undertake a range of technical investigations and collate and present the findings on demonstrations currently taking place throughout Western Australia.
- Using information gathered from demonstration projects and technical investigations, prepare a final strategy by December 2003 which outlines how Government will achieve 20 per cent reuse of treated wastewater by 2012.

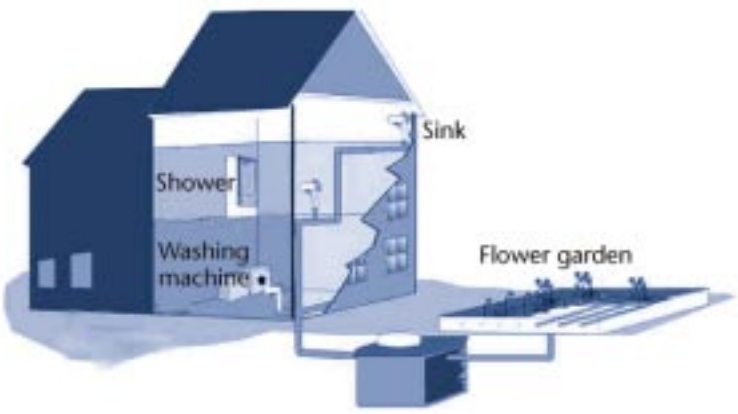
The biggest water recycling plant in Australia will be built at Kwinana by late 2004 to provide reclaimed water to several industrial users.

5.2 Greywater

Greywater is wastewater that comes from the kitchen, bathroom and laundry, but does not include toilet wastes. It involves collecting and reusing this water for garden irrigation, reducing the demand for scheme water. Importantly, because greywater takes place at a household level, it provides an opportunity for individuals to become involved in reusing water.

In Western Australia, householders are permitted to utilise greywater by 'bucketing' or through the installation of an approved greywater treatment and reuse system. However, greywater systems are not permitted if they compromise public health or the environment.

The guidelines governing greywater reuse have now been reviewed to make greywater reuse more readily achievable for householders. The Department of Health can provide more information on how to successfully implement home greywater reuse.



In Western Australia, householders are permitted to utilise greywater by 'bucketing' or through the installation of an approved greywater treatment and reuse system.

Response

- **Establish regulated areas in which greywater reuse systems are permitted and make this information freely available to the public.**
- **The Government through the Premier's Water Foundation*, will encourage industry, local government and institutions to research and develop domestic scale greywater reuse systems that are economically attractive without compromising health and/or environmental outcomes.**

* See Section Seven for details

New supplies and total water cycle management

Water service providers develop programs for new water source development that ensure the provision of reliable supplies to meet demand for water across Western Australia.

6.0 New supplies and total water cycle management

Integrated resource planning recognises that customers do not necessarily want more water. Instead, they want the services water provides, such as safe drinking water, showers, clean clothes and attractive landscapes.

Integrated Resource Planning ensures that options that reduce demand on valuable water supplies are compared on an equal basis with options that increase supply. This is achieved by viewing water saved through water conservation as a resource, in exactly the same way water stored in a dam is regarded as a resource. Comparisons include the total costs and benefits to water service providers and the community, ensuring that the water planning options implemented are those with the lowest cost to the community.

Integrated Resource Planning will continue to be used more extensively in the allocation, licensing and development of water supplies for all water use sectors in Western Australia.

6.1 Planning and developing new scheme water supplies

Planning approach

Water service providers develop programs for new water source development that ensure the provision of reliable supplies to meet demand for water across Western Australia. The programs are regularly reviewed in response to local requirements.

The occasional use of restrictions is usually included in the planning assessment. However, the inclusion of a restriction category that requires a total sprinkler ban is now acknowledged as undesirable. Source capacity will be developed to ensure that the likelihood of a total sprinkler ban is very small.

Community involvement and public participation will continue to be an integral part of Western Australia's water source planning.

Increased community awareness and demand for participation was again demonstrated through support for the 2002 Water Forums and Water Symposium activities. It is clear that while the community supports the efficient use of water resources, it is also essential that adequate supply capacity be developed to sustain the State's economic and social requirements.

New water sources need to be developed within an environmentally acceptable framework. However, the key challenge currently facing water planners is the ongoing impact of changing climatic conditions that potentially can change the water available from many source options. Western Australia will continue to support research into climate change and adjust management processes as required to better prepare for climatic change.

6.0 New supplies and total water cycle management – *continued*

The Integrated Water Supply Scheme

The need for future water supply sources will largely depend on the attitudes and behaviours of the groups that drive the demand for scheme water. A successful reduction in per capita consumption in the Integrated Water Supply Scheme to the now established target of 155 kL per year, and a return to rainfall pattern similar to the last 28 years would defer the need for additional new water sources until 2016. However, a return to pre-restriction demands or continued extremely low rainfall in 2003 may trigger the need for a new major water source to be available by the end of 2005.

