

# Buying time: City growth and concealed environmental problems<sup>+</sup>

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## INTRODUCTION

Over the past few decades, Australia's capital cities have experienced significant growth. They now cover vast areas, visiting their impacts further and further into the countryside and along the coast like spot fires ahead of a main blaze. Their rising economic prosperity, reflected in an insatiable appetite for goods & services and fed by aggressive economic commentators is, through materials and energy imports, sending environmental impacts into far away places. (Brown, 2003; Hamilton, 2003).

But society is still to convince itself that it should be facing up to the intractable problems of burgeoning affluence and population growth, detailed for example in the recent New South Wales environmental audit (EPA-NSW, 2003), that threaten to envelop cities and their far-flung hinterlands.

Meantime, there are critical often subtle concerns of growing seriousness that demand concerted attention, especially from State and local governments. This paper focuses on five, by no means the only such concerns touching cities, that are rarely on planners'

screens, or if so, are given too little attention. Notably, these are fine particulate pollution, heat island effects and noise in local area settings, water quality deterioration from run-off, and the degradation of green space in urban environs

Many elements in fact defy straightforward solutions. Nevertheless, a range of measures have been identified to reduce their severity; in effect, helping to buy time while we face up to the downsides of runaway consumption and major population growth.

## TODAY'S BROADER CONTEXT FOR CITY PLANNING

A popular focus of critics of our metropolises is their dispersed low density form and high reliance on the car, resulting in the burning of large amounts of fossil fuel.

Growing road traffic makes high demands for energy and causes environmental damage both locally in terms of air pollution, contaminated runoff, noise and globally in emission of greenhouse gases (GHG). The transportation sector now accounts for about 17 per cent of the GHG produced in Australia and most of this is from road transport. ABARE anticipates an economic growth rate of 2.4 per cent per annum for the sector through 2015. Traffic volumes are already increasing at around 2-3 per cent per annum and this can be expected to rise further as vehicles grow yet larger (e.g. SUV's) &/or are driven further.

Not surprisingly, given the global reach of the issue and the American and Australian governments intransigence towards the signing of Kyoto, environmental problems at large are usually viewed through a climate change prism. It took a severe drought to elevate water to anything near the profile that energy enjoys in government and industry.

There are plainly many other factors that make for or impair environmental quality and thus form part of the sustainability equation. The BASIX scorecard of NSW's Sustainability Unit, for example, in addition to energy and greenhouse, lists water, waste, transport and social goals as requisites for checking new developments. These parameters crop up in metaphors like the extended metabolism of human settlements (DEST, 1996; Newman, 2003; Yencken & Wilkinson, 2000).

Treatises on the sustainability of cities are often obtuse, understandably still exploratory, but when they do get around to practicalities frequently focus on transportation and densification. A debate continues to run in academic circles between proponents of compaction and continuing car-driven suburbanisation (Newman, *op cit*; Troy 2001). When it reaches into government agendas, the conclusions for policy are usually about infrastructure provision, in the "predict and provide" mould. Population restraint rarely gets a mention. Among the political leadership only Premier Bob Carr has spoken out on the need for limits on people numbers, urging immigration quotas be reduced to 70,000 per annum. While he's still finding ways to fit larger numbers into Sydney, Carr can foresee continuous coastal development "from south of the Daintree to Southern Victoria".

Australia's population growth in any event looks set to swamp gains made by the application of eco-efficiency principles - a core precept of ecologically sustainable development. The idea here is to replace a situation where technology damages or threatens the environment on the one hand and is used to secure it on the other, by a unitary (sustainable) technology that augments economic growth but by using less energy, water and materials per unit of output. (Fisher, 2000a).

Unfortunately the gains coming off greater efficiencies can be used as a platform for consuming more of the same service or product (i.e. the 'rebound' or 'revenge effect' (Tenner, 1997). So, no matter how brilliant the innovations in management or technology might be, they can only advance cities so far towards sustainability.

Modifications are needed in consumer behaviour - a recent success story being the reduction in household water demand.

Nonetheless, it needs to be acknowledged that whereas a handful of Western cities - Amsterdam immediately comes to mind – appear to be well on their way towards sustainability, their levels of consumption are stressing ecological systems elsewhere (Beckett, 2003; Fabian Society, 2003). Not to mention how a world-wide growing appetite for air travel is adding to global warming (Fisher, 2000b; ENDS 2003).

