

Chapter 5

Urban water: Policy, institutions and government

Steve Dovers

This chapter seeks to connect discussion of human behaviours around water not to taps, toilets and timing showers, or dams and desal plants, as much discussion (very usefully) does, but to the policy processes and instruments, institutional and governance systems, and household realities that shape human and organizational behaviours toward water in a modern society and economy. The focus is on urban water, but the discussion necessarily travels to rural water and issues like energy that cannot easily be separated from water. The chapter comprises a series of linked discussions on issues that surround more singular policy debates around water, hinged on the proposition that water policy is better constructed as being about far more than just water, and where the prospects for behavioural and institutional change become both more complicated and realistic.

The rising tide of debate

It seems too easy a question to ask why we are so worried about water in Australia today. The overall answer is scarcity — not just of available water, but of convenient supply options, opportunities for quick reform of infrastructure and institutions, resources both financial and informational, and capacity in the environment to receive wastewater. In the spring of 2007, parts of rural Australia are at breaking point in both house and paddock and perennial horticultural plantings may be abandoned along with small communities. Towns larger and smaller face shortages never before imagined. Cities face near-term restrictions, some inconvenience and cost, and are worried about an escalation of both.

On any international comparison Australians use water rather profligately: in rural irrigation systems, in industrial processes, at tourist resorts, on sporting fields and golf courses, and in houses and gardens. Against increasing scarcity, there is a reasonable expectation that there are ripe, low-hanging fruit in efficiency gains. Australians, at least urban ones, have never really been told to be frugal (the odd mild water restriction aside) but, rather, have been encouraged to splash it about in all sorts of ways. That is a hard legacy to shift and involves

much more than changing immediate behaviours concerning appliances and orifices.

In recent years, water has become prominent in national political and policy debates in a manner unprecedented in Australian history, as a major issue at all levels of government, and through much stronger and more comprehensive national policy development in the form of the COAG-agreed National Water Initiative (NWI) and the more Commonwealth-imposed National Plan for Water Security. Why now? Drought, obviously; or, more accurately, a particularly widespread and persistent drought. That is still an incomplete answer. The slow and inexorable progress toward centralism in the Australian federal system is a major factor, sharpened by federal government of 1996–2007 but reflecting longer trends. This fulfils Deakin's prediction regarding the states being bound to the 'Chariot Wheels of the Commonwealth' made in 1902 with an insightful reference to drought (see Connell 2007). Centralism combines with populist political styles and the rise of Executive power to make big, sudden policy shifts and big, sudden infrastructure announcements more likely. While the broader, stable and moderating traditions of Australian governance and political confluence are apparent (Wanna and Weller 2003), in particular sectors such as water, instability and rapid change do occur. Concerns over climate change are influential, instilling an understanding of possible permanence of water scarcity. So too is the slow and incomplete move toward seeking ecologically sustainable development, mixing concerns over water supply with arguments for environmental flows and evidence of the downsides of the way in which we deal with wastewater. Increasing demands for participatory approaches to the management of natural resources influence the way in which water is understood and managed, although this is more obvious so far in rural than urban contexts. The marketisation of water services and agencies following the neo-liberal revolution has altered both water management and expectations of relative public and private benefits (for example, Sheil and Leak 2000; Gowland and Aiken 2003). Finally, there is the fact that the easiest option — increasing supply — has run up against the constraints of a flat, dry land. The easy dams have been built.

As with most eruptions of interest in major policy issues, there are multiple factors behind the current topicality of water, however dominated by a severe drought. This is not new. Economic scrutiny of the wisdom of unthinking bulk supply of water began in earnest with Davison's (1969) *Australia wet or dry?* Economic scrutiny, both sophisticated and simplistic, of investment in water infrastructure increased in intensity from the 1980s onwards, although large, panicked and arguably inefficient expenditures on engineering fixes have not ceased (although they have more in rural areas largely as a result of few remaining supply-augmentation options).

Water debates and policy activity, and, at times, real policy change, follow El Niño drought cycles with a slight time lag and depressing regularity. We do not here delve deeply into the broken past of water attentiveness — for example, post-war development-oriented reports and programs, and the 1963 and 1975 national water resources surveys — but take national water-policy debate and development and data gathering in recent times as an indicator. Water 2000, the most comprehensive set of reports and recommendations on water in the country's history, followed the early 1980s drought (DRE 1983) but soon faded from memory and influence. So did Water Review 85, the first time water resources and use were surveyed together nationally (DPIE 1987). There was to be a 'review 95' and each decade hence, but this basic need and pledge was washed away in a few wet years. The early 1990s drought led to 1996 election promises from both sides to examine water resources again, and the National Land and Water Resources Audit ensued (www.nlwra.gov.au), not matching too well with previous data sets or with the ABS's emerging Water Accounts, but very welcome nonetheless. Early 2000s drought has driven development of a new national data set, the National Water Commission's Australian Water Resources 2005 program, one that assumedly will be maintained consistently and improved, at least until the end of the NWI's implementation schedule of 2004–14 — an unusually long-term policy timeframe. Australia worries about and measures water when there isn't enough of it. Maybe this time the reality of the driest inhabited continent, and the most variable rainfall on earth, will sink in permanently rather than quickly evaporate.

