

Physical Determinism and Australian Cities

Introduction

The growth of Australia's major cities is revealing a number of problems. For most of the post WWII period they grew in accordance with the form and structure of highly centralized cities. Their growth was accommodated within

- simple notions of property rights,
- a dramatic increase in the level of home ownership,
- archaic notions of distribution of political rights and how they might be expressed – we have for example accorded 'central city interests' a higher level of authority and control over development of the city as a whole than their proportion of the population or their 'mix' of economic activity might indicate was appropriate ,
- low levels of investment in public transport and, for much of the period,
- an assumption that road based private transport would lead to the desired 'connectivity' with and 'accessibility' to other members of the community, commercial undertakings, employment opportunities and cultural facilities and services,
- a physical planning process (Town Planning) the assumption of which is that even in a market economy it is important to try to regulate and arrange the physical distribution of social and economic activities in cities and regions to ensure that their location led to felicitous outcomes.

The supply of energy and potable water (generally provided by State or metropolitan agencies) seemed sufficient for the needs of their populations. Rudimentary planning for and regulation of them was thought to be adequate..

History

From settlement in 1788 to WWII the planning and development of Australian cities was at best episodic and heavily influenced by 19Cth and 20Cth views of the accommodation needs of the population in response to social challenges and the spatial relationship of 'industry' to housing (particularly with what we now see as 'polluting' or potentially health threatening industrial activity although some industrial working class suburbs developed with minimal segregation of residences from noxious industries).

The aetiology of illnesses such as those described by Smith (2011) as '*crowd diseases*' was only beginning to be understood as the nascent biological sciences developed in the 19Cth. Those who focused on the poor health outcomes of overcrowding, poor dwelling ventilation and insanitary conditions, especially of working class households in the cities following the enclosure movement and the working out of the Industrial Revolution in Britain (Morris 1997), sought ways of improving their living conditions. This was largely driven by a desire to reduce the risks to the "better off" as much as to improve the "lot" of the poor. As Ashworth (1954,18) comments "In most places members of various classes had lived in fairly close proximity, but as the rapid influx of population into any locality lowered its condition, so those of higher incomes moved into other districts as opportunity arose." The living conditions of workers in 1844 documented by Engels (1971) adding to the pressure for reform. Pressure to improve the living conditions of

workers was also due to the influence of Dissenters including Methodists who helped develop self confidence in and the capacity for organization of working people (Thompson (1964)). Leading Quaker industrialists who developed 'model' estates for workers in their factories (Lever at Port Sunlight and Cadbury at Bournville) embraced the assumption that workers should have comfortable accommodation and enough space around their dwellings to engage in gardening and social recreation (Keeble 1961). The effect of industrialization was seen by some as reducing the quality of people's lives (Sharp 1940). Later reformers drew attention to the ways in which better planning and location of activities led to better transport outcomes (Tetlow and Goss 1965). It was believed that the physical arrangements of their lives would produce healthy communities. This elemental form of physical determinism became one of the basic tenets of British town planning and, because of its British heritage, to town planning education and practices in Australia.

Those founding their critiques on more systematic exploration of conditions in the emerging cities found it easier to spatially summarize their observations. This handy simple description of objective conditions provided satisfaction enough for reformers to construct responses to alleviate, even eliminate, the problems. While the descriptions were accurate their causal linkages were less clear. Many of the changes in physical living conditions were accompanied by improvements in health but the 'science' behind them was less well understood. In some cases the improvement was due to better ventilated, more commodious housing with better sanitation and waste disposal services. Some of the health improvements were due to higher household incomes, better diets, better hygiene practices and, in no small measure, to better fertility control and greater equality of women.

The identification of the spatial concentration of disadvantage, poor housing and health led to a useful 'shorthand' in policy responses. Davison (2015) reminds us that, aside from the medical ideas about density and disease, there was also a strain of moral argument which may be traced to Thomas Chalmers (1823), the Scottish theologian's writings, especially his *Christian and Civic Economy of Great Towns* in which he suggested that there was a relationship between physical density and social breakdown. His conclusion was based on his experience as a minister in the crowded inner neighbourhoods of Glasgow in the years after the end of the Napoleonic Wars. He argued for more churches (i.e. increasing the density of their provision so that the population would become more 'christian' to encourage more engagement). His assumption that the lack of social cohesion was due to the crowdedness of the neighborhood is dubious but his views were influential with late 19Cth reformers.