## MORE CONCEALED FORMS OF URBAN DEGRADATION

Whereas planners pursue consolidation and other arms of government busy themselves with promoting energy saving, water conservation and 'water sensitive urban design', a number of problems are being overlooked or downplayed which are affecting human health &/or degrading terrestrial and aquatic biodiversity.

However, because they are incremental, aren't producing any immediate or obvious harm and where applicable, the offending contaminants are invisible or near invisible, most receive little if any government, media or community attention (Kearney, 2003).

*Especially concerning are:*

1) Particulates less than 2.5 microns (PM<sub>2.5's</sub>) originating from growing numbers of diesel engines many poorly tuned (And, to some extent, internal combustion engines). It has been estimated that city dwellers take in 25 million such particles with each breath. Lodging into the respiratory system these minute fractions are capable of triggering an inflammatory reaction in the lungs otherwise known as 'acute chemical sensitisation', which can lead to cancers, heart disease, etc (Fisher, 1999; ABC-RN, 2003). They may similarly affect pets and wildlife.

And, a new study has shown that carbon nano-particles like those from diesels can travel to the brain as well by moving down the brain cells that pick up odours and transmit signals to the olfactory bulb (Oberdörster, 2004).

Also present in diesel exhaust is 3-nitrobenzathrone, a nitro polycyclic aromatic hydrocarbon which is produced in quantity from engines under heavy load. 3-nitrobenzathrone has been found to cause massive chromosomal aberrations in the blood cells of mice, suggesting that it is likely to have similar effects on other mammals, including humans.

2) An increased volume of stormwater due to the loss of vegetated surfaces and trees especially as a result of infill development. This runoff can be contaminated by endocrine disrupting and other damaging pharmaceutical residuals such as antidepressants originating in mobilised doggy-do and the occasional sewage overflow into drains during downpours (Fisher & Borland, 2003; Streater, 2003). Also present are heavy metals. There is a palpable failure to intercept and treat this water before it reaches and damages stream and marine biota (Fisher, 2002a)

*Lesser but still perturbing concerns are:*

1) Urban heat island effects from tree loss and replacement by hard, often reflective surfaces leading to increased power demand and rain shadow effects. A NASA sponsored study of Atlanta for instance, found that the swapping of trees and other vegetation for heat absorbing asphalt, concrete and rooftops created an urban heat island that can generate its own winds, and thunderstorms warm the city well into the night and dramatically increase the production of harmful ground level ozone. (ENN, 1999)

2) A noise epidemic extending beyond annoyance to sleep disturbance affecting health (WHO, 1999) especially in newly consolidated areas. There is even evidence that road noise is impacting the breeding of birds by drowning out mating calls.

3) Light pollution affecting humans (a possible breast cancer source - Stevens & Rea, 2001), animals, insects and plants: Intense constant illumination causes the normal circadian rhythm to go into arrhythmia, to essentially go whacko. (IDSA, 2003).

*A variety of other factors are adding to these troubles:*

For instance, tree lopping and removal is gaining pace encouraged by opportunistic "tree managers" to avoid public liability from falls as a result of climate change related storms; to preserve views (Lamont, 2004); or simply because of an outbreak of whipped-up hysteria and minimalist landscape fashions. Such degreening has had a domino effect - exposing and similarly damaging nearby trees leading to their subsequent removal and so forth. As a result, habitats are being lost for birds and marsupials (e.g. possums and flying foxes) while the shading effects of tree cover are being foregone leading to higher energy usage for cooling. Tree loss also means that the pollutant filtering capacity of foliage (Sequest et al, 1998) is being diminished thus increasing exposure to PM<sub>2.5s</sub> near busy roads.

Tree removal is in turn increasing runoff because precipitation normally caught and adsorbed by leaves - the cumulative leaf area of a tree is 100-1000 times the area of its drip zone - and taken-up by roots is now in the gutters. Increased runoff is in turn lowering salinity levels of inshore areas of seas affecting marine life by delivering freshwater well in excess of earlier or pre-settlement eras.