Physical as well as policy activity has been lumpy in time. The bulk of Australia's water storages, rural and urban, were built in a rapid period from the 1960s (Smith 1998), in answer to multiple factors and needs — post-war development, rising populations, possible expansion of rural commodity exports, memory of previous droughts and particularly the 1940s in NSW, and especially the engineering and fossil-fuel-fired ability to build big things. That rush of dams is an infrastructure legacy that locked in and further fashioned the deep-seated water behaviours and institutional inertias that now present as problems. A hectoring focus on people's water-use behaviour ignores the fact that these behaviours are determined, enabled and constrained by the operating environment in which they take place — just as a focus on 'green consumerism' can deflect attention from deep-seated inconsistencies between the function of modern economies and ecological (and arguably social) sustainability. At best, a focus on individual consumption behaviour change ignores how a modern society functions; at worst it conceals a blame-shifting onto the individual that eases the need for effective reform of patterns of production and consumption, settlement and governance.

'Water policy': Distilling the intent

The focus of this chapter is not the fine-scale management of urban water or the detail of water consumption behaviours. Other contributions in this book do that. It discusses, rather, the settings that do much to determine management and behaviour — policy processes and interventions, institutional systems through which these are negotiated, and patterns of governance that surround these. We talk of 'water management' but it is really about managing people, whether individually or collectively in households, firms, communities and cities.

Some clarity helps. Water policy is in the news a lot, and policy interventions of all kinds are proposed. Policy interventions are always a form of social engineering to greater or lesser extent, and are thus *interventions* in society. This discussion follows the definitions of policy, institution and related terms used in Connor and Dovers (2004) and Dovers (2005). Policy interventions are intended to change human behaviour in order to further some social, political or policy goal, whether that goal is clearly apparent or widely shared or not. (Also, policy interventions almost always have unintended and multiple impacts, such as on water consumption, and some such will be noted as we proceed.) Whether a tax incentive is used, an educational campaign or strict regulation, a subsidy to a water-efficient technology or any other specific policy instrument — the point is to encourage, enable or enforce behaviour change on the part of individuals, households, demographic strata, firms, professions, communities, organisations or governments themselves. Policy instruments are *messages*, conveying information whether in the form of a threat, exhortation, appeal to generosity, mildly suggestive signpost or blaring claxon (Dovers 2005). The strength may vary but the intent does not: a harsh and confronting advertisement is a strong message, just as strong as a strict regulation and hefty fine or a large tax impost.

It should always be remembered that policy interventions in urban water seek to drive some very widely distributed and highly personal behaviours embedded in daily lives and close environments — washing bodies, cooking and cleaning up afterwards, going to the toilet, creating pleasant backyards to live in. Changing behaviours is serious business, and doubly sensitive and difficult when it gets personal. The most apparent urban impact of drought from a local government management point of view is grass, in parklands and especially on sporting fields and in swimming pools. Recreation and sport may seem to some trivial, but are hugely important socially, culturally and economically, and in answering their local democratic imperatives, do not doubt that local government councillors know this very well.

To decide not to make a policy intervention is a message also, confirming existing behaviours, as does a supply-side response (dams, desalinisation plants, groundwater tapping) that does not interfere with and indeed encourage

continuation of use patterns. That is again a conscious choice regarding human behaviour, even if apparently unthinking. This clarifies what water policy and management is about, and weighs against the all too common and simplistic debates around the relative merits of different classes of policy instrument — regulation doesn't work, education is the most fundamental approach, leave it to the market, etc. *What is the best medium for the message*; or what is the best mix of instruments to convey the message effectively, clearly and fairly? Here I will take a non-discriminatory approach to policy instruments, accepting all as possibly valid, without favouring, as many do, one class of instruments (regulatory, market, educational). Better to consider first the nature of the problem and the desired ends, and then consider the means (policy processes and instruments, technologies and management strategies, institutional forms).

Policy interventions emerge from policy processes shaped within institutional systems and by governance. At this higher level of organisation and abstraction, it is equally all about human behaviour. Institutions are how we manage and structure transactions in a manageable and orderly way. These transactions are social, legal, economic, formal and informal. Seeking sustainability is more than anything an issue of institutional change (Connor and Dovers 2004). Governance is the way in which the state, private sector, civil society and public interact to lead to decisions about institutional reform and policy directions — how human behaviours are managed. We undertake collective endeavours and reconcile differences (or fail to) through institutions and processes of governance — water policy is no exception.