It is now essential that Western Australia position itself to be able to quickly respond to a range of future scenarios.

In Perth and the south west of Western Australia significant investments have already been made in response to observed rainfall reductions. The Government has invested $523 million to boost capacity of the Integrated Water Supply by more than 70% since 1995. This accelerated source development program was completed in 2002 with the opening of the Stirling Harvey project.

Response to the 2001/02 water supply situation

The water shortage of 2001/02 prompted further investment in new water sources as well as the use of a two-day a week sprinkler regime to help conserve water. Outstanding community support for the use of restrictions helped to deliver a 45GL water saving during 2001/2002.

Additionally, immediately following the completion of the Stirling Harvey project, the Government began detailed planning for new water sources that could deliver significant quantities within a short time frame. Investigations and new sources developed include:

- Development of **three new bores** into the deep **Yarragadee aquifer** which have provided an **additional 15 gigalitres** of water annually for the Integrated Water Supply System. Work began in April 2002 and all three bores under the Perth northern suburbs of Gwelup, Carine and Scarborough were operational early in 2003.
- Also in 2002 an **additional nine bores** were developed in the Perth suburb of Mirrabooka providing an **additional six gigalitres** of water.

- The undertaking of a comprehensive **feasibility study** for a **seawater desalination plant** at Kwinana. It was determined that a major desalination plant could be commissioned in two years from the time a decision was made that such a contingency was needed.

However, the Integrated Water Supply System will require careful monitoring well into the future and the drought recovery period is likely to stretch over a number of years. This recovery will be boosted through the development in 2003 of two further surface water projects in the more rainfall productive South West. These projects are:

- A dam on **Samson Brook**, outside Waroona that will provide **up to 13 gigalitres** a year for the Integrated System.
- A dam on **Wokalup Creek**, near Harvey that will provide **up to 10 gigalitres** a year.

Both dams will begin filling with water in the 2003 winter.

The total amount of water from all new sources commissioned, or to be commissioned since the start of 2001 is **44 gigalitres annually**.

The acceleration of the Water Source Development Program has meant that in the current drought we have been able to avoid total sprinkler bans. A robust source development program out to 2031 and the proven contingency option of seawater desalination will ensure that there is no shortage of water for the future. The challenges involve timing, environmental, economic and social issues.

Future water source options

The current drought and the response to it underlines the fact that planning for future water sources must take into account a worse case scenario.

Source development planning has identified a range of new water sources that may provide water to the Integrated Water Supply Scheme. These include:

- **Eglinton groundwater**
  up to 17 gigalitres.
- **Gingin groundwater**
  up to 40 gigalitres.
- **Wellington Dam**
  15 gigalitres.
- **South West Yarragadee**
  45 gigalitres.
- **Seawater desalination**
  30 gigalitres in the short term.
- **Additional runoff to existing dams from enhanced surface water catchment management activities**
  up to 40 gigalitres over 10 years.
- **Brunswick River**
  up to 30 gigalitres.
- **Yanchep groundwater**
  up to 11 gigalitres.
- **Karnup/Dandalup g'water**
  up to 22 gigalitres.
- **Water trading**
  most likely with irrigators in the South West.
- **Groundwater from the Gnangara Mound in conjunction with land use changes and opportunities from using reclaimed water for indirect supply**.

