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SUSTAINABILITY, PLANNING AND URBAN FORM

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The approaches of Troy, Newman & Kenworthy, Trainer and Rees

Planning is an inherently political activity. It is value-laden. However, as Campbell (1996) noted, there is nothing inherent in the discipline that steers planners either toward environmental protection, economic development or social equity. Where do the values reside? They are embodied in roads and dwellings, grounded in plans and policies, living in institutional and corporate cultures, but first and foremost, they reside in planners.

One important value that has received increased attention in recent years has been sustainability (Jones & Brennan 1997; Gollner 1996; Fowke & Prasad 1996; Jacobs 1995). Sustainability is a contested concept (McManus 1996). It is contested in definition, emphasis, desired outcome and the means to achieve a desired outcome. For some authors it is the synthesis of environmental, economic and social issues. However, these three terms are themselves constructed and open to contest. For example, Wackernagel and Rees (1996) critique one of the favoured terms of planners, 'environment', because of its implicit assumption that nature exists outside of humans as our surroundings.

This current article is needed because debates in Australia on important issues such as sustainability, planning and urban form have been restricted due to a limited framework for the debate (i.e. urban consolidation), the misrepresentation of other authors' positions and the absence of information about these authors (Troy 1996). In response, this paper compares and contrasts the work of four leading

theorists of sustainability, urban form and planning.

The aim is to present a discussion and framework that clearly represents the important similarities and differences among these authors with regard to sustainability, urban form and planning, thus enabling readers to enter urban debates with awareness of the positions of key authors. My value judgements are that sustainability is an important issue in encouraging wider participation, especially from younger readers and community members, and is crucial for both moving towards sustainability and for improving planning processes.

The authors chosen for this paper are Pat Troy, Peter Newman and Jeff Kenworthy, Ted Trainer and Bill Rees. While others could have been chosen, these four authors have contributed significantly over many years to debates about the nature of planning, sustainability, urban form, and processes to achieve their desired vision in these areas. However, these earlier debates were framed in an uncooperative way so that the nuances of each author's work were lost in the stereotyping. The structure of these debates limited the ability of other readers to clearly identify important differences within the debates.

This article rectifies problems from previous debates by using a writing process that attempts to achieve fair representation of each author's viewpoint. The aim of this paper is not to sit in judgement upon this work, although judgements are inherent in any writing process. This paper provides a framework, analysis and a fair overview of each author's work,

rather than a detailed critique on individual points. Any useful debate should encourage wider participation and should be built upon fair representations of each author's viewpoint.

This paper has been prepared through a collaborative process with the above named authors. In November 1997 these authors were invited to comment on a draft version of this paper to ensure their viewpoints were represented as fairly and honestly as possible. It was also intended that this process would highlight changes in viewpoints over time. Replies were received from Peter Newman, Bill Rees and Ted Trainer. Writing this paper was intended as an educational experience for all people involved in the process. In hindsight, the writing process, reliant upon the cooperation of the above mentioned authors, has produced a more nuanced and contemporary paper that opens possibilities for further understanding and wider debate.

The article begins with an overview of the main ideas, writing and history of the four authors. These viewpoints are then compared and contrasted in relation to a number of key issues in planning, urban form and sustainability (and summarised in Tables 1 & 2). Issues such as biodiversity, climate change and global commons have not been specifically addressed in this framework because they are not common to the work of the four authors.

The authors

The authors chosen for this study are Pat Troy, Peter Newman and Jeff Kenworthy, Ted Trainer and Bill Rees. For the purpos-

es of this paper only, two individual people, Peter Newman and Jeff Kenworthy, are counted as a single author in recognition that they have jointly authored many of the major works referred to in this article. Recently they have worked more independently of each other, fostering a new generation of researchers. Three of the authors are Australian, while Bill Rees is Professor and Director of the School of Community and Regional Planning at the University of British Columbia, in Vancouver, Canada.

It is also significant that, like myself, the four authors studied are white men working in universities. A high public profile and engagement in advocacy work are common to all authors. The background of these authors (including myself) raises many wider issues for sustainability, including issues of gender and indigenous people. For the purposes of this paper, the discussion will be mainly limited to urban issues that the authors have addressed in their work. While there are important disagreements between the authors, the starting point for this paper is best expressed by Newman (1997 p10) who described the different viewpoints as "conflict ... between ecologically-oriented people trying to see what sustainability means for cities".