Early in the 19Cth as the fruits of the Industrial Revolution became more obvious to commentators like Engels (1971), who drew attention to the living conditions of the working class in 1844, some British civic leaders and social reformers argued that social benefits would follow from improved physical conditions.

Housing regulations were adopted to improve the structural and fire safety of buildings and later to improve ventilation and more exposure of habitable rooms to sunlight. These,

together with regulations designed to improve sanitation after the innovations promulgated by Chadwick (1842) were followed by improvements in city residents' health. Many of the ideas and understandings of the need for reform of the urban environment in Britain survived sea voyage to Australia. The early understanding of disease transmission relied on simple 'models' of behavior such as by miasmatic theories of disease transmission enshrined in the City of Sydney Improvement Act of 1879 requiring all living rooms to be externally ventilated.

The 19Cth documentation of poor sanitation, overcrowded housing and stressful working conditions revealed health and social conditions in Britain that were a source of social discontent and unrest in a period of developing notions of democracy and citizen's rights (Thorns 1972). Thorns also wrote of the attractions of suburban development. The vestiges of the hierarchical feudal order were being challenged as the market economy strengthened. Ebenezer Howard (1960) opposed suburban development but made a case in the late 19Cth for re-organising city development, launching what became a popular appeal for 'garden cities' in which households would have a garden around their houses. His argument that households would have a healthier environment and be able to develop a degree of self-dependence rested in part on a notion of property rights in which urban space was communally owned.

By early 20Cth the case for better planning of British towns was reflected in popular texts as well as in the emerging profession of town planning (Warren & Davidge 1930). The basis of much town planning in Britain rested on the notion of the development of planned neighbourhoods that were conceived as the spatial unit required to facilitate and support family life and in which households could find most of the services and facilities (separate houses, shops, schools, churches, recreation facilities, pubs etc.) on which they depended and usually built around a transport node – most often a railway station.

Administrations in Australian colonies in mid 19Cth were aware of the debates and expression of concern over urban living conditions in Britain and the changes wrought by the 'working out' of the agricultural closure movement and the Industrial Revolution and the remedies devised to address them. They were likely as aware that the flow of migrants to Australia in the mid to late 19Cth was, in part, a response to the conditions in Britain. Davison's (2015) account of the migration of his forbears to Australia is a useful example.

The planning in cities in United States of America (USA) followed the evolution of town planning in Britain for similar reasons. The industrialization that occurred in many cities in USA produced poor quality accommodation in challenging environments similar to those in Britain. Similar constellations of economic interests produced similar urban environments. The inhibitions found in Britain as a consequence of its pattern of land ownership did not apply in USA meant that in some circumstances communities and individuals were able to 'experiment' with different approaches to the development and management of their cities. Reps (1965) acknowledged that 'the first settlers brought with them concepts of towns and cities derived from European experience' but that 'physical environment, isolation and inadequate resources acted in different ways to prevent

wholesale transplanting to the colonies of the newer techniques of city design'. There were examples of 'urban improvement' and town planning in USA that had similar springs to those seen in Britain (Gans 1968).

In all three countries the civil order was increasingly organised by the adoption of Town Planning. Much of the order was built on notions of continuity of the location of major activities. It was assumed that better physical relations between where people lived and the contacts and activities they pursued, including the services they required, would result in felicitous outcomes if their spatial disposition was planned. It was also assumed that such a physical framework would be able to accommodate evolving, changing aspects of their family and social lives. It was also assumed that industrial activity and the employment it offered should be physically separated from other activities - especially domestic life - because of the hostile environment it created. That is, the planning of urban development would be beneficial to the health and development of communities. The benefits would flow from the physical relationship of activities but not be determined by them. Town planning would set the stage but not define activities pursued in the towns.

Australian Cities

The nature of Australian cities was framed by processes which led to them developing as low density in form but with a structure that was essentially radial. Mayne (1993) showed how the development of slum housing in Sydney in mid 19Cth accorded with practices and policies pursued in London. In Australia the notion of physical planning was established. The focus on improving physical aspects of sanitation paid little attention to the economic and social processes that led to households occupying poor quality accommodation. The idea that the quality of life in the cities, especially for the lower income households could be improved without disturbing the social order was powerfully attractive. The establishment of standards for structural and fire safety of housing and for separation of industrial activities from residential areas followed (Troy 2004).