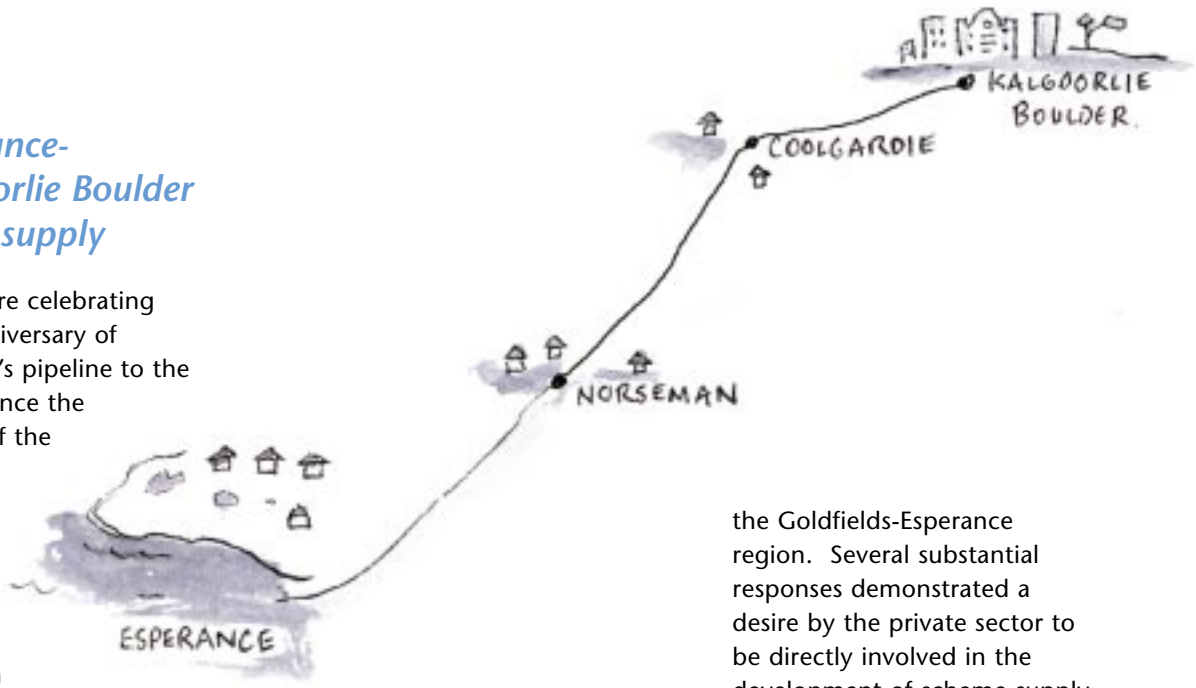
In the Pilbara, expected significant demand growth from industrial development will be supported through desalinated seawater. Local water sources provide a valuable contribution to this area and investigation and monitoring of conventional surface and groundwater sources will continue.

Other regional localities will rely on local, conventional water sources, piping systems for inter regional transfers or desalination to meet growth in local demands.

Response

- Undertake $6 million investigation activity to support the water allocation process that will permit decisions in relation to the south west Yarragadee project to be made in October 2003. It is planned to undertake development of this resource for the benefit of communities in the South West and those served by the Integrated Water Supply Scheme.
- The development of a desalination facility for the Integrated Water Supply Scheme providing water to Perth will not take place at this time. However, it is recognised that desalination can be an important part of future water source development throughout Western Australia when and where it is appropriate.
- Undertake timely allocation planning for future water sources to ensure regional growth is not compromised.
- Support development of improved catchment management activities and undertake a research trial to investigate the impact of active catchment management strategies that enhance water quality and quantity outcomes.
- Develop and implement a sustainable management framework for land and water use of the Gnangara Mound. This will be an important step in the utilisation of sustainability assessment within Western Australia and will ensure that the Government's leadership in this area continues.
- Review the current planning approach to consider existing levels of service and the impacts associated with higher levels of supply reliability, but recognise that it is not possible to drought proof communities. The applicability and community acceptance of the use of watering restrictions to manage consumption during periods of water supply scarcity will be a key consideration.
- Develop a water supply scheme to meet requirements of new gas processing industries on the Burrup Peninsula in the Pilbara region. The provision of seawater for cooling purposes and high quality desalinated water for potable and processing requirements will be available from late 2004.

6.2 Esperance-Kalgoorlie Boulder water supply



This year we are celebrating the 100th Anniversary of C.Y. O'Connor's pipeline to the Goldfields. Since the construction of the pipeline, the need to supplement water supplies of the region has been raised on numerous occasions. Concerns include the future availability of groundwater for use in the mining industry; the price of domestic water and restrictions on domestic usage in recent years.

Mining companies use potable water in end-stage processing, but most of the industry's water requirements are met from hypersaline paleochannels. This water is up to six times saltier than seawater and requires chemical, other treatments and careful process design to enable it to be used.

There has been considerable investigation to gain a better understanding of the reliable yield from paleochannels in the Goldfields. This work has established that paleochannels recharge more rapidly and that current and expected future use for this water is well within the sustainable limits. The draft strategy concluded that there is sufficient paleochannel groundwater in the region to sustain predicted mining industry demands for at least 40 years.

Another major study established that the existing Goldfields and Agricultural Water Scheme has sufficient capacity to meet the potable water requirements of the area until 2010. The Water Corporation is currently undertaking planning for the future augmentation of the scheme to ensure that demand for potable water continues to be satisfied.

In early 2001 the State Government called for Expressions of Interest to assist with the provision of a sustainable water supply for the Goldfields-Esperance region. Several substantial responses demonstrated a desire by the private sector to be directly involved in the development of scheme supply options. These were subsequently considered in the draft Goldfields Esperance Water Supply Strategy.

The draft strategy assessed five main supply alternatives based on a range of expected demands and a cost evaluation taking note of environmental, social and economic aspects. The five options considered in the strategy were:

- Expansion of the Goldfields & Agricultural Water Supply (G&AWS) pipeline and self supply groundwater.
- Desalinated water pipe from Esperance.
- Seawater pipe from Esperance.
- Brackish water pipe from the Officer Basin.
- Brackish water pipe from the Eucla Basin.