Watering city and country

Water in Australia is largely considered in the separate domains of urban and rural. This split exists in the narrative of settlement, political discussions, the jealousies of pub talk, supply and management systems, and policy and institutional regimes. Rather than urban–rural differences when referring to households and water, the real split is reticulated or independent supply. The split is evident too in research. Relative to population and economic activity, far more resources are expended in rural water and related research in natural resource management (NRM) than in the urban domain, despite the fact that major urban centres contain some 85 per cent of the population, and the bulk of social and economic activity. Yet on spatial extent, ecological impact and gross share of consumptive and non-consumptive water use, the rural domain deserves attention. In national policy debates, in the NWI and the National Plan for Water Security, the greatest focus is rural — or, rather, the Murray-Darling Basin. Some researchers advocate the importance of one over the other and therefore, like the policy regimes, can ignore interactions. It would be better for researchers, policy-makers and the public to believe two things at once. Both rural and urban

water (and extant, missing or proposed links between them) are important and deserving of close attention.

Nevertheless, the NWI does instruct a linking of rural and urban water management (regarding the NWI, see Hussey and Dovers 2007); and, increasingly, attention is being paid to water management in hitherto overlooked peri-urban areas. Mostly, the linkage is interpreted in terms of transfer of water, whether through trading or simple capture, from rural sources to thirsty cities, and the provisions have yet to be pursued with any vigour and consistency. But this is a future area of research and policy activity with strong behavioural dimensions that are merely hinted at below.

While the focus here is urban, we do need to maintain an integrated focus, or at least recognise the other domain as a reference point. It may be that, behaviourally and in policy terms, it is in smaller rural settlements, localities, farm households and the non-metropolitan Indigenous domain where the sharpest insights into the human dimensions of abstemiousness are to be found. In southern NSW, there are small settlements that have been beyond Stage 5 water restrictions for more than five years; in rural homesteads in drought-struck areas children are bathed in suspect water hauled manually from diminishing farm dams while generational legacies of homestead gardens are irrevocably dead; small-town tourist ventures have suffered massive turnover losses and entire communities have lost the facilities to play sport; in Indigenous settlements, water supply and quality are of third-world standard. It is not a discussion of how long one should stay in the shower, as turning on the tap is an empty gesture. Such situations are far beyond the experience and imagination of the vast bulk of urban Australians and bear reflection.

Later a simple characterisation of phases in urban water management will be presented, and it is foreshadowed that the earlier phases have not been replaced but still struggle for space amid multiple values surrounding water and the inertia and path dependency of agencies and institutions. The households in drought-struck grazing districts, technological changes aside, are close in their use of water to predecessors. Joe Powell's (2000) symbols of two fundamental black and white Australian water dreamings still apply — the Rainbow Serpent of creation and the Water Cannon of intervention. The formal recognition of Indigenous water values in the NWI in 2004 — a great advance even if yet to be addressed seriously — shows that the oldest Australian institutions regarding water, Indigenous law and story, have not gone away (Jackson and Morrison 2007). These two symbols are non-urban; later we will consider some purely urban icons of water use.

Energy, water and climate

Water debates are littered with ‘stuff of life’ arguments, and water is indeed a fundamental requirement for life, and this property adds a human-rights and basic-needs dimension to policy considerations. Not just human life — few of our water decisions do not have implications for the integrity of ecological systems and biodiversity. It is also a systemic economic resource, irreplaceable as an input to production and consumption, and thus implicated in countless other policy sectors: the stuff of life, and the universal solvent, lubricant, coolant and producer of steam.

For example, it is sub-optimal to seek to understand water and to make policy about water without factoring in another, even more systemic resource — energy — which is equally topical at the moment (Proust *et al.* 2007). Climate change threatens water systems, and is caused largely by energy use. The shower links major uses of water and energy in the household. Different water-supply options (solar, nuclear desalinization, gas turbines, and so on) have very different energy demands, and vice versa. High-efficiency irrigation systems are abstemious but use pumps and energy-rich products; water-wasting flood irrigation is marvellously undemanding on energy. Most pollution is related to our uses of water and/or energy.