The loss of green space is more prevalent than commonly thought. For example, thirty years into their establishment, 'third-tier' suburbs (featuring lot sizes of 500-600 m<sup>2</sup>) are being pummelled by the removal of large canopied trees with a resultant loss of native fauna around houses and on large lot reserves. This extends to unwanted commercial and institutional sites which are being pressed into higher density housing. (Puglisi, 2003). The removal of remnant deep rooted vegetation in some city localities/soils also raises the

prospect that they will one day succumb to rising salinity: This has already occurred in Wagga and Dubbo and is now emergent in Penrith.

At city perimeters, growth has hammered and continues to hammer biodiversity - birds, reptiles, marsupials and insects are steadily losing habitat from the resumption of farmland and clearing of remnant bush. The toll is truly staggering with over 100 million mammals, birds and reptiles dying each year in Queensland alone: (WWF, 2003) And, major road projects especially motorways, are acting as impassable barriers to genetic exchange between mammal populations or as sites for running down creatures foolhardy enough to attempt a crossing (Ariza, 1998).

Yet more disquietening is the appearance of 'extinction debt' where bird losses can occur up to thirty years after the original partial clearing (Traill 2000).

Remnant patches of vegetation both at the perimeter and within built-out areas are in trouble too because of the lack of fire, fringe effects, loss of pollinators and insectivorous/ pest eating birds, reduced gene pools and lack of genetic exchange (Saunders, 2002). For example a small patch of surviving box forest in Royal Park, Melbourne has been invaded by exotic weeds and the number and variety of its native plants has plummeted in the mere space of seven years. An interesting indication of decline in urban bushland would stem from re-surveying the native flora in Studley Park and Yarra Bend Reserves in Melbourne and comparing the results with an earlier survey (McIntyre & Yugovic, 1982). *Epacris impressa*, Victoria's floral emblem recorded there in 1982 and within sight of the CBD, looks to have vanished possibly as a result of the loss of its bird pollinator, the Spriated Thornbill, and absence of fire..

Finally, in this litany of too little recognised environmental depredations of urban stress, city water appetites are seriously impacting environmental flows in tapped rural rivers already adversely affected by the drought (Fisher, 2000c).

A further commandeering of this supply is suggested by the Californian experience (Murphy, 2003) Viz. in a head-to-head confrontation between agricultural interests and those of the bigger constituency of the cities, the cities will usually win out.

## GOVERNMENT POLICIES AND THE INVESTMENT BOOM

There have been a number of consequences flowing from the property and investment boom apart from the hype. (A Sydney real estate agent recently declared that "Most of the world has become a developer" while a newspaper headline boasted that "Now we are all landlords".).

1) Foremost has been the creation of an atmosphere that cities can keep on growing without meeting resource walls or causing serious harm to the environment.

Even the drought has failed to dent this expectation because governments have simply said that increased demand can be accommodated through water saving and water recycling rather than new dams. Never mind that at some stage the fat will have been fully taken up. (Downie, 2003; Fisher, 2000c)

In fact, the States (with perhaps one notable exception) avoid looking at this issue and proceed by nominating a year into the future, say 2020 or 2030. Then, in what could be called "the infrastructure first approach to planning", governments, leading or more probably lead by them, ask their various service authorities to say how that service can be supplied to the specified year. The planning authorities are instructed to find the land to "fit in" a range of projected population numbers.

The political and technical limitations of that approach are obvious: The service and planning arms of government are under direction to accommodate more people, so they must perform. No serious conclusions are drawn as to what might happen after the specified year. Nor is there consideration of what the implications of starting

down the track from a higher platform of population might mean for future governments.

If the reason for proceeding in this constrained way is a belief that thinking too far ahead is fanciful, it can only mean that governments have yet to recognise the time-scales and imperatives that are driving today's rigorous environmental assessments (Pimm, 2001).

2) The boom has also served to exacerbate the systemic environmental problems identified earlier in this paper. It has speeded up land clearing, lifted the amount of hard surfaces through site redevelopment and seen the removal of many trees (Hitchmough, 1992). The resumption of land at the perimeter for new housing has also deprived cities of nearby sources of fresh produce by overrunning market gardens especially around Sydney (Kelleher, 2001).