The draft strategy concluded that there is no immediate imperative to begin development of an alternative water supply to the existing Goldfields and Agricultural Water Scheme (G&AWS).

One of the proposals the Government received was to pipe desalinated seawater from Esperance to the Goldfields. The Government is now keen to determine whether this project is feasible and economically viable.

Response

- **The immediate start of planning work on the development of a project to double the water storage capacity in Kalgoorlie-Boulder from 11 days to more than three weeks supply. Construction work will begin on the building of a 400,000 kilolitre capacity storage reservoir in 2004 with completion in late 2005.**
- **The Water Corporation will formally withdraw as a proponent in the Expressions of Interest process.**
- **The Water Corporation and the Office of Water Regulation will enter into discussions with the proponent, United Utilities Limited, to ascertain if a cost-effective solution is possible.**
- **The parties will report to the Premier's Water Taskforce on the feasibility of the project.**

6.3 Total water cycle management and urban design

In Western Australia the capture and reuse of stormwater is practised broadly, particularly in the Perth metropolitan area. In fact, the State's stormwater system is unique in Australia because most homes recharge groundwater directly on their own property through the use of soak wells and community areas, while drainage schemes recharge groundwater through the use of compensation basins. In other states it is common practice to collect stormwater and transport it for disposal off site to waterways and the ocean.

By increasing the recharge of groundwater with stormwater it is possible to utilise groundwater bores to supply water for a wide range of activities. These include watering household gardens as well as public parks and gardens.

Many country communities also capture stormwater runoff and reuse this water for the greening of public open space.

The capture and reuse of stormwater provides the community with an opportunity to become involved with an important basic element of total water cycle management and Water Sensitive Urban Design (WSUD).

However, there is still significant potential to further reduce demand on potable water supplies.

The benefits of practical water sensitive urban design can also extend to significant reductions in groundwater contamination from phosphates and nitrates, and a reduction in the capital costs and maintenance of drainage infrastructure in new developments.

As WSUD becomes more sophisticated, institutional arrangements that have worked well in the past will be challenged by partnerships and relationships that will provide the means of most effectively managing all stormwater as a component of the total water cycle.

New subdivisions provide an excellent opportunity to plan and design neighbourhood systems that harvest water 'on site' for applications that would normally use potable water. In developed areas, WSUD requires greater community support and is often more difficult to implement than in new developments.

On site water harvesting and reuse into new developments presents a major opportunity to significantly reduce current and future demands for water.

Response

- **Department for Planning and Infrastructure will prepare an appropriate Statement of Planning Policy for adoption by Western Australian Planning Commission to incorporate the principles of WSUD (including retention, infiltration and reuse of stormwater at source) in town, district and regional planning schemes.**
- **Industry associations in conjunction with Western Australia Local Government Association (WALGA) will be encouraged to renew building codes to ensure that they facilitate water efficiency.**
- **Establish a series of pilot projects for drainage water reuse at neighbourhood and/or streetscape level.**
- **The regulation and institutional arrangements for drainage will be reviewed to achieve reform, which recognises the harvesting potential and includes management of water reuse and water quality.**
- **Water and Rivers Commission to update the 1998 Manual for Management of Urban Stormwater Quality to more fully incorporate a Total Water Cycle management approach and Water Sensitive Urban Design principles.**

Innovation, Research and Education

The Waterwise Schools Program takes a whole-of-school approach to learning and encourages schools and students to help spread waterwise information through their local communities.

7.0 Innovation, Research and Education

7.1 Research and development

Western Australia must have a strong research and development program to assist in ensuring a viable water future for everyone. Research ensures that we develop new technologies and also develop a better understanding of the implications of climate change, increasing urbanisation and factors influencing our ground and surface water resources. Managing our water resources effectively requires the knowledge and ability to develop and utilise the latest technological innovations, based on an in-depth knowledge of the source water environment.

Additionally, it is essential we develop new practices that enable greater conservation and re-use of our precious water resources. The focus of future research and development activities in Western Australia will be on:

- The current position and changing nature of the ground and surface water resources to ensure these sources remain viable in the long term. It is essential that our climate is well understood because it is vital for long term water planning in Western Australia that the impact of any variability or change is managed properly.

Trials being conducted at University of Western Australia to determine turf types best suited to Western Australia's arid conditions.

- Methods and technologies for conserving water across all water use sectors.
- New approaches and technologies to reuse both treated wastewater and stormwater flows. This work will cover all approaches for the reuse of water, from private use of greywater in an urban environment through to large scale reuse projects in industry, agriculture and recreational areas. Investigations into the suitability of artificial recharge of groundwater will also be undertaken.