This warns against hydrological determinism, of narrow water-fixations in policy and management. In the non-urban domain, recent topicality of water issues has diluted hard-won and still-evolving integrated catchment and landscape-management regimes, where water is one, albeit crucial, component of a portfolio of issues to be managed in a coherent fashion: soils, vegetation, production, biodiversity, etc. In cities, too strong a singular focus on water may serve to embed a forgetting of the links to related issues and trends. The fact that, on a cradle-to-grave basis, the great bulk of water use attributable to household end-point consumption occurs before final consumption (known as virtual or embodied water, used in growing, manufacturing and transporting goods and services) indicates how deeply embedded water is in a modern economy. The same applies to embodied energy.

Water policy is a cross-sectoral, -portfolio and often -jurisdictional matter. These attributes suggest that extant policy and institutional settings, fashioned around levels of understanding before much attention was paid to water (and energy) as sustainability problems, are *prima facie* likely to be inadequate (Dovers 1997). Water is obviously a cross-disciplinary issue, and while research attention has flowed strongly toward water in recent years, it is largely a portfolio of separate components. Less-than-satisfactory integrative, intellectual attention to water and energy issues stems in great part from the inability of the research and education community to rigorously traverse the disciplinary boundaries

within which intellectual activity is clustered (very productively, too, in all sorts of ways).

Water policy is a narrow construct, then, as water use is firmly linked to and determined by other policy and management sectors: planning, landscape and catchment management, fire policy, building regulations, energy availability and price, the evolution of appliances, garden and leisure fashions, and so on. Glib as it sounds, everything is indeed connected to everything else; to be effective, water-policy interventions must take account of the links, of the knowledge that underpins them and the policy frameworks constructed.

Watering policy and institutions

What follows is a sharply summarised and simply characterised view of overlapping phases of water management, policy and institutional forms in Australia, which roughly accord with approaches taken to other natural resources such as energy, and many other policy problems (for example, Bolton 1980; Frawley 1994; Connell 2007).

Indigenous Australian water law and management, although non-urban, have the longest pedigree and argument for 'fit' to the Australian environment, on the basis of impressive longevity. It can be surely expected to contain — although this is shamefully unexplored — a great variety of geographically and culturally defined variation. The difficulty of translating traditional Indigenous water management to contemporary urban settings is immense, except in a general value-shift sense, but the reality of 50 000-plus years of human–water interaction cannot be ignored.

Early Australian urban-water management was characterised by (i) rapid development of an understanding of the variable Australian hydrological environment, and (ii) a mostly localised and ad hoc approach to capture, provision and disposal of water. As populations grew and production demands and technologies drove increased water use, issues of adequacy and safety of supply became apparent.

The rise of public-health considerations in cities — potable supply and safe treatment of human and other wastes carried in water — defined the imperative for development of reliable, widely (if not universally) accessible bulk supply and disposal of water and related wastes. Though nascent technologies could have prompted a policy of widespread independent water management at household level and in some industrial settings, there was instead a move toward large dams, bulk piped supply, and (later) big-pipe waste disposal and mass treatment of wastes.

An 'engineered ascendancy' (Powell 2000) and institutionalisation of bulk water capture, supply and waste disposal was the result, beginning in the late nineteenth century and implemented vigorously. In major urban settings,

independent statutory authorities (water boards) became highly professional, powerful and purposeful organizations, with a singular and highly effective focus. In small towns, the same overall approach was taken, with local government rather than state agencies taking responsibility.

Rethinking these Leviathans began in the 1980s and gathered pace in the 1990s, amid rising concerns around cost-effectiveness, organisation flexibility, environmental impacts and, above all, economic efficiency. Agencies were put on a more commercial footing through corporatisation (in mandate, form and style of title) and outsourcing or privatisation of ancillary functions. Some revision of supply-oriented mandates occurred, and marginal efficiency measures were pursued. Whether these revised institutional forms equal a significant shift in emphasis remains to be seen.

These 'phases' reflect a sequence of shifts in policy styles and institutional forms; however, they are not strict or exclusive. Indigenous water management is extant, and in some areas pure state provision exists alongside corporatisation. Overall, they are not inconsistent with broader trends in public administration and governance, in their social goals and the organised means of addressing these.

There have been few big shifts in the underlying institutions — the rules of the game — in the history of Australian water management, much policy and management turbulence aside. This is to be expected: institutions, as opposed to the organisation that manifests them, by definition, do not change often and only occasionally quickly. Australia's first environmental regulation affecting water came quickly when Governor Phillip acted on the belief that faeces were out of place in the Tank Stream, and much has happened since. But the rules of the games, basic institutional forms, are slower to change. There is considerable path dependency in institutions — we generally operate within an institutional system that is far more consistent with past rather than present knowledge and imperatives. This inertia resides in modes of understanding, statute law, organisational and professional expectations and norms, and physical infrastructure. Modern Australian cities have developed assuming abundant low-priced water and energy, and the urban structure, housing forms and transport options that abundance make possible. Those assumptions have only recently been questioned. With only around 2 per cent of the building stock changing each year, and major public and private infrastructure projects having functional lives of many decades, rapid change is difficult, especially in the myopia of modern politics (see Marsh and Yencken 2004).