3) Further, it has resulted in record numbers of light commercial vehicles and new cars on urban roads. At first sight the latter might be expected to reduce pollution levels with the retirement of 'smokers' - that 10 per cent of the car fleet that produce 50 per cent of vehicular emissions (ENDS, 1994). However, the presence of SUV's, many of which are diesels, has markedly increased (Marks, 2003). (Light commercial vehicles are usually diesel too.)

The miniscule particles emitted from these engines can remain in suspension, swirling around in the air for a week or so, assuming new chemical guises after being repeatedly super-cooked in the carburettors of other engines.

Especially hazardous are de-greened locations notably street canyons close to gridlock conditions where hard, non-vegetated surfaces predominate (Vardoulakis et al, 2003). Fines are swept up here by wind and traffic in the hotter, drier months. Deceleration, idling and acceleration, similarly make intersections especially hazardous places when average daily flows exceed 20,000 vehicles (Pearce, 2002; Kearney, op cit).

In terms of policy responses short of broad traffic reduction measures, authorities would be unwise to use or to promote congestion as a tool for regulating traffic levels yet some do just this. The proliferation of complaints in local air stressed situations belies the complacency that things are going well on the air quality front. (Could the fear of opening a Pandora's box of claims be preventing decisive responses?).

Under consolidation policies, multiple dwellings, shopping and recreational uses have been added to the pre-existing, lower density urban fabric, very commonly along major roads and near busy intersections. Alas, these are putting more and more people, and worryingly, children, at serious health risk (AATSE, 1997. Janssen, 2001). What is more, a short cut to higher density, seen as desirable because locations are often near train stations or adjoin transit routes, has heightened exposure.

Accordingly, if higher density development oriented to public transit provision is to have a place in the construction of Australian cities, then, as a policy, it will need to be carefully crafted to particular, probably very few, locations. There is enough experience now of the poor outcomes which flow from the broad-scale overlay of a general policy of consolidation across metropolitan areas.

A comprehensive study of urban form and energy gives a salutary warning about the complexity of this issue. "It is one thing to say that cities with different urban forms have different rates of energy consumption; it is quite another to say that a significant improvement can be achieved through realistic changes to the form of a particular city." (Anderson, 1996).

## RELIEVING CITIES OF ENVIRONMENTAL STRESS

A preparedness to restrict population growth is fundamental to relieving resource and environmental stresses in the capital cities. Since the States are in fierce competition with each other for

development opportunities there is little prospect of this happening in the short run. In the long run many of the problems we have identified will have taken their toll on people, wildlife and habitats.

*While governments and society are not yet willing to contemplate at least the stabilization of population numbers, and society seems reluctant to dampen its drive for greater and greater affluence, what should we be looking at by way of remedying even the worst of these problems - as we say, seeking to buy some time?*

Insofar as particulates are concerned it could be argued that the early introduction of low sulphur diesel will provide a remedy but unfortunately, not for 3-nitrobenzathrone. Moreover, PM<sub>2.5</sub>s also stem from internal combustion engines. Hybrid powertrains will undoubtedly help but a full transition to these and fuel cells is still decades away.

So as a first level development assessment tool, there seems no getting away from an imposition of setbacks (Whiston, 1983), planting regimes, building designs, etc, that would avoid or even reduce the deleterious effects for people who work or reside in unsatisfactory locations. In some cases, planning authorities should contemplate outright refusal of permission to build poorly located premises. Planning law allows that general policy intentions be interpreted in the light of site-specific considerations.

Another response would see 'low exposure zones' established in the most hazardous areas allowing entry only to vehicles meeting Euro III (or minimally, Euro II) type emission standards – a ploy followed in some European cities.

The dousing of soils, groundwater, waterways and seas by stormwater contaminated with heavy metals, herbicides, hormones and pharmaceutical residuals, is no more tractable. Curiously, regulators are still preoccupied with litter, sediments and nutrients. (The dramatic decline in the diversity of marine life at Ricketts Point in Port Phillip Bay over the past quarter of a century (Herrick, 2003) could be partly interpreted in terms of the cumulative impact of

heavy metals, herbicides and possibly pharmaceutical residuals in runoff entering its reef zone.)

