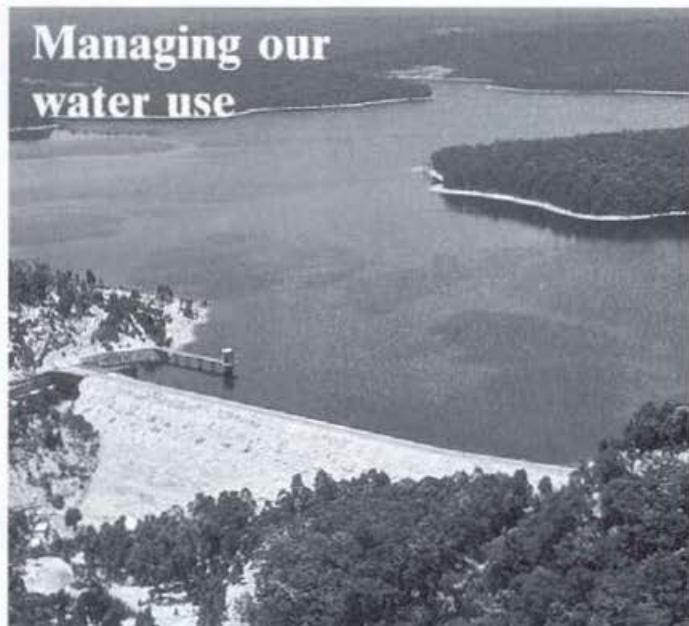


Managing our water use



They provide a delivery service to every home-owner in our cities, with their product on tap, at any time of day or night, whenever and wherever it's needed, and charge less than 40c for every tonne delivered. A superb service, but who are they?

The answer is Australia's water supply authorities. Bulk handling and transport of our most precious commodity is their game.

In Australia's largest city, Sydney's Metropolitan Water and Sewerage Board delivered more than 700 million tonnes of water to its 3 million inhabitants during 1985. This far exceeds the amount of freight moved by all the railways around Australia, or, for that matter, the tonnage hauled by all the transport concerns scattered around the country.

It is difficult to think of anything else that could be delivered at less than 40c per tonne, and authorities try to keep the cost down by careful planning and investment in new schemes. However, they must make their investment decisions well before they need the new source of water.

In the case of new dams the time taken from the identification of a site to completion may be as long as 25 years and, in the interim, millions of dollars are tied up

—earning no revenue, but still attracting interest charges. If the wrong decision is made and consumer demand isn't as high as expected, the cost to the authority — and ultimately the consumer — can be very high.

An increasing complication with new investment decisions is that the water authorities have already dammed or tapped all the easily exploited sources of water around the capital cities. As a result they have to move further afield for new supplies, with a concomitant increase in the cost. In addition, they often find themselves in conflict with city-dwellers who see nearby rivers as ideal spots for recreation; in the future this could see schemes either abandoned or delayed.

Obviously detailed and precise planning is needed and the authorities will have to consider more closely the behaviour and attitudes of their customers. Once water demand was assumed to just increase in line with the population increase, but the recent behaviour of Perth residents suggests that it is not that simple.

Prior to 1976 the water supplied to Perth residents increased stepwise, in line with the growth of the city. Unfortunately a serious drought, in the mid to late '70s, led to a severe depletion of the

city's reservoirs. Restrictions were imposed in 1977, and these weren't completely lifted until 1979, when a new dam and several groundwater schemes came on line.

Surprisingly, no major jump in consumption of the water supplied by the Metropolitan Water Authority (MWA) was recorded after the lifting of restrictions. In fact, not until 1984/85 did consumption reach the peak level recorded in 1975/76, yet in the intervening years there had been a substantial increase in the number of people supplied. The drought, and the associated restrictions, had obviously had a big impact on the average householder's behaviour.

The MWA wanted to know precisely why total water use did not revert to pre-drought levels. The reduction led to great uncertainty about whether the lower usage would be permanent and how demand would grow in the future — both important questions affecting investment planning.

So the Authority set out to discover how people used the water it supplied and, related to this, the likely impact of any restrictions it might be forced to impose in future years. It didn't have much information to draw upon; in fact a literature search revealed an almost total lack of documentation about domestic water use or the

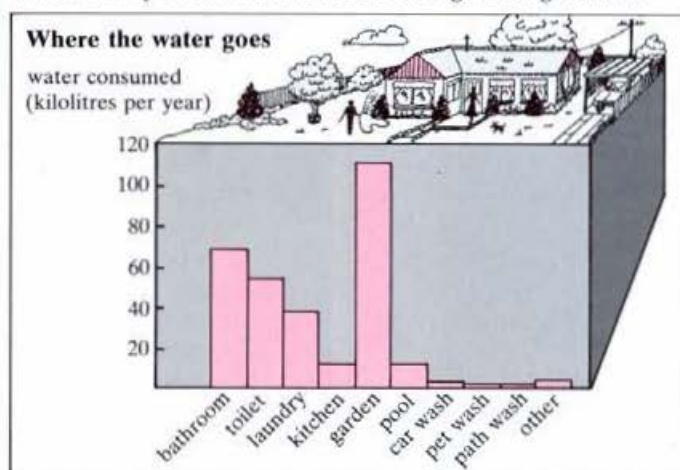
behaviour of consumers. To try to correct this deficiency the MWA set up a small research group, which was soon expanded to draw upon the expertise of the Australian Bureau of Statistics, the Department of Mathematics at the University of Western Australia, and the CSIRO Division of Groundwater Research.

A total of 3640 households had their water usage analysed via a combination of questionnaire, diary, and direct metering of consumption. As well, the group measured the water used in various household appliances and activities — such as in flushing the toilet or washing the car. Supplementing this, a socio-economic study involved about one-third of the households, and a smaller study investigated people's attitudes to pricing.