The four authors may be broadly classified as occupying political positions that are left of centre, with varying elements of green political thought. All authors tend towards the 'transformative' end of a spectrum of approaches to sustainability, in contrast to 'mainstream' or 'reformist' approaches that concentrate on technological fixes, expanding markets, commodifying nature through environmental economics and expanding trade as ways to achieve sustainability (after Rees 1998). However, as will be discussed below, Troy's approach is left-wing, Newman and Kenworthy's approach is reformist environmentalism, i.e. light green, while both Trainer and Rees are dark greens, i.e. they call for fundamental change in the structures of society rather than tinkering with the outcomes of existing structures. These differences arise partly from the varying concepts of sustainability. Both Rees and Trainer emphasise human society as being within the larger biosphere/ecosphere, whereas Newman (1997) perceives sustainability as being at the intersection of the economic, social and environmental realms (see Tables 1 & 2 following the individual author cameos for further summarised

comparisons).

It may be argued that other authors should have been included in this study. One may question why Bill Rees, a Canadian, has been chosen in preference to a number of other potential non-Australian authors. This choice was made partly on the basis that urban issues in Canadian cities, especially Rees' home city of Vancouver, show some similarities to those in Australian cities. Bill Rees has, like the other authors studied in this article, contributed to our understanding of urban issues and sustainability over many years and recently released an influential book that addresses these issues (Wackernagel & Rees 1996). His work connecting planning and sustainability (particularly Rees 1995) is important in any context, not just in Canada.

Similarly, it may be argued that while Pat Troy has written about environmental issues (Troy 1990; 1996), he does not use the term 'sustainability'. However, his work on urban form, and his debates with Peter Newman and Jeff Kenworthy, are seen as being influential in the development of planning for sustainability in Australia. Indeed, it was Troy (1995 p10) who wrote that "we need to develop a debate about the size, nature, form and structure of Australian cities". To appropriately address Troy's call for a debate, we need to represent fairly the work of each of these four authors.

PAT TROY

For approximately three decades Patrick N. Troy has been, and continues to be, a leading figure in Australian urban and housing policy. He is currently the Director of the Urban Research Unit at the Australian National University in Canberra, and was influential in the directions of the Australian Labor Party's urban policy, especially in the 1970s. He has edited major works including *A just society?* (Troy 1981), *Technological change and the city* (Troy 1995a) and *Australian cities: issues, strategies and policies for urban Australia in the 1990s* (Troy 1995b). He has also authored an important book in this debate; *The perils of urban consolidation* (Troy 1996).

In this latest book Pat Troy has synthesised and further developed his ideas about Australian housing and urban development policies. He emphasises equity, ie. fairness in society, although for many years he has recognised the importance of ecological issues. This can be clearly seen in Troy (1990) where he

addressed the issue of global warming, and made policy recommendations at local government, state and federal level to deal with this issue (Troy 1990).

Troy became involved in the urban consolidation debate largely as a result of the influence of urban consolidation proponents on Brian Howe during the Keating Labor Government. He dubbed urban consolidation the 'new feudalism'" (Troy 1992), and argued that the 'traditional' Australian housing form, ie. the suburban block of the post Second World War period, was "one of the ways in which the lower income members of Australian society obtained a greater share in its wealth" and that the housing policies that promoted this urban form were "part of the commitment to egalitarian principles" (Troy 1996 p147). Troy has been very critical of proponents of urban consolidation for their perceived outcomes (e.g. mean streets, not Green Streets), unaccountability, assumptions about gender, Australian cringe, environmental determinism and flaws in their methodology. His perspective is that the Australian suburban form enables a gradual accumulation of equity in housing, but also enables a number of environmental activities that move towards sustainability to be undertaken in the private backyards of houses. These activities include vegetable and fruit growing, which save money for the householder and reduce transportation costs of food from distant locations to suburban shopping centres. These activities can be made more ecologically sustainable by domestic water catchment and management, introducing solar energy systems, designing buildings that are suited to the climate and introducing composting (Troy1990).