Response

- **Establish the Premier's Water Foundation to promote and enhance water related research and development activities within Western Australia. This initiative will begin with a $3 million commitment from the State Government.**
- **A Board of Directors will be responsible for overseeing the selection of research activities and the generation of new funds. The Board will act independently from Government and will be responsible for ensuring the ongoing management of the foundation.**
- **The State will also seek complementary funding from the Commonwealth Government and private industry partners.**

7.2 Education

Public education across the whole spectrum of water supply, use and efficiency is crucial to the success of efforts to reduce water usage. A number of effective programs are in place, including a major information campaign, but more will be required, particularly in support of efforts to reduce per capita consumption.

Waterwise Schools Program

This program is conducted by the Water Corporation in association with the Department of Education. It has proved highly successful in educating primary and secondary level students in the basics of water conservation and a range of other water related topics, including the importance of water to health and the environment.

It takes a whole-of-school approach to learning and encourages schools and students to help spread waterwise information through their local communities. Schools are recognised as being Waterwise after meeting a number of criteria including adopting a school policy and conducting learning activities at all year levels and across all learning areas. By the end of 2002 more than 100 WA schools had achieved this status, while many more were working towards it. Ongoing encouragement is given to schools to join the program, and extensive teaching aids and notes are made available.

Garden bores

Increasing emphasis is being placed on education about the use of garden bores. Information is distributed by a number of sources, including the Water and Rivers Commission, the Water Corporation and the irrigation and drilling industries. The latter provide practical advice on sinking bores, sharing with neighbours and converting existing scheme water reticulation systems.

It is estimated that about 130,000 private bores operate in Perth alone, and the number is increasing, boosted by the current water restrictions. The responsible use of bores is strongly encouraged because they can greatly reduce demand for scheme water by tapping into the shallow aquifer that is readily available in most Perth suburbs.

However, some areas are not suitable for garden bores and the Water and Rivers Commission maintains a Groundwater Atlas providing information about Perth's groundwater resources, their quality and possible contamination areas. The Atlas is an invaluable tool for providing information on groundwater to the community, but further education on the need for efficient use is still required.

Water audits

Efforts are being made to increase the use of water audits to obtain clear pictures of water usage in individual homes, businesses and other places. These audits encourage water use efficiency by encouraging the installation of low water use appliances and plumbing fittings, and through the introduction of water saving practices.

Response

- **Establish broad-based community education campaigns focusing on climate change, sustainability principles, processes and water conservation for both scheme and self suppliers.**
- **Implement a pilot, personalised marketing approach to provide information and advice on water use efficiency in the domestic sector. The objective is to reduce personal water consumption by providing interested householders with specific water efficiency information relating directly to their individual situation. This personalised approach should build on recent experience in the Pilbara region where householders were provided with personalised information on how to improve water use efficiency.**
- **Review the Department of Education curriculum and ensure it incorporates coverage of water and energy conservation in accordance with state sustainability objectives.**
- **Develop an education package drawing on the experiences of the NSW Waterwise on the Farm initiative. This will provide technical assistance and support to farmers in the testing and adoption of water efficient agricultural practices.**

Resource protection and management

The management of our finite water resource is becoming more complex. Decisions will continue to have greater inpact on water users, the environment and the community.

8.0 Resource protection and management

8.1 Understanding our climate

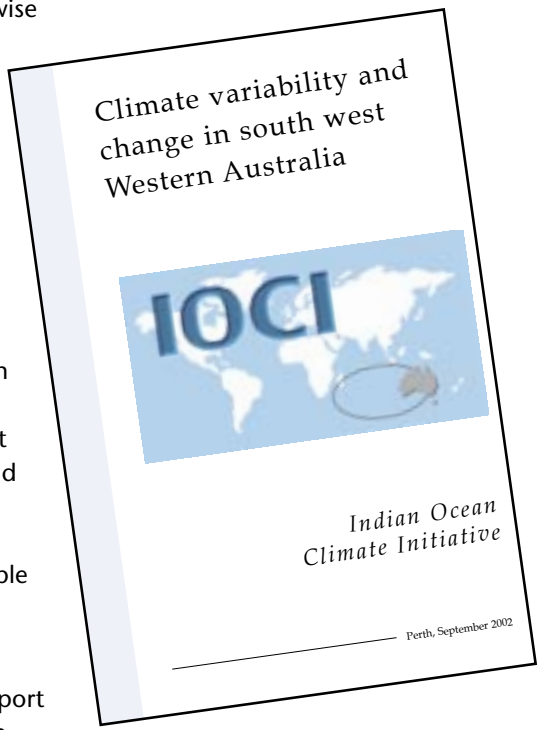
The climate in South West Western Australia is variable and changing. This variability and change can have a significant impact on the availability of water resources within the region.