Davison G (2009) charted the shifting meaning of the word "suburb". The OED records that in its original (1350) meaning the word referred to "the area immediately outside a town or city; the area belonging to a town or city that lies immediately outside its walls or boundaries". The sub-urb was essentially low density with few substantial buildings or structures that might be advantageous for forces attempting to invade or attack the city, or for traders not allowed to establish inside the city, although it refers now to the outlying residential parts of a city. The freedom and attraction that the suburban form offered settlers in Australia was not due to notions of communal defence but did enable households to provide their 'domestic defence'. Until late 19Cth they could manage much of the wastes they generated and provide much of their own food and water.

By mid 19Cth suburbs were the dominant form of Australian cities and seen as a virtue. Mullins (1981a and 1981b) suggested that suburbs were a cornerstone in the history of Australian urbanization. The form of early development of the various colonies in which households had to develop a degree of independence in securing their supply of potable water and food and their ability to manage domestic wastes forced settlers to develop

housing which had space around it to do so. Land was available to settlers who adopted a form of ‘suburban’ development and industrialization similar to that occurring contemporaneously in Britain’s towns. Richer households escaped from the noisome conditions of the cities to live in new healthier ‘suburbs’ beyond the reach of the city. The development of the Potts Point in Sydney was one of the earliest suburbs developed to escape the problems associated with overcrowding and poor sanitation in the centre of Sydney (Troy 2003).

The attraction of the separate house in its own garden was recognised by political leaders on both ‘sides’ of the aisle in Australian politics. Menzies (Liberal) in 1942 in defence of the suburban nature of Australian cities said: “*one of the best instincts in us is that which induces us to have one little piece of earth with a house and garden which is ours, to which we can withdraw, in which we can be among our friends, into which no stranger may come against our will.*” and McClelland (Labor) in 1963 made a similar statement “*Whatever a man’s calling, in a country with an area of some three million square miles, he has a right to a block of land some 50 by 150 feet that he can call his own...*”). That is, the suburbanization of the city and associated increase in home ownership must be seen as a mechanism for delivering/encouraging a greater degree of autonomy. We may also see suburbanization as an example of physical determinism – there is a strong sense in the content of the speeches of leaders from both main political parties that houses on their own plot of land provide opportunities for households not only to contribute to their own comfort and survival but to develop their sense of communal engagement. It was only a short step for some to claim such benefits were a result of low to moderate density development.

Garton (1990) provided a more nuanced analysis of the social and political conditions in early Sydney that found expression in the development of housing (including slums). His analysis revealed how the solution to perceived health issues was to take refuge in ‘physical’ responses i.e. to insist on better sanitation rather than focus on the economic conditions or processes that led to the creation of overcrowded housing.

By the end of the 19Cth Australian cities were clearly ‘suburban’ in form and radial in structure. The majority of the population, rich and poor, enjoyed a life in the city in which they had reasonable access to the wide variety of services. For the most part they had sufficient space around their dwellings that gave them the freedom to pursue a wide range of activities and to be confident that their children could enjoy outdoor activities in security. Such space also provided opportunities for households to provide some of their own food and to accommodate less fortunate members of their extended families (see Mullins (1981a & b) and Gaynor (2006) for explorations of the way households provided a significant proportion of their own food). Stretton (1970) suggested that the resulting suburbs were a cornerstone in the development of Australian egalitarianism.

The regularization of control of development of Australian cities to avoid problems of structural safety, sanitation and overcrowding and without ‘upsetting’ the social order seemed to be an acceptable compromise. The adoption of ‘physical’ approaches led to the promulgation of regulations designed to ensure adequate ventilation of dwellings,

improved sunlight, appropriate living space, provision of potable water and basic sanitation. The regulations often evolved out of analysis of specific traumas. Measures to reduce overcrowding grew out of the concerns revealed by rudimentary health measures. As cities grew and their populations had less access to a more 'natural' life style the need for a more controlled development emerged.

Attention focused on the provision of housing for the poorer members of society in the inner suburbs of Sydney and Melbourne. Conditions in the 'slums' drew the attention of activists in several of the major churches and to the reforming ambitions of the Labor Party. The dominant physical determinism was constructed by taking a baleful view of the behavior of the poor and a conveniently myopic view of the causes of the slums, ignoring the way the economic system 'produced' low income households where the poor did not have the resources to gain access to housing of reasonable comfort.

By the end of the long Depression (1939) the housing situation was significantly worse for a large proportion of low skilled workers and their families. Over-crowding of dwellings in the inner working class suburbs of the cities was commonplace and unemployment was high.