It is in the areas of city form, private ownership, urban density and transport that Troy stands apart from other authors. He argues that the reduction in individual housing area does not significantly reduce the total land area of the city, unless it is accompanied by a reduction in road space and other land uses. This is because "housing occupies only a small proportion of urban land and because peoplewho live in high density housing need more public open space" (Troy 1996 p29).

This view is built upon work by McLoughlin (1991; 1993).

The continuation of what Troy argues is an egalitarian housing policy requires the continuation of road based transport for people and for the movement of goods and services. He believes that public

transport, especially rail , is not economical to serve this urban form. However, Troy has argued for "the banning of central city parking, increasing charges for on and offstreet parking throughout the metropolis to create a redevelopment and infrastructure development fund for application to new investment in public transport ... [and] the scaling down of the inner city freeway program" (Troy 1990 p20). Troy acknowledges the trade-offs that are necessary in policy making, and through this issue gives some insight as to the priorities he favours. He argues that;

We can and should make a case for investment in, and maintenance of, public transport systems but the environmental considerations do not appear to favour fixed rail systems. Road based public transport appears to offer the possibility of an appropriate trade off between equity, flexibility and environmental stress (Troy 1996 p124).

Troy's work has been critiqued by a number of authors, including Diesendorf (1993) and the 'author' discussed below, Peter Newman and Jeff Kenworthy.

PETER NEWMAN AND JEFF KENWORTHY
These writers are both based at the Institute for Science and Technology Policy, Murdoch University, in Perth. Their work has been influential in Australia and overseas. Their major publications include *Cities and automobile dependence* (in 1989), *Towards a sustainable Canberra* (in 1991), and *Sustainability and cities* (forthcoming). With other authors they have written *Transport energy conservation policies for Australian cities* (Newman, Kenworthy & Lyons 1990) and *Housing, transport and urban form* (Newman, Kenworthy & Vintila 1992). They have also authored numerous articles in major refereed journals, and focused on accessible publications such as *Winning back the cities* (Newman, Kenworthy & Robinson 1992).

The basis for their work is a Christian ethic that emphasises community and environmental stewardship. Automobiles, and the urban forms that result from and further encourage automobile use, are undesirable if they lead to a condition Newman and Kenworthy label 'automobile dependence', which destroys communities and the environment. Their alternative is an urban form suitable for energy efficient accessibility, which is claimed to simultaneously encourage a sense of community.

The focus of their work has been ener-

gy use in transport, although this focus has broadened over time to include globalisation (Newman, Kenworthy & Laube 1997), new urbanism and the global commons. Their main argument is that automobile-based transport systems consume more energy and require more space to function than walking, cycling, light rail or heavy rail based transport systems. These later forms of transport are more viable in higher density cities, yet urban form (often reduced to the issue of density) and transport modes are mutually constitutive. Low density leads to automobile dependence, whereas access to automobiles encourages lower densities. They argue that if higher density living can be encouraged (e.g. Arabella Park in Munich) then walking, cycling and light rail will flourish, while alternatively if rail systems are provided (e.g. Toronto) then it is possible to increase density close to railway stations.

Locations close to existing and new railway stations are seen as suitable places for an 'urban village', i.e. a medium to high density urban development containing a mixture of housing types, with an emphasis on public space and the removal of automobiles from its internal areas. The transport focus is on walking and cycling, with longer journeys on the rail system that is adjacent to or under the urban village. The social focus is on developing community and styles of urban living which overcome the perceived alienation of contemporary suburbia. Peel (1995 p58) noted that the urban village is a physical model, but it "also functions as a metaphor for 'community spirit'". Recent work by Newman, Kenworthy & Laube (1997) focuses on the potential of cities to reurbanise with increased population and housing growth in inner areas.

The work of Newman and Kenworthy is empirically based. In a landmark study of twelve European, ten North American, five Australian, three Asian and one Canadian city, they used 1980 data to analyse factors such as travel distance, energy use and density (Newman & Kenworthy 1989). This project has since been extended to include other factors, other cities and has been updated to show changes over time. Among the changes in cities, some work has been done on Canberra (although this is not always included in the major international comparisons), West Berlin has been dropped (due to incomparability following the reunification of Berlin) and seven new

Asian cities have been added at the request of the World Bank (Kenworthy et al 1997). The full update is to be published as Kenworthy & Laube (forthcoming).