An understanding of climatic interactions helps ensure that water service providers can confidently develop sources that will supply the required amount of water. An important step in understanding our climate came in November 1997 with the formation of the Indian Ocean Climate Initiative (IOCI). IOCI, a partnership of government agencies, pursues the overlapping research and development interests of several sectors, including the water industry, where the low rainfall sequences of the past 27 years are of significant concern.

Importantly, the IOCI research has enabled the establishment of vital associations with the national and international research activities of CSIRO and Bureau of Meteorology Research Centre (BMRC). These associations have ensured that the best national and international research into climate change can be focused down to a regional level. The information that has been obtained has already brought about improved decision-making that would otherwise not have been possible.

Improved understanding of our climate ensures a more certain water future and improved management of environmental and social outcomes. The achievements of the Indian Ocean Climate Initiative have provided an excellent insight into our climate and the continuation of this work will be vital for the achievement of a sustainable water future.

In September 2002, the Government released a report from the IOCI Panel which drew together five years of study of climate variability in south-western Australia.



www.wrc.wa.gov.au/ioci/Tech_Report_2002_SC.pdf

Response

- **The Government commits to supporting the second phase of the Indian Ocean Climate Initiative.**
- **Information from climate modelling will be used to guide water resource and supply decisions. This will help to ensure a sustainable water future for all Western Australians.**

8.2 Providing water for the environment

An important element of water management and allocation is to balance environmental and community water supply needs. Environmental Water Provisions (EWPs) are water allocations provided to ensure the maintenance of key environmental values. They are established through the water allocation decision making process and help ensure that the water needs of the environment are met.

The Council of Australian Governments (COAG) Agreement (1994) on water reform throughout Australia established a national set of principles providing policy direction on how the specific use of water for the environment should be progressed. In Western Australia, the Water and Rivers Commission is responsible for ensuring water resources are shared equitably. The Commission does this within a framework that balances ecological needs, social expectations and consumer demand. The COAG principles are recognised in the Environmental Water Provisions Policy (2001). This policy provides for the protection of water dependent ecosystems, while allowing for the management of water resources for their sustainable use and development to meet the needs of current and future users.

Response

- **Ensure that water dependent ecosystems (eg conservation category wetlands) are protected through the allocation process, while allowing ongoing sustainable use and development of water resources to meet current and future needs.**
- **Utilise the Precautionary Principle[1] to guide decisions where scientific knowledge of ecosystem requirements is limited.**
- **Establish a strategy to manage instances where EWPs have been set and are unable to be met in the short term due to historical decisions and allocations to existing users. This will be completed in consultation with stakeholders.**

(1) Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

8.3 Allocating our water resources

The allocation of water resources requires a balanced approach to ensure that environmental, social and economic developments needs are met. It is important that the needs of all water users are balanced and addressed through the allocation process.

Public health, environmental and ecological issues, social equity, cultural issues, economic issues and the hydrology and hydrogeology of the water resource in question must all be carefully considered when allocation decisions are made.

There are a number of principles that guide the water allocation decision-making process. These include:

- Ensuring that social, environmental and economic requirements of water use are considered for all water allocation plans.
- The consideration of climate variability and change in all allocation decisions to ensure that allocation mechanisms are able to accommodate changing circumstances.
- The need to consider provisions for future beneficial community use through allocation reservations.
- The basing of decisions on scientific information and application of the Precautionary Principle in cases where scientific certainty does not exist.
- Allocating water of a quality that is 'fit for purpose' so that the most valuable resources are available for the highest value uses,and to ensure that all water is used efficiently.
- Providing equity to all water users through the licensing process and protecting the rights of existing water users to access water resources on a sustainable basis.
- Protecting the quality of important existing and future water resources.
- Providing opportunities and mechanisms through which the community can become involved in allocation decisions.

The management of our finite water resource is becoming more complex. Decisions will continue to have greater impact on water users, the environment and the community. The use of regional committees (Water Resource Management Committees) will enable better integration of technical management skills with local knowledge and understanding of water resources.

These committees will help promote a culture of local management of water resources and can assist the water resource manager to develop and implement plans promoting sustainable management of Western Australia's water resources.

Application of the Integrated Resource Planning approach to allocation and licensing of water across all water use sectors makes it possible to improve the uptake of water conservation measures and therefore support key conservation initiatives.

Response

- **Establish broad-based Water Resource Management Committees to further the community's involvement in water allocation and management decisions.**
- **Utilise the Integrated Resource Planning approach within the allocation and licensing process to drive appropriate consideration of, and appropriate investment in, conservation measures.**
- **Enhance the licensing process to require all applications for new licenses and renewals to include a Water Conservation Plan establishing objectives for increased efficiencies in water use. Licence conditions will require implementation of the Water Conservation Plan to an agreed schedule.**
- **Users of water will be responsible for efficient use and minimisation of any ecological damage associated with the use of their licensed water allocation.**

8.4 Integration of land use and water resource planning

Land use and water resource planning need to be closely aligned, particularly when water resources in a local area get close to full allocation. However, land use planning also plays a pivotal role in protecting the water quality of our existing resources. Inappropriate or poor land use planning can seriously impact the water quality of existing sources. This can result in risks to public health and increasing costs for ongoing treatment and management of the resource. In the worst case it could even result in the loss of the resource completely.