In response the Commonwealth Parliament established a Joint Parliamentary Committee on Social Security (JPCSS) in 1941. The outbreak of war focused attention on the accommodation of the population and brought into high relief the various campaigns to eradicate slums, especially those in Sydney and Melbourne. Following the 1941 change in Government the Labor administration acted on the JPCSS's recommendations relating to housing reform seizing the opportunity to plan for the needs of post-war reconstruction including developing capacity to plan and provide for improved housing.

In 1946 the Commonwealth Government created a public housing program to address overcrowding and poor provision of open space for many low income households in inner suburbs. The program, an important element in its postwar reconstruction activity (Macintyre 2015), was based on the notion that adequate dwellings on their own 'plot' of land would create housing appropriate for the development of a healthy population and the elimination of slum housing (Troy 2012). Although the economic origins of poor housing were acknowledged its solution was seen in physical determinist terms. To gain access to Commonwealth funds for public housing states were required to introduce town planning. Not all states complied with the condition, nonetheless, all plans developed in the 1950s to regulate and guide the development of, towns and cities were based on the notion that they were suburban in their form. Development was low density housing with provision of recreation and open space, schools, commercial and industrial development. Public transport networks facilitated the form of development.

Australian cities since WWII

In 1946 few had received training in town planning in Australia. Those who had relied on studies carried out in the 19Cth on British cities that drew attention to the living conditions under which a high proportion of the populations lived. They were educated using texts largely by British planners such as Ashworth (1954) and Keeble (1961),

which were based on physical determinist 'research' and assertions. Later, Australian texts using local examples of design based on physical determinist principles Brown and Sherrard (1951) and Winston (1957) became staple texts in town planning courses in Australian universities. Similar influence may also be found in the adoption of initiatives pursued in some North American cities. The work of Olmsted (1968) being particularly influential in developing a 'new world' approach to the development of urban areas paying greater attention to the integration of parks and open space development. Mumford (1966) also documented the development of the suburban model of the development of cities in Britain and USA which resonated with the nascent planning profession in Australia.

Pro-decentralization arguments used to sponsor development initiatives in various regions in Australia may also be seen as elements of a physical determinist approach to urban development. The increasing power of millers and brewers based in the State capitals saw many of the regional enterprises in these industries close. Improvement in rural roads was accompanied by decline in regional rail based transport centres. The change in the rail system from steam to diesel based power was followed by decline in rail transport employment in regional centres. Adoption of new technologies in primary production together with rationalization of retailing and financial services led to decline or reduced opportunities for growth in regional centres. The lower rate of population growth in post WWII seemed to accentuate the reduced growth of regional centres.

The notion of physical determinism was established. Articulation of standards for structural, fire safety and accommodation of housing and the need to provide for separation of industrial activities from residential areas followed. The idea that it was appropriate to build an efficient, healthy city rather than rely on a serendipitous outcome of a series of investment or development decisions led to the notion that it would be beneficial for urban areas to be planned and their development managed. This created a demand for people who could advise on the appropriate standards for housing and the disposition of activities. The profession of town planning was born. The training of town planners focused on the physical determinist initiatives that were seen to be felicitous. For a while this seemed to be an adequate approach to the challenges provided by the growth and management of urban areas.

The changing nature and scale of economic activity and social control of development in a city began to reveal the limits of physical determinist precepts for its direction and control. The quality of housing and the range of facilities and services urban populations demanded required more sophisticated analyses. This led to a more nuanced evidence-based critique of urban development. Australian universities provided opportunities for research in geography, sociology, public administration, public health, engineering and the history of human settlement. The wealth of information and new understanding that flowed from the focus on urban matters was reflected in new policy and development initiatives.

It is hard to identify the 'tipping point' (and there may not have been a single event or 'point of inflection') but all cities seemed to reach a moment in their recent public debate

where they were seen to be in crisis and significant changes in their planning, development and management based on the initiatives established under the Commonwealth State Housing Agreement in 1946 were called for.

This change in ‘mood’ coincided with increasing concern over the consequences of climate change, the most important cause of which lies in the level of consumption of energy (as suggested in a sequence of IPCC reports) and natural resources, including potable water. The level consumption arises largely from the way we build and operate our cities and the activities we pursue in them that increases stresses in the natural systems.

The debate over the way we should respond to the climate challenges has been framed by the language used. We have tended to focus on ‘efficiency’, ‘equity’, ‘adaptability’ and ‘sustainability’ although we have also been careful to avoid precision in what those words might mean in Australian cities. The language was also in tension with the prevailing ‘economistic’ notions that established the terms under which development and management of Australian cities occurred.