In rural Australia, the shift from Indigenous management to British riparian doctrine was the first big institutional change, and the second occurred in the years around Federation consistent with Deakin's injunction to overturn riparian doctrine and invest control of water with the Crown. Little changed

fundamentally until recent years when concerns over economic efficiency, environmental quality and limits to supply saw management of water shifted toward private control and property rights (including environmental) began to be refashioned. Whether this current phase of institutional change will be as profound as some hope remains to be seen (see various contributions in Hussey and Dovers 2007).

In urban Australia, white occupation was the first big shift, but the early years of establishing white governance saw largely ad hoc urban water management. The second institutional shift was the rise of large state agencies entrusted with water and sanitation, beginning in the late nineteenth century and becoming formalised behemoths of unquestioned authority and expertise. Importantly, the logic was not so much water supply, but *public health*, borne of the post-Industrial Revolution wave of urbanisation, microbial diseases, scientific understanding of disease, and *distributional equity*, to offer all citizens a safe and reliable supply of potable water. The third shift, not unlike in rural Australia, is partial and ongoing: the corporatisation of water-supply agencies, application of pricing mechanisms, and partial incorporation of environmental constraints. Consistent with neo-liberalism, the most significant and effective policy expression came from the National Competition Policy-inspired COAG water reforms of the 1990s (for example, Sheil and Leak 2000; Smith 1998; Cater 1998). The social and institutional logic shifted, although the shift was not widely understood. While public health and basic service provision were still important, *economic efficiency* of operations became an underlying imperative, given direction by the corporatisation of water agencies within statutory frameworks that gave greater primacy to financial return. Citizens became consumers. As traditional statutory authorities, these agencies were thought by reformers to be inflexible and wasteful (and certainly that critique held in some ways); the answer was to make them more like the idealised private firm. As with other manifestation of corporatisation and privatisation, much depends on the quality and comprehensiveness of the statutory framework, and whether public-good functions such as long-term monitoring, public health, infrastructure planning, and so on are catered for (for example, Richardson and Bosselman 1999).

This indicates a widespread issue in natural-resource management, and many other policy sectors, where significant institutional change can occur under the guise of policy and management changes that are perceived to be, or sold as, a relatively straightforward matter of instrument choice or organisational form. Market-oriented policy approaches, especially those that refashion property rights, are not simply 'another option in the policy toolbox', but are transformative policy options that carry with them institutional change (Connor and Dovers 2004). Property-rights instruments — individual transferable quota in fisheries, tradable water rights in water — shift the policy logic from distributional equity plus some ecological consideration, to economic efficiency

plus sustainability concerns. Those impacted by a new policy regime, and indeed sometimes those proposing and implementing it, may not fully understand that crucial shift. Trouble usually ensues. Moreover, such market instruments are not themselves an end or a singular means, but first require support from other, co-ordinated policy instruments (statutory, communicative, informational), and second are pro-sustainability only as an efficient allocation mechanism within a robust sustainability (scarcity) limit. Also, the standard conditions for any functioning market — good information, clear property rights, reasonable symmetry, and so on — are required. This basic economics is often assumed away or left un-discussed in the establishment of markets in natural resources (and other things). This does not discount the potential of market mechanisms, but seeks clear recognition of their implications and design of policy regimes in a manner sensitive to this understanding. As proposals for and implementation of water pricing and trading increase, this should be borne in mind.

Urban Australia as we know it grew up with and became accustomed to reliable and abundant supplies of clean, safe water. This is a truly tremendous achievement, and a curse. The achievement is of urban amenity, quality of life, convenience and, above all, public health. The curse is an inflexible, institutionalised water and waste system based on a large-scale, engineered, ‘big pipe in, big pipe out’ logic. This system does not encourage frugality, is hard to refashion given the inertia of infrastructure, and does not readily admit independence of supply or inventive and less environmentally disruptive use of wastewater. Some of the best-quality treated water in the world is used for all applications, from drinking to gardening and flushing toilets, and huge quantities of it are required to shift wastes in low gradient, gravity-driven sewers to bulk treatment plants from whence valuable water and nutrients are ejected into the ocean (or, worse in some cases, rivers).

The organisations and professions that developed and oversee this at once wonderful and regrettable system of water and sanitation are often as resilient as the infrastructure. This is an expectable example of the co-evolution of professional and organisational norms. That appears to be as true of today’s marketised corporations as it was of the statutory authorities from which they arose. In their defence, many of the things that are increasingly being demanded of corporatised water utilities are simply not rational for them to do within the statutory mandate that governments, representing society, have given them. This includes such things as mandating efficiency, undertaking long-term environmental monitoring, collecting water data that informs other than straight commercial accounting needs and investing in different forms of supply and treatment infrastructure.