In their methodology, Newman and Kenworthy often employ the trope of synecdoche (where a part becomes the whole). For example, Los Angeles is seen to represent automobile dependence, Portland (Oregon, USA) becomes a city that supposedly turned the corner (opting for a light rail system, which has since been extended, instead of the Mt. Hood Freeway), Toronto is a model of 'paradigm shift' to rail (see also Kenworthy 1991; Brindle 1992; McManus 1992; Kenworthy & Newman 1994; Mees 1994) and Copenhagen is a walking/cycling city. Their methodology has been critiqued by Gomez-Ibanez (1991), Gordon and Richardson (1989), Gordon, Richardson & Jun (1991), Brindle (1992), Peel (1995) and Troy (1996). Replies include Newman and Kenworthy (1992), and Kenworthy and Newman (1994).

In the approach of Newman and Kenworthy, urban form is more consolidated to encourage walking and cycling. Automobile dependent (and generating) urban 'sprawl' is halted, and sustainability is achieved by reducing energy use (Newman 1994), reducing emissions from transport, reducing the rate at which unproductive suburbs consume farm and bush land, and by incorporating sustainability initiatives (e.g. communal food gardens) into higher density urban areas. The use of demonstration projects is important in order to 'mainstream' the sustainability initiative (Newman 1997).

In their recent work, Newman, Kenworthy & Laube (1997 p2) define sustainability as "the simultaneous improvement of the economy and the environment (global and local)". In the same article, sustainability is later defined as "a process which leads to reduced impacts of natural resources (land, energy, water, materials), reduced outputs of wastes (solid, liquid and air emissions) whilst simultaneously improving livability (health, income, employment, housing, education, accessibility, public spaces and community" (Newman, Kenworthy & Laube 1997 p13). There are no stated limits to growth in Newman, Kenworthy & Laube (1997) or Kenworthy et al (1997). Instead, globalisation is accepted and it is argued that "global cities may indeed be able to assist the sustainability agenda, but only if infrastructure priorities enable

them to reinforce the concentrating processes in less car-oriented ways" (Kenworthy et al 1997 p23). This approach to sustainability differs from the more radical approaches of both Ted Trainer and Bill Rees.

TED TRAINER (F. E. TRAINER)

Ted Trainer works in the School of Social Work at the University of New South Wales. He has written on a number of different issues, but the focus in this paper is his books *Abandon affluence* (in 1985), *Developed to death* (in 1989), *The conserver society* (in 1995) and *Towards a sustainable economy* (in 1996). These writings are informed by his work on morality (see Trainer 1991).

Unlike the previous authors, Ted Trainer begins with the explicit assumption that there are limits to growth, but these limits are not merely based on the availability of resources such as minerals and oil. Instead of emphasising computer-based models, as was done by Meadows et al (1972; 1992), Trainer approaches limits to growth in terms of political economy. He thoroughly critiques the construction of measures such as Gross National Product (GNP) and the sacrosanct notion of economic growth (Trainer 1985; 1996). In Trainer's analysis, it is implausible that improved technology will cut resource use and environmental costs sufficiently, especially if economic growth is continued. While recognising that energy and other resource use can be reduced by efficiency inititatives, Trainer (1996 p41) argues that "if there remains any commitment to growth in economic output, any plausible cuts in energy use will be overwhelmed in time by the increase in energy needed to produce the increasing volumes of output". Similar to Rees, Trainer argues that we have already exceeded the long-term ecological productivity of the planet.

Trainer's work on 'development' in poorer countries draws clear links between the poverty of these countries and the wealth of countries such as Australia. Our lifestyles are seen to be based on exploitation of minerals, labour and waste sinks (for pollution disposal) in these poorer countries. Trainer argues that it is a fallacy to believe that 'development' can ever bring these countries up to our expanding material standard of living (as distinct from our quality of life). The biosphere cannot accommodate the current excesses of rich countries, without even contemplating the prospects of bil-

lions of people in Africa and Asia consuming at North American, Western European and Australian levels. He argues that if eleven billion people were to have the same per capita consumption as the developed countries would have by the year 2070, allowing for three per cent per annum economic growth, world economic output would have to be 110 times its current level. According to Trainer, this is unsustainable (Trainer 1997).