It is also framed in a change in the articulation of the issues about which we have ‘manufactured’ our concerns. Part of the early concern for the quality of urban life lay in what was seen as overly dense development or ‘overcrowding’ so we focused on the transmission of disease, the level of sanitation and lack of ventilation. This led into exploration of minimum space standards. The early public housing initiatives, including in Australia Troy (2012) paid attention to the minimum space standards required at different stages in the life of households (‘families’ were expected to need more space with greater differentiation than that needed for an older couple). Public housing programs were designed, and the dwellings allocated, with the different needs of households in mind. Planning was seen as providing the framework for organizing the disposition of activities pursued in neighbourhoods that constituted the cities.

More recently we have tended to see the ‘urban crisis’ and its resolution in physical terms. In spite of lack of supporting evidence a view was promulgated that the form of Australian cities was the central cause of the increasing level of energy and water consumption. The structure of cities and the manner in which energy and water services were supplied was ignored. Studies of water consumption in Sydney Randolph & Troy (2007) and Canberra Talent, Troy & Dovers (2013) revealed that increasing density did not reduce per capita consumption. Moreover, per capita energy consumption indicated that higher density accommodation was associated with higher energy consumption (Talent, Troy and Dovers (2014), Energy Australia (2005)). Although these results may be counter-intuitive there are strong social reasons why we might expect this to be the case Randolph & Troy (2011).

Rather than explore the social and economic factors that operate in and shape the nature of Australian society and find expression in its cities little attention has been focused on the development of an informed critique of their operation. Much contemporary physical determinism in Australian cities rests on conclusions or observations related to other

cities in other cultures built in different times and with different ‘sets’ of economic and social forces as though they are relevant, without translation, to Australian circumstances. It is as though we are encouraged to believe that the historical, legal, cultural and economic experience and circumstances of other cultures and economies can provide more than illustrative comparisons. The assumption that we can determine universal constants of behavior or outcomes for Australian cities rests largely on a limited source of environmental stress, in particular, the amount of energy we use in our urban transport.

We have also realized that the cities cannot function as we might like by relying on private motor vehicles – the level of road investment, the congestion costs of the road system and its maintenance together with the direct pollution costs resulting from the reliance on internal combustion engines are unacceptable. A more developed ‘accounting’ of the way the earth’s climate system is undergoing changes leads to exploration of other pressures arising from our consumption (and the associated or consequential production processes) of food, water and materials. The simple associational correlation between sensitively planned and developed environments and better health outcomes for households elided into an assumption that there was a causal connection.

The response to the challenge of climate change and its consequences for Australian cities has been to take a physical determinist approach that underlies most urban planning pursued in Australia and adopt development policies based on ideas of a causal connection between their design and the physical relationship of accommodation and its location in relation to employment and social activities.

In spite of the efflorescence of new knowledge, local administration of urban areas now appear to be ‘preserved in aspic’. Town planners, many of whom were trained when physical determinist analysis seemed to offer a ‘satisfactory’ explanation of and a congenial way of controlling urban growth, were comfortable in their preconceptions of the nature of economic and social relations. They were not moved to review their policies as they were applied to the range of new activities taking place. With little evidence, they restated as ‘irrefutable truth’, elements of earlier physical determinist policies.

The Commonwealth’s refusal in the early 1960s and 1970s to fund development of the public transport systems meant that many of the suburbs built on the expanding fringe of the cities had poor access to public transport. Rather than directly address the problem some tried to show how increasing residential density would lead to better use of public transport.

The take up of modern data processing techniques throughout public and private administration facilitated decentralized administration and delivery of services and provides energy and stimulus for ‘within city’ decentralization policies. Nonetheless, the argument that workers in public and private administration should be centrally concentrated was strongly made in support of increasing density in central city areas.

By the late 20Cth concern over environmental issues was increasing. State and local governments responded to mounting evidence that increasing consumption of energy produced by burning of fossil fuels was a direct contributor to global warming by encouraging investment in renewable energy sources. They also encouraged households to reduce their demand for water services.