That applies to individuals as well, hectored to save household water use but subject to instructions and constraints in other dominant areas of policy and

technology that weigh against such frugality (see below). Inert and commonplace, the garden hose should be up there with the Victa mower and Hills Hoist as icons of suburban Australia. It symbolises the end point of the bulk-supply reticulated system (the real end point, the hidden sewer, is not an attractive icon): the hose as the serpent of waste in our gardens. The advent of unbelievably cheap black poly pipe and associated efficient drippers has revolutionised water use and efficiency in backyard and on farm, but simply is nowhere as satisfying to use. Or is the real serpent the spa bath? In future, the water tank or dry-composting toilet may become the symbols of urban water behaviour; currently in some rural towns it is a front yard of dust.

The many initiatives to get individuals to change their water behaviours are good and logical, but policy-driven behaviour change as we have noted is not a straightforward matter. Institutional change in a democratic society cannot be too discordant with public values, lived experience and thus supportive normative change. At a practical level, there are issues of how capable and motivated people in houses in Australian cities are when it comes to responding to demands for frugality and effort in managing their personal water consumption.

Real human water behaviours

Thus far, the connection between policy, institutions and governance and human behaviour has been discussed at a broad level. Now consider the realities of real human behaviours in real human settings in real time. Contemporary ideas in water policy and management do imply significant changes in human behaviour. So it needs to be considered what such changes entail, against the many other factors that impinge on individual and household behaviour. Picture an 'average' or at least a believably typifiable Australian household. It contains two adults, both of whom now work full jobs to maintain a house and debt, the value of which has been increased significantly in line with the logical impacts of behavioural changes driven by policy interventions in the housing finance system such as negative gearing. Finances are tight. They collectively work longer hours than they did 10 years ago and than their parents ever contemplated. With retrograde funding of public education, one parent is committed heavily to helping at the local primary school and the other manages a junior sports team; commitments that each take six–eight hours out of a crowded week.

Enter a serious commitment to using water and energy more sustainably, with an eye not just to immediate use but whole-of-production-chain use (embedded energy and water). Water tanks are expensive to buy and install and require maintenance (and the embodied energy in that metal or plastic!), and the reinstallation of all light fittings, small subsidies aside, costs money. Doing installation oneself is cheaper and might be rewarding, but who can find the time, let alone plumb it into the toilet? Managing the internal temperature

manually via shutters and scheduled closing and opening of windows takes 10-times longer than using the air-con. Negotiating rebates and green-energy subscriptions seems to take even more time than managing the kids' mobile phone plans. Finding reliable information on the embedded energy and water in all those products is hard work amidst a deluge of commercial, government and NGO claims. Water prices do not really drive frugality and would need to treble to really stand out in the household budget: energy prices are larger, but the gains are hard to make to the extent that they really show dollar benefit. Composting the wastes is yet another everyday responsibility, and using greywater on the garden keeps slipping because a quick half-hour hit with the sprinkler is much easier. So it goes on.

Such constraints apply beyond the household scale. Many prescriptions for sustainability require time-intensive collaborative endeavours — landcare and waterwatch groups, neighbourhood gardens, clean-up days —and all when traditional and important voluntary enterprises such as charities, junior sport and school fund-raising struggle to find human resources and time. And we expect people to do more?

This is a crucial and often-overlooked point — more ecologically sustainable behaviours generally replace external sources of energy and other resources such as water with metabolic (muscular) energy and labour time, and the intellectual effort to organise and manage (for the fundamentals, see Boyden 1987). Conservatively, can we propose that the time-cost of running a considerably more sustainable household may be six–eight hours per week? That is, roughly, another day's working time. Interestingly, there appears to be a convergence when one anecdotally surveys the time-cost of serious non-paid work activities such as chairing a Landcare group, being an active P&C executive member, coaching a junior cricket side, or getting real about household sustainable management — about an extra day's work per week. Sure, down-shifting or dropping out might square the circle, reducing expenditure to match reduced income, but that is not currently a widely available option. Reliable part-time work is not is easy to find.

This is obvious stuff, and has been since the onset of the industrial revolution — fossil fuel and other external uses of energy extend and supplant the metabolic energy used to do things manually (Boyden 1987). That is the time-saving magic of each instance of using energy and technology, even if the cumulative impact adds up to a tail-chasing feedback between expense, work and time. However, the necessary changes in human behaviour implied by many prescriptions for water and energy frugality seem not to mesh at all well with household realities and weekly time budgeting.