From these points, Trainer's position may be summarised as being;

■ The present rich world living standards are unattainable by all people, and

■ Any notion of growth is farcical. (Trainer 1997)

This analysis leads to a call for fundamental change in our value system that implores us to abandon affluence. Trainer advocates a Gandhian lifestyle which raises the quality of life by valuing nature, friendships, community, creativity and productive work towards desirable social and ecological ends. This fundamental transformation includes the cessation of non-productive and/or environmentally and socially damaging work. It also includes the redesigning of our cities to both adjust to these lifestyle requirements and to further create the conditions for sustainable lifestyles.

Ted Trainer advocates a "radical conserver society" which emphasises small scale, highly self-sufficient economies. This vision includes neighbourhoods being redesigned to accommodate windmills, woodlots, solar panels, neighbourhood workshops and many animals. However, this vision has been critiqued for its practicality, e.g. there is minimal potential for wind power in urban areas. Trainer argues that many of the existing roads should be dug up and planted with fruit trees and vegetable plots. Most back fences would be pulled down to create greater communal space. This space may include market gardens, restored creeks and ponds, orchards and meadows. Energy and material resources would be obtained from within the neighbourhood, and 'wastes' would be returned in a useable form for another essential neighbourhood activity. Nutrients would be recycled to local gardens. Sustainability is achieved by a high level of local self-sufficiency, by appropriate closure of waste and energy loops, and by a reduction in material consumption. Social organisation includes direct democracy in cooperatives, local committees to run local enter-

prises, limited market-based activity and some essential services (e.g. defence) being provided by the state.

This vision argues for fundamental social transformation and for fundamental transformation of our urban areas. These processes are seen to occur concurrently.

BILL REES (WILLIAM E. REES)

The work of Bill Rees is similar to that of Ted Trainer in its focus on ecological limits, on already exceeding these limits and on the lifestyles of the 'already rich' people who overconsume the earth's material resources and pollution assimilation capacity. This latter focus is an outcome of the analysis, not a predetermined target (Rees 1998a). Similar to Ted Trainer, Bill Rees argues that on a finite planet, not everybody can enjoy unlimited consumption. We cannot grow our way to sustainability.

Rees has written on sustainability in a number of important articles and chapters (Rees 1990, 1992; Rees & Roseland 1991; Rees & Wackernagel 1994). In 1996 he co-authored the book *Our Ecological Footprint* with Mathis Wackernagel. Rees' work emphasises the importance of maintaining a constant level of 'natural capital' per capita, which cannot be substituted by human-made capital. This means that we must maintain a certain level of 'natural assets', and that if we increase our population, then this total level must rise. If it does not, then we fail to meet the criteria of maintaining a constant level of natural capital per person. Rees is very aware of imbalances in consumption patterns based upon location, class, and so on, but he also recognises that more people require more resources in order to be fed, clothed and to enjoy an adequate material standard of living.

Rees' approach begins with a critique of the lack of physical analysis in economic development planning. To overcome this deficiency he has developed the 'ecological footprint', which recognises humans as being ecologically connected to the rest of nature. The 'ecological footprint' restores the physical connection in economic analysis by identifying the amount of land required to maintain lifestyles. Invariably the finding is that urban areas in rich countries require 'ghost acres' of land outside of their boundaries in order to function. The extent of these 'ghost acres', or the 'ecological footprint' of the city, is influenced by the consumption patterns, production

techniques, culture, and so on, of the city's residents.

In this approach to sustainability, the emphasis is on the already rich liberating themselves from material wants. This process would free up 'ecological space' to enable poorer people to meet their material needs. Rees argues that the world cannot afford the current lifestyles of the already rich, and that it would take two "phantom planets" to enable all existing residents on earth to live like today's average North American. As Wackernagel and Rees (1996 p15) note, "unfortunately, good planets are hard to find ...".