At present little if any drainage is caught to remove gross pollutants before discharge to streams or the sea - Sydney has the most Gross Pollutant Traps with about 600 but Brisbane is catching up. However these devices are allowing many serious contaminants through and if not regularly cleaned their polluted wet vaults are flushed out by the next storm. Disturbingly, benchmark scientific tests undertaken on some Melbourne GPT's, established that the solid and liquid muck in their wet vaults failed to meet even standards set for discharge to sewer.

Whereas Water Sensitive Urban Design is brandished as a universal remedy it is near impossible both in terms of space and the price of land to comprehensively retrofit built out areas – places responsible for the vast amount of urban runoff load. Offending contaminants instead should be trapped closer to their point of origin targetting hotspots like (fish) markets, car parks, industrial estates, etc as proposed for Sydney's Black Wattle Bay catchment. One promising device has been developed by wetland specialist Geoffrey Sainty and collaborators using a vertical reed bed RootZone™ filter. Out on the streets there are one or two proprietary devices featuring catch baskets (e.g, Enviropod™ in the Brisbane CBD) which can be inserted into side entry or gully pits alongside kerbs. These may also be fitted with filters keyed to different pollutants. However, this remedy is costly due to the sheer number of pits and the time may fast be approaching for independent financing of SQID infrastructure (Chanan et al, 2001; Hunter & Fisher, 2003). One possible means is a stormwater tax levied according to the amount of impervious surface per site. Such taxes already apply in Florida.

*The remaining systemic problems similarly defy all encompassing solutions but a reduction in their severity remains possible:*

1) Many councils have powers to limit tree removal but can do little about the destruction of understoreys (justified for fire protection) which are key habitats for many small creatures. It would seem that

most patches of remnant vegetation in any event are genetically doomed although strategic burns from time to time would temporarily reinvigorate them provided there exist nearby refuges for fauna.

2) The valuable role played by backgarden vegetation in providing corridors for the movement of birds and some marsupials could be better recognised as well, while urban heat island effects can be partially overcome by insisting that large trees remain in consolidated localities. These effects might otherwise become so severe that city authorities will be forced to plant trees to create cool spots and to paint roofs white to reflect heat back into space (Radford, 2000).

3) Some progress appears to have been made on noise mainly in relation to buildings but little has been achieved with off-the-street noise or the problem in relation to airports. Changing life styles has rendered many noise ordinances inappropriate.

4) Finally, light pollution can be lowered by retrofitting street lamps with infrared switches saving energy as well. Or at least adoption of the practice of American states like Arizona, Maine, New Mexico and Connecticut of eliminating the amount of light that goes above the lamp in streetlights and other outdoor lighting fixtures. (IDSA, op cit).

## CONCLUSIONS

Australia is a deep-time creation (Fisher, 2002b). Successive waves of immigrants to its shores stumbled upon an extraordinary entity, with stunning regional variations, unmatched in natural diversity, certainly in relation to the Europe from which most of the second contingent came. We should not settle for lives in lost or degraded landscapes let alone a diminution of the invaluable services to the economy that the other Australia's natural capital provides. Its remnant existence (White, 1994) posits a question mark against the wisdom of chasing a global-style urbanism/minimalist built form in architecture and landscaping. Australia's indigenous nature can

be understood as a metaphor for the local as against the global view of the world.

Yet our cities are teeming with people living and working in settings where the relationship between their existence and the life-support system beyond the ex-urban areas and paddocks is becoming more obscure despite the drought.

Recent figures reveal that concern for the environment among Australian households has fallen to its lowest point (62 per cent) since the ABS began asking the question in 1972. But it may take several generations for Australians to acquire a fresh perspective on their residency of this continent. That shift is imperative for repair to take hold and inspire.

This deep-time perspective and evidence - pointed to earlier in the paper about the serious degradation resulting from population growth, runaway affluence and boom-time development - suggest a cautionary stance by planners towards accommodating the rush for big numbers. Subtlety is needed in dealing with different sectors of Australia's major cities, by overlaying more sophisticated evidence of stress emerging from growth so far (White, 1997).

There are clearly difficulties in making that transition and no one knows the best ways to redirect a still largely reluctant society to look more than a short time ahead. Planners at least need to start by voicing concerns about the raw push for growth and acknowledge its limitations. At the very least, decisive action is well overdue to lessen the incidence of the problems we have identified.

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