It is obvious that land planning determines land use, but the influence that the land planning has on water use and management is not as clear. When considering the future use of a given land area, the constraints and opportunities need to be closely evaluated prior to establishing the permitted land use. The permitted land use sets controls on what the land can be used for and, therefore, influences the associated water use. For example, land that is made available for horticultural use has a completely different water requirement to land that

will be used for residential purposes.

As part of a 'total' water cycle management approach, planning processes must consider the water requirements of the permitted land use. It is important that this process helps landowners adopt a water quality that is suitable to meet their water requirements ('fit for purpose'). Ultimately, this process should ensure that all opportunities for on-site storage, local bore use, use of reclaimed water, water recycling and any other harvesting options are implemented. These actions will minimise the need to import water via scheme supplies.

Land use planners and water resource managers need to take accountability for decisions and ensure that sustainability principles are met and potable water supplies are protected.

Response

- **The Western Australia Planning Commission (WAPC) will produce an implementation plan specific to various regions to ensure that water resource management and land use planning is coordinated across agencies.**
- **The Department for Planning and Infrastructure (DPI) will address water resource management issues (quality and quantity) in the formation of land development programs such as the Country and Metropolitan Land Development Programs.**
- **DPI will prepare and / or use an appropriate statutory planning instrument (eg Model Town Planning Schemes, Special Control Areas, Statement of Planning Policy) to require implementation of sustainable water resource management and protection of water quality in land zoning and development processes.**

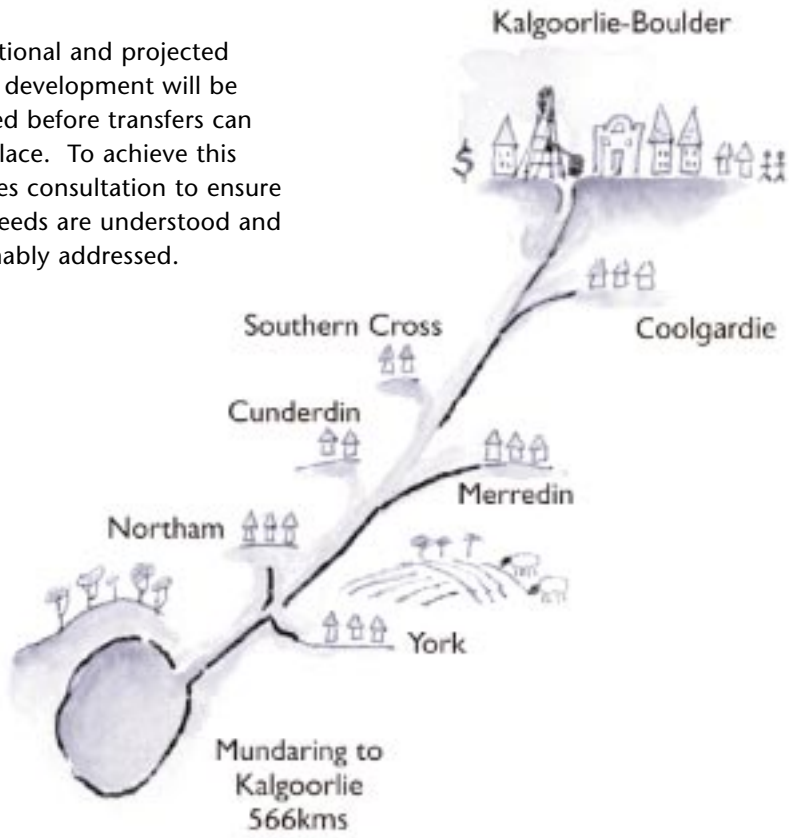
Water conservation can be built into streetscape design.

8.5 Transferring water between regions

The transfer of water from one area to another has long been a part of the history of water supply in this vast State. The most well known and visible example is the Goldfields Pipeline that transfers water more than 550 kilometres from Mundaring Weir in the Darling Range outside Perth to Kalgoorlie Boulder in the Goldfields, supplying water to towns and communities along the way.

There are many examples of inter-regional transfers in Western Australia, including the Pilbara in the North West, a scheme extending deep into the Great Southern from the Harris Dam outside Collie, while the most recent is water transferred to Perth from the Stirling Dam on the Harvey River through a 105-kilometre water pipeline.