Of course, it is not only people's time-scarcity that weighs against behaviour change — the conservatism and inertia of water- and energy-supply agencies,

the locked-in patterns created by past urban planning, the constraints or at least lack of encouragement in building codes, an economic and taxation system that does not particularly encourage frugality, and of course — and perhaps most powerfully — the active anti-sustainability that is carried in the aggressive marketing in a consumer society. The daggy 'stop the drop' adverts in low-ratings slots are up against the flash, prime-time spa and air-con ones. Economic growth and water and energy use are tightly coupled. Those six–eight hours a week of pro-sustainability time and efforts entail flying in the face of the inevitable logic of the inherited urban system, market-defined social expectations, the inertia and discouragement of powerful organisations, and the growth imperative of the economic system.

So, small adjustments in financial and other policy settings to encourage frugality aside, what prospect for behaviour change at the individual and household level? The playing field is not even. Recall that not to act in a policy sense is a conscious act of ensuring that current behaviours exist. This means that, unless pro-frugality policy interventions significantly outweigh these multiple anti-frugality policy messages, then on balance there is no reason to expect other than changes at the margin.

Conclusion: The singular and systemic in water policy

The foregoing has traversed some issues around human behaviour and water use in Australian human settlements. Currently Australia is in a water panic, but faced by significant path dependencies and inertia in water and sanitation systems, statutory and organisational dimensions of the institutional system, and human behaviours both individual and collective. There are also countervailing policy and commercial messages weighing against the prospects of significant change to water behaviours. How long the current policy panic will last is unknowable, but there is a greater chance now, with a focus on climate change and variability, of attention being maintained for longer than in previous dry spells. Actually, things are fine in metropolitan Australia (although not in some smaller towns and rural areas), but we have no idea how the politics of really severe or even absolute (as opposed to the current inconvenient) scarcity would play out, when whole categories of use become either impossible or grossly unviable from an equity point of view. Things may not get so bad, and whether we should seriously prepare for such a state of affairs is a matter of individual risk-aversion as well as careful projection.

The current water panic is characterised by a contest between a range of singular policy and technological responses with very different behavioural implications. Large-scale supply-side options lessen the need for behaviour change, whereas significantly greater household responsibility for capture and storage of water and treatment of wastes implies large behavioural adjustments. In between is a mix of these, mediated by various technologies. Many specific

policy interventions are proposed — regulatory, economic, communicative — but all have the same intent of changing human behaviours, which is not a trivial undertaking.

What is not discussed as much are meaningful shifts to other policy sectors so that all that determines water use is as consistent as possible. Or, should another social and policy goal be considered to override water issues, then the inconsistency in policy and technological messages are transparent. Water policy needs to be connected to other policy domains, the agendas and mandates of over agencies and portfolios. Attempts to alter individual and household behaviours would take account of the other determinants of those behaviours: technological, commercial advertising, countervailing financial measures, available urban form, energy issues, and more. That would require connections at present poorly developed in both the research and policy-and-management domains.

It would also require reviewing and revising the statutory frameworks and thus socially-mandated parameters of function of key organisations, and most particularly water utilities — both directly state-run and corporatised. Similarly, a wide and deep review of the statutory framework surrounding water management is overdue (for example, Fisher 2007). Serious attention to whole-of-chain water demand in systems of production and consumption would be needed, to address embedded as well as direct water use. Planning regimes, and especially strategic planning, might be reviewed for their consistency with water issues. In a pro-sustainability institutional system, strategic environmental assessment or some equivalent would be applied to major policy proposals to assess cross-sectoral impacts on environment, society and economy in a precautionary manner (Dovers 2006).

In all the above, it would be best to include broader sustainability imperatives rather than only water — the issues are linked, and not many reviews are likely to be possible. None of these reviews and institutional reforms will save a single drop of water; rather, they would reorder the operating environment of the policy intervener and their subject, whose behaviour is meant to change in the interests of greater clarity and possibility. They would treat water and related issues as complex and systemic, rather than simple and thus suited to singular responses. They would allow for strategic rather than silver-bullet responses to water scarcity.

In the 16 years since the integrated agenda of sustainable development (prefixed as ‘ecologically’ in the Australian term ‘ESD’) was first formally adopted in policy (UN 1992; Commonwealth of Australia 1992) and the two decades since the idea was first clearly articulated (WCED 1987), we have seen principles of ESD enunciated in countless policies and laws in Australia and internationally. However, serious policy attempts to implement it in sectors have been rare and

partial — in Australia, Regional Forest Agreements and now the NWI are examples (for example, Dovers 2002; Dovers and Wild River 2003). In urban water, National Competition Policy has been more influential than ESD ideas, and carry a particular set of assumptions and reliance on market-oriented instruments. While we might well get by with disintegrated and ad hoc approaches to urban water, with the odd drought-induced catch-up, climate permitting, it is worth considering the merits of something more integrated.