The city that emerged in Australia in the second half of the 20Cth confirmed its radial structure and low density form. The form also facilitated the ambitions of post war governments to ensure that the cities were more equitable. Whereas before 1945 home ownership in the city was significantly less than 50 percent, the promise of the 'new life after World War II' facilitated an increase in owner occupation. By 1966 owner occupation reached 70.8 percent. The greater part of the increase in owner occupation occurred in the suburbs and was largely due to the massive increase in 'owner built' houses constructed in the substantial number of speculative developments that took place in the suburbs of the major cities during the 1920s and 1930s but had not been developed, due to the state of the economy and to World War II. The early public housing programs also delivered large numbers of houses on separate blocks of land in the outer and middle distant suburbs. The post-war period also saw a dramatic increase in the proportion of dwellings that were classified as 'flats' rising from 5.9percent in 1947 to 22.3percent in 2006 (n.b. 'flats' include semi-detached, row or terrace house, Townhouse, etc) (Census 1947-2006).

Construction of public housing to reduce the density of accommodation of low income households to improve their health was achieved by establishing space and sunlight standards to apply to low income households.

The continued growth of the cities in the second half of the 20Cth was accompanied by further centralization of the city. Investment in public transport faltered and much of the urban expansion was not provided with adequate public transport. For a brief period increasing car ownership seemed to be able to meet the demand for accessibility as manufacturing moved to more commodious sites in the outer suburbs and retailing was restructured. The radial road networks could not meet the demand and congestion grew. The Commonwealth focus since 1928 on improving the road system using funds raised from the hypothecation of an excise on petrol and spent largely on rural roads (even though the greater part of the revenue was derived from consumption of petrol on urban road transport) meant States had insufficient resources to build additional public transport capacity (Troy 2014).

The current preoccupation with and prosecution of the case for increasing the density of Australian cities rests on such an assumption. The research 'evidence' presented by Newman and Kenworthy (1991) of a number of cities (many of them cities in USA) to buttress policy designed to increase the centralization of Australian cities is one illustration of claims of universal validity. Paradoxically, one of the leading authorities on American urbanization Gans (1992) concluded that it was a fallacy to argue that increasing density by high-rise development would resolve urban issues. Rather than explore the total energy consumption in Australian cities the Newman and Kenworthy

analysis rests on simple assumptions of gross transport energy consumption within a selection of world cities, the 'representative' nature of which was not explained. In arguing that increasing density will be accompanied by reduced transport energy consumption, and therefore in environmental stresses, the analysis is at best partial. Mindali *et al* (2004), using the Newman and Kenworthy data sets, concluded that there was no evidence to support the claim that increasing density was accompanied by reduced transport energy consumption.

The Ewing and Cervero (2010) study of travel and the built environment rejected the use of such highly aggregated metropolitan level data on the grounds that "Such studies have limited variance in both the dependent and independent variables with which to explain relationships." They observe that 'density has the weakest association with travel choice'. O'Toole (2008) writing for the conservative Cato Institute reviewed rail transit operation in US cities and concluded that there may be reasons for building rail transit systems but that saving energy and greenhouse gas emissions are not among them and made a strong case for urban bus systems. He made no claim relating to the form or structure of the city but this may be read as implicitly arguing that regardless of their structure or form, buses were the preferred public transport technology.

Rickwood, Glazebrook & Searle (2008) reviewed the relationship between urban structure and energy consumption and although they confuse the impact of structure and form they ascribe a primacy to transport energy consumption that a more fundamental review of how we live, or desire to live, in our cities might be reflected in their form. In a more recent study of Los Angeles Houston, Boarnet, Ferguson and Spears (2015) explored the question of whether investment in rail transit corridors transformed the automobile city. They found that the ability of near-transit compact growth to reduce vehicle travel varied depending on station area constraints and development context (although in one case they identified reduction of about 30% in vehicle carbon emissions). Their general conclusion that 'efforts to target household and job growth in dense, high quality areas... **may** (emphasis added) support policy goals to reduce household vehicle travel and reduce household vehicle travel and promote greater transit usage and walking', however, cannot be regarded as unequivocal support for densification of the city.

Policy makers often take recourse to arguments in favor of increasing density to minimize environmental stress. They do this out of a belief that there is a limit to growth but that by increasing density we can reduce that stress. The claim that increasing density will reduce transport energy has now been challenged. Nor is there evidence that general household operational energy reduces with increasing density (Talent *et al* 2013). Moreover, it is clear that increasing density is accompanied by estimates of increasing *per capita* consumption of embodied energy in the city.