Water is a State resource. Western Australia has low, intermittent and unreliable rainfall making it critically important that the State's water resources can be accessed and transferred beyond regional boundaries. This ensures a more reliable and equitable access to water for all. Importantly, in undertaking this process all reasonable regional needs including social, recreational and projected future development will be satisfied before transfers can take place. To achieve this requires consultation to ensure that needs are understood and reasonably addressed.



Response

- **A review of current new water source development projects involving inter regional transfers will be completed so that all reasonable regional needs can be provided for. This will include the south west Yarragadee and Wellington pump back proposals.**
- **The effectiveness of public consultation processes undertaken during water supply developments will be reviewed to ensure the adequacy of these processes.**

8.6 Catchment protection and land use controls

The quality of water supplies to homes and industry throughout Western Australia begins at the source. By protecting water at the beginning of the supply system, it is possible to minimise the risk of contamination and therefore reduce the amount of treatment required.

In Western Australia, a multiple barrier approach to drinking water protection, consistent with the Australian Drinking Water Guidelines 1996, has been established. This multiple barrier approach helps ensure that the quality of water supplies is protected using a range of measures from catchment management and land use controls through to treatment and disinfection.

All drinking water catchments are assessed and managed to minimise the potential risks from local activities and land uses. In surface water catchments this approach may also result in the restriction of public access around drinking water dams.

An important element of catchment protection is the recognition of a Public Drinking Water Source Area (PDWSA) and the establishment of Water Source Protection Plans. These plans focus on the characteristics of individual catchments so that suitable land use controls can be established and pollution risks and other issues addressed.

Catchment salinity management

The Salinity Action Plan identifies five key water source catchments where declining water quality due to increasing salinity is an issue. In partnership with local community Catchment Recovery Teams, the current and possible future salinity levels are determined and salinity management options including forest management, revegetation, drainage and engineering solutions are investigated and implemented.

Managing the salinity in our catchments is an important activity undertaken to improve and protect the quality of our existing and future water resources.

Response

- **Recognition of the primacy of water quality in the management of drinking water catchments, to protect the long term sustainability of the resource, will be used to guide catchment management decisions.**
- **Complete water source protection plans for all public drinking water supply catchments throughout the State. In support of this, Water Quality Protection Notes should also be established to guide conditional land use activities.**
- **Review and make recommendations on control of activities and impacts within strategic (PDWSA) groundwater and surface water catchments to maintain water quality of these resources.**
- **Establish appropriate environmental and planning mechanisms to provide a high level of water quality protection for strategic ground and surface water catchments.**
- **Ensure specific clearing controls that apply in some existing and proposed water supply catchments are maintained for the protection of public water supplies.**

8.7 Water trading

Water trading refers to the process in which a licence holder trades all or part of a licensed entitlement to 'take water' to another water user.

Water trading in Western Australia is in the early stages of its development and only a small number of trades have actually taken place. Because of this it is possible to monitor all activity and refine the framework to achieve sustainable outcomes for all interested sectors.

The ability to trade water surplus to requirements will encourage existing water users to improve the efficiency of their use. It will also provide a mechanism through which new ventures can obtain water in areas where water is scarce. At the same time, buying and selling water is not always straightforward and careful management is required to minimise the risk of harming other water users or the environment.

The expansion of integrated water supply systems throughout south west Western Australia makes it likely that more water trading will occur.

This will particularly be the case as alternative water users begin to create demands for the same water sources. In this context, water trading is encouraged, as it promotes water use efficiency and helps to make water available for the highest value use.

Response

- **The Water and Rivers Commission will promote and encourage water trading and provide regular updates on trading activity through the public register.**

8.8 Water resource management charges

Western Australian families, industry, agriculture and the environment all rely on a steady stream of quality water. Our water resources, found in rivers and wetlands and beneath the surface as groundwater, are managed sustainably to ensure that we will always have sufficient high quality water to meet the needs of the community and safeguard the environment.

As the pressures on our water resources increase, so to do the costs associated with water resource management. In the most recent years the annual cost associated with managing the State's water resources has been around $50 million – more than twice that of 15 years ago. It is expected that the cost will rise markedly within the next 20 years because of an expected doubling in water use and the much higher cost of managing aquifers and streams that are fully allocated and threatened by more intensive land use activities.

In other Australian states, water resource management charges are small charges that apply to water users (typically licensed commercial self-suppliers and water service providers) that operate on 'beneficiary or user pays' principles to fund water resource management costs.

Clearly, water resource management charges are not the only way to fund water resource management but they can help to achieve equity for all users and contribute to a sustainable water future.

Response

- **The Government will continue to fund water resource management activities being undertaken to ensure a sustainable water future.**
- **Undertake an investigation of the applicability of implementing a water resource management charge in Western Australia. This will include consultation with key stakeholders and should consider the possible timeframes, potential impacts and the overall applicability of any possible implementation.**

Securing our water future

A State Water Strategy

for Western Australia

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