References

- Bolton, G. 1981, *Spoils and spoilers: Australians make their environment 1788–1980*, North Sydney: Allen & Unwin.
- Boyden, S. 1987, *Western civilization in biological perspective: patterns in biohistory*, Oxford: Clarendon Press.
- Cater, M. (ed.) 1998, *Public interest in the National Competition Policy*, Sydney: Public Sector Research Centre University of NSW.
- Commonwealth of Australia 1992, 'National strategy for ecologically sustainable development', Canberra: AGPS.
- Connell, D. 2007, *Water politics in the Murray Darling Basin*, Sydney: Federation Press.
- Connor, R. and Dovers, S. 2004, *Institutional change for sustainable development*, Cheltenham: Edward Elgar.
- Davidson, B. 1969, *Australia wet or dry? The physical and economic limits to the expansion of irrigation*, Melbourne: Melbourne University Press.
- DPIE (Department of Primary Industries and Energy) 1987, *1985 review of Australia's water resources and water use*, 2 vols. Canberra: AGPS.
- Dovers, S. 1997, 'Sustainability: demands on policy', *Journal of Public Policy* 16: 303–18.
- Dovers, S. 2002, 'Sustainability: reviewing Australia's progress, 1992–2002', *International Journal of Environmental Studies* 59: 559–71.
- Dovers, S. 2005, *Environment and sustainability policy: creation, implementation, evaluation*, Sydney: Federation Press.
- Dovers, S. 2006, 'Precautionary policy assessment for sustainability' in Fisher, E., Jones, J. and von Schomberg, R. (eds), *The precautionary principle and public policy decision making*, Cheltenham: Edward Elgar.
- Dovers, S. and Wild River, S. (eds) 2003, *Managing Australia's environment*, Sydney: Federation Press.
- DRE (Department of Resources and Energy) 1983, *Water 2000: a perspective on Australia's water resources to the year 2000*, Canberra: AGPS.

- Fisher, D. E. 2007, 'Delivering the National Water Initiative: the emergence of innovative legal doctrine' in Hussey, K. and Dovers, S. (eds), *Managing water for Australia: the social and institutional challenges*, Melbourne: CSIRO Publishing.
- Frawley, K. 1994, 'Evolving visions: environmental management and nature conservation in Australia' in Dovers, S. (ed.), *Australian environmental history: essays and cases*, Melbourne: Oxford University Press.
- Gowland, D. and Aiken, M. 2003, 'Privatisation — a history and survey of changes in organization structures, cultural and environmental profiles', *Australian Journal of Public Administration* 62: 43–56.
- Hussey, K. and Dovers, S. 2007, *Managing water for Australia: the social and institutional challenges*, Melbourne: CSIRO Publishing.
- Jackson, S. and Morrison, J. 2007, 'Indigenous perspectives in water management: reforms and implementation' in Hussey, K. and Dovers, S. (eds), *Managing water for Australia: the social and institutional challenges*, Melbourne: CSIRO Publishing.
- Marsh, I. 2002, 'Governance in Australia: emerging issues and choices', *Australian Journal of Public Administration* 61: 3–9.
- Marsh, I. and Yencken, D. 2004, *Into the future: the neglect of the long term in Australian politics*, Melbourne: Black Inc.
- Powell, J. 2000, 'Snakes and cannons: water management and the geographical imagination in Australia' in Dovers, S. (ed.), *Environmental history and policy: still settling Australia*, Melbourne: Oxford University Press.
- Proust, K., Dovers, S., Foran, B., Newell, B., Steffen, W. and Troy, P. 2007, *Climate, energy and water: accounting for the links*, Canberra: Land & Water Australia. ISBN 978-1921253348. www.lwa.gov.au/downloads/publications_pdf/ER071256.pdf
- Richardson, B. and Bosselman, K. (eds) 1999, *Environmental justice and market mechanisms: key challenges for environmental law and policy*, London: Kluwer Law International.
- Sheil, C. and Leak, B. 2000, *Water's fall: running the risks with economic rationalism*, Sydney: Pluto Press.
- Smith, D. I. 1998, *Water in Australia: resources and management*, Melbourne: Oxford University Press.
- UN (United Nations) 1992, 'Agenda 21: the programme of action from Rio', New York: UN.
- Wanna, J. and Weller, P. 2003, 'Traditions of Australian governance', *Public Administration* 81: 63–94.

Troubled Waters: Confronting the Water Crisis in Australia's Cities

WCED (World Commission on Environment and Development) 1987, *Our common future*, Oxford: Oxford University Press.