The claim that increasing density of the city will lead to reduction in environmental stresses is a comfortable belief constructed out of ignorance of the way people actually behave. Nor is it related to their ambitions. That is, it is not related to the kinds of accommodation they seek at different stages in their life for their 'household'. Moreover,

replacement of coal fired production of electricity by solar and wind power with its lower stress on the environment (including replacement of petroleum based power sources in motor vehicles) it is expected that urban areas will reveal lower stresses. Neuman (2005) argues that the claim that increasing density reduces environmental stress is a fallacy. Nonetheless, the persistence with the notion of 'increasing density' as a way of accommodating to the phenomenon of climate change needs to be addressed.

There is strong data emerging from Australian cities that the per capita domestic consumption of energy increases with density (Talent *et al* 2013). Contrary to public perception the per capita consumption of water in Canberra (Talent *et al* 2013), and in Sydney (Randolph and Troy 2011) increases with density. The evidence in relation to household transport energy consumption is inconclusive although it does not appear in household expenditure studies to be proportionally more than domestic energy consumption. A significant but un-estimated proportion of transport energy consumption results from household members' participation in a range of social, cultural and employment activities that are not determined by density.

The development of modern cities has been predicated on the availability of secure supplies of potable water. It was convenient to use the water now reticulated to each dwelling as the medium to transport domestic wastes away from residences. There is emerging evidence that we have inadvertently created a problem in the management of our cities. While the per capita ingestion of water remains low the increase in our 'consumption' has largely been due to the use of water for waste management and, initially, for cleanliness although in this latter case it may partly be seen, not as a recognition of godliness, but as a debt to pleasure. Water consumption is now an 'environmental problem' that must be taken into account in exploring policies in relation to the form and structure of cities

The newer forms of legal rights in the strata titling of higher density development provide more opportunities for contention between owners and residents than found between owners and residents in conventional housing (Easthope *et al* 2012). Children have fewer opportunities for healthy development in higher density housing. Moreover, owner occupation is lower in higher density development.

Yet development proposals for specific areas are justified on the grounds that increasing density will be accompanied by reduction in energy and water consumption and increased levels of social engagement. Proposals for increased density of office and residential developments in central Brisbane, Melbourne, Sydney and Perth to make them more 'efficient' and socially and environmentally 'lively' are frequently made although little evidence is led to support the claims.

Arguments favoring primitive physical determinism and associated approaches to urban development policies were challenged by Gleeson in two important papers (2012 and 2013). In the first he drew attention to the work of North American scholars who argue that increasing urbanization (meaning increased density) increases prosperity and reduces environmental stress which we note is not an argument that withstands empirical analysis

in Australian cities. In the second he argues the poverty of positivism denies the social/political experience and realities that cities embody. Other scholars (Grosvenor and O'Neill 2014) have challenged the basis of current urban development policy based on physical determinism and rationalized as a way of making cities more sustainable arguing that the relationship between urban form and sustainability cannot be reduced to a single density metric.

Why we respond to physically determinist development proposals as though they are socially beneficial especially and lead to reduced energy and water consumption when the empirical evidence derived from explorations of Australian urban water and energy consumption behavior and its social construction suggests otherwise is not clear?

Some argue that it is imperative to increase the density of urban life to ensure that we can continue to 'grow the economy' rejecting the notion that there is a limit to growth. Evidence provided by the scientific community indicates that the natural systems that 'govern' the operation of planet earth are increasingly stressed implying that there is a limit to the kind of growth we have pursued.

The justification for increasing density should be seen not as a measure to reduce environmental stresses in the city but to protect and enhance the power of central city interests. The proposed changes to owners' rights in strata titled development not only implies the appropriation of some of the value of those rights (especially of elderly low or fixed income owners) it also assumes that such people may be made to move to allow for new usually higher density development. That is, it is based on an assumption that lower or fixed income households should have no expectation that they have a right to continued association with the community. While the measure focuses on the form of the city the effect of increasing density at the centre of the city also significantly affects its structure. The financial instruments employed to achieve the increase in density are largely designed to 'produce' financial outcomes rather than development of accommodation for the population.

Proponents of higher density do not generally comment on the lower level of owner occupation in high density developments, or that the limited nature of tenants' rights in rental accommodation means that there is lower level of 'community' engagement in such developments and tenants have less 'say' in the operation of the bodies established to manage the development. The dwelling size in higher density developments is also smaller than generally found in 'suburban developments'. A consequence of these aspects of higher density development is that there is generally a higher 'turnover' of population in such developments that in turn implies fewer children, older and low income households .