The statistics confirmed obvious truths: daily consumption peaks at the week-end (when most people are at home) and during the summer.

An average household tapped 298 kilolitres (or tonnes) each year from the mains supply, 173 kL of this being used inside the house. The bathroom topped the in-house use, with close to 39% of the water heading down the bathroom drains — most of it flowing from the shower. The toilet came a close second with 32% of total

Water use by Perth's Mr and Mrs Average during 1981/82.



consumption, then the laundry (22%), and finally the kitchen (7%).

The study also over-turned some commonly held assumptions — particularly about water usage outside the house. The generally accepted figures are 40% inside and 60% outside, but the study results showed that, for Perth at least, the position was different: 58% of the mains water was used inside the house and 42% outside.

However, analysis of outdoor water use was complicated by the fact that some Perth households exploit the groundwater that can be found at shallow depths below many suburbs. Many had put in bores during the years since the drought and, since the MWA also exploits it, the group needed to know the extent of this groundwater use because any increase in the price charged for MWA water, or future restrictions, could increase household competition for bore-water.

The survey showed that almost 30% of households had a bore, and these could use up to seven times as much water — mainly on their gardens — as those households solely dependent on mains supplies. When this bore use was taken into account, a staggering 70% of total water use went into outdoor activities.

That bore-owners were more interested in their gardens became obvious during the survey: more than 90% of their lawns were ranked fair to very good, whereas only slightly more than 60% of people reliant on MWA supplies achieved the same rating.

In general, more than 90% of the water supplied by the MWA outside the house went into watering gardens, the remainder ending up in pools or being used to wash cars, paths, or animals, or in other minor activities. Bore-owners used about the same amount of MWA water for their pools

and other outdoor activities, but used significantly less on their lawns and gardens — the bore more than making up the difference.

The mass of statistics collected on those 3640 households provides some insight into household activities and priorities, and is a real goldmine for dedicated trivia buffs. However, the fact that the average one-toilet family flushes that toilet 15.2 times every day (using 157 L of water in the process), while it may appeal to some, cannot, on its own, help identify ways to regulate demand or conserve water. Only when the households are analysed in greater depth, and comparisons made between various groups, do any practical implications emerge.

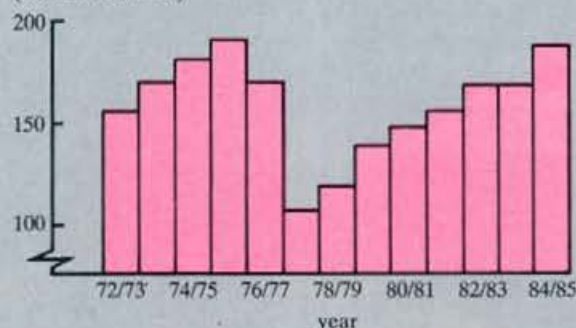
According to Mr Peter Clarkson, the chairman of the study group, the results provide the MWA with many options for managing water demand. Water authorities around Australia are now using this information to develop a united approach to manufacturers of domestic appliances, with the aim of reducing wastage, refining their consumer-education programs, and modifying pricing policies.

The study showed that some washing machines used twice as much water as the most efficient one. And although many had the water-conserving 'suds-saver' option, very few households could take advantage of it because their laundry sinks were too small.

Toilets are another essential household item offering big potential savings; some of them used double the average flush volume of 10.3 L. Installing dual-flush toilets — where partial depression of the button releases 5 L, and full depression 10 L — in new homes, or when the older cisterns break down (and they don't have an unlimited life) — could provide major savings,

Perth's annual water use

water consumption
(million kilolitres)



The drought, and associated water restrictions, led to a sharp drop in water consumption. Since the restrictions were lifted, per capita water use has remained below previous levels.

since the toilet is the single largest consumer of household water.

There are also opportunities for educating people about the use of their toilet(s). Why does a single person in a one-toilet house need only six flushes a day while, in a house with two toilets, the flushing rate suddenly jumps to nine a day. Is it because, as seems likely, toilets are being used for waste disposal?

Gardeners, too, are prime targets for a dose of education; while many under-water — and they may do this by choice, not neglect — many others over-water. In particular, the bore-owners seem to dump excessive amounts on their gardens. Here a little addendum to the daily weather forecast could help conserve that precious groundwater.

And so the information collected in the survey goes on and on. Showers don't save water: they use just as much as the average bath. But water could be saved in showering by an alteration to the shower rose. Indeed, many apparently minor changes could transform water-use figures if they were adopted — but, of course, we need the will.

As demonstrated in the period of water restrictions and subsequently confirmed during the survey, most consumers have a positive attitude towards water conservation. Admittedly they

don't seem to respond strongly to price increases — the pricing study suggested that, even if the price of water was doubled, only a 20% reduction in water use could be expected, and 50% of consumers wouldn't change their habits. This possibly reflects the urban consumers' expectation that the abundance of fresh clear water that they have known since birth will always be available, and damn the cost!

However, we live on the driest continent on this planet and, unless we want to commit ourselves to damming all our wild rivers, that particular attitude will have to change. Meanwhile, the study suggests that we still have a lot of room in which to manoeuvre. As Mr John Thomas and Dr Geoff Syme, of CSIRO, point out, the traditional description of the hydrological cycle taught in schools — rain, rivers, oceans, and evaporation, leading back to rain — will have to alter. On our increasingly crowded planet man is an increasingly important component in that cycle. If we are to manage the cycle to best effect, then altering man's machines, attitudes, and behaviour is essential.

Wayne Ralph

'Domestic Water Use in Perth, Western Australia.' (Metropolitan Water Authority: Perth 1985.)