In the early stages of the development of planning it was argued that improving the living conditions of the lower income households in the community would lead to improved health and a greater degree of social engagement. That elemental form of physical determinism based as it was on improved housing, provision of communal infrastructure and better access to employment and a variety of cultural and social institutions was an

important aspect of the development of a cohesive relatively egalitarian society and to the nature and organization of Australian cities.

We are now entering a new phase with a new more aggressive approach to the physical elements of our cities.

The economic and social systems societies developed to facilitate or control their activities are not as adaptable. The physicality of urban development is determined to a large extent by investment in 'bricks and mortar' which, once built, persist. Their uses may be adaptable to a degree; that is, buildings built of bricks and mortar may be able to be used to accommodate different activities but there are, in many cases, social limits to those uses. The device used to pursue higher density housing was the change in the way such property could be held and to eliminate the 'constraints' that the more traditional mode of management of citizens' rights in their city could be expressed.

The origins of planning lie in the realization (and experience) that an efficient, equitable, healthy city was unlikely to be the result of a serendipitous outcome of a series of separate investment or development decisions that led to a felicitous outcome. In short it grew out of the clear evidence that reliance on 'the market' was unlikely to satisfy the demands of the population for an urban life. Reliance on physical determinism as a major determinant of social or, especially, environmental outcomes, may be seen to be an inappropriate response - notwithstanding - the entreaties of property developers.

Lipsky (2014) goes further arguing that setting out rules for engagement (which is what planning attempts to do) is central to the democratic process. He is arguing in the context of USA experience but the same points may be made with equal force in exploring physical determinism in Australian. Translation of Lipsky's argument implies that rather than cities being seen as the 'accidental' product of the playing out of 'The Market' they should reflect the physical expression of what the community wants. That is, they should be the expression of the way the community wants to create the spaces, facilities and services (including their location) for individuals and households to pursue their ambitions and needs. The ambitions and needs may change over time which means cities must be able to secure and provide facilities and services to meet them. An advantage of the traditional form of development of Australian city is that it is resilient and adaptable and they have been able to respond to the demand for a variety services and ensure their efficient provision over time.

The way water and sewerage services were sequentially provided in most cities meant that they did not have to wait until the whole city was serviced before their benefits were available. The sequential development of suburbs meant that households could enjoy a high degree of stability and continuity. The 'life cycle' of households meant that **communities** could develop in which there was a 'mix' of people of different ages, interests and temperaments who could exchange and interact with one another to create the kinds of continuities and commitments needed in a civilized population.

Traditional suburbs afforded the 'setting' for a variety of activities and pursuits at different ages and stages of households. Children grew and developed knowing other children, knowing that there are other older people, that their accommodation was flexible and capable of supporting different activities at different stages in their lives.

Mullins (1981a&b) showed that households in traditional density developments could develop the capacity to meet at least some their own demands for food. They may also be able to adopt practices and behavior not generally available to those living in higher density housing to manage and reduce their water consumption. They may be able to significantly reduce environmental stresses in ways generally not available to those who live in higher density housing and also have the space and flexibility to pursue their own artistic and cultural activities. Households living at traditional densities are not circumscribed in their activities or expression by rules and regulations devised by managers of higher density accommodation.

One of the more persuasive arguments made for a kind of physical determinism is that made by Hall (2015) who argues for the need to understand and respect the history of the way cities grow to create the kinds of urban environments we want. In this he is arguing that cities may continue to grow and significant areas may be redeveloped, not necessarily to higher densities, but in a way that preserves the opportunity for communities to articulate and preserve their social objectives. He argues that, with the correct structure - one that accommodates and supports community growth, renewal, operation and stability the form of the city may change but enable households to flourish.

Hall does not want to limit the economic and social options open to citizens but believe it is prudent to explore the way people live in our cities and try to understand the socio-political-economic processes that affect and are reflected in their consumption of resources. This is needed **before** attempting to use cumbersome measures, such as increasing density to reduce environmental stress, but which seem to be ineffective and inappropriate.

Gleeson (2014) offers an alternative: We do not need to limit our approach to the development of Australian cities by the crude physical determinism that has shaped our planning and control. We can accept that there will be different physical expression found for their development at different times but we must pay greater attention to the socio-political contexts in which they operate and that also change. Australian urban areas each have a condition of their own.

We might, however, need to explore how notions of property rights might be developed to cope with the pressures we will experience due to climate change and the consequential changes to our need for accommodation in that condition.

We might also explore how we might best facilitate our need for connectivity, engagement and accessibility to ensure that it is urban, if not urbane.

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