The solution, according to Rees, is to move towards sustainability by living within nature's limits. Trade, which often expands the capacity to be unsustainable, needs to be reduced (but not eliminated) and people should learn to live within their bioregion (biological region). Trade is seen as 'distancing' the urban area from its ecological limits, by importing carrying capacity from a "distant elsewhere" and exporting environmental degradation (e.g. pollution). Countries with high trade volumes have not decoupled wealth creation from resource acquisition and waste disposal as conventional economists believe, but are having an ever increasing ecological impact by importing sustainability from elsewhere.

The lifestyle choices that enable humans to live within nature's limits include less automobile dependency, more walking and cycling, high density city housing, less emphasis on automobile transport and a reduction in energy use. Rees argues that cities are social, cultural, economic and ecological phenomena. Cities, as presently defined, are inherently unsustainable, being dependent upon ever expanding 'hinterlands' to

import sustainability. His biological metaphor, of how should a parasite value its host, highlights his ecological perception of cities in relation to sustainability (Rees 1998b).

Importantly, Rees argues that any gains in efficiency must be further used to move towards sustainability. If this does not occur, despite new technology being more energy efficient, the total impact will be to increase the capacity to be unsustainable. An example of this may be energy savings increasing company profits, so that shareholders can buy new powerboats (more fuel consumption and additional pollution) or be used to fund industrial growth elsewhere. Rees argues that gains in efficiency (including energy) have enabled industrial growth for at least two hundred years, and that the *total* reduction in global energy and materials use and industrial waste is most important, not simply improvements in one economic sector or one country which may be importing unsustainability from other parts of the world.

Similar to authors such as Trainer, and Newman and Kenworthy, Rees argues that community is important in moving towards sustainability (Rees & Roseland, 1991). He argues that most of today's wealthy cities were built using technologies that assumed an abundance of land and cheap energy. This has led to urban sprawl, which is unsustainable because of the land area consumed and imported energy. The alternative approaches vary, although Rees generally appears to favour high density living (1995). According to Rees and Roseland (1991 p17); the ideal urban form for a particular locale will depend to some extent on the nature of the energy-supply options: for example, higher densities make most efficient use

of district heating and public transport networks, while lower densities make solar energy more viable.

Rees (1995 p355) sees planning as being "uniquely positioned to play a leadership role" in the transition to a sustainable future. Actions sanctioned by planners can be considered sustainable "only if they contribute to any of the following goals without significantly violating the others: reduced energy and material use, lower levels of waste production, the enhancement of natural capital stocks, and greater social justice and equity in an increasingly crowded world" (Rees 1995 p355).

The four approaches compared

The four approaches outlined above are compared in Table 1 and Table 2. It can be seen that the authors come from a variety of intellectual traditions, and have different critiques, visions and means to achieve their visions. While all authors move beyond mere technological fixes and pricing nature, there is variation in the extent of change, either physical or social, that is required. Troy's emphasis for change is mainly on the social, Newman and Kenworthy tend to emphasise physical change in transport and landuse patterns, while both Trainer and Rees see the need for fundamental social and physical changes.

These changes are seen more specifically in Table 2, which summarises the work of the four authors around selected planning issues. It must be stressed that this table necessarily condenses the richness of many articles and books into a few short lines so that details are invariably lost.

Ted Trainer and Bill Rees recognise

TABLE 1: A SUMMARY OF THE FOUR APPROACHES TO PLANNING, URBAN FORM AND SUSTAINABILITY

AUTHOR(S): ACROSS ISSUES: DOWN	PAT TROY	PETER NEWMAN & JEFF KENWORTHY	TED TRAINER	BILL REES
Traditions	Socialist, urban policy	Christian ethics, including environmental stewardship	Limits to growth, Gandhian, Marx	Human ecology, bioregionalism
Political/Ecological position	left	light green	dark green	dark green
Critique of	urban consolidation	urban sprawl, automobile dependency	growthism, capitalism, unsustainability	growthism, transboundary appropriation
Vision	equity, redistribution of wealth	medium density cities, urban villages, light rail, energy efficiency	"Radical Conserver Society", small scale societies with less work & development not growth	reduced material consumption, bioregionally based
Means to achieve vision	urban policy, based on equity & accountability	policy, planning, community	shift in social values	shift in social values, reduced individual ecological footprints
Extent of social change required	major	minor	fundamental	transformation (not reform)
Extent of physical change required	minor	major	fundamental	major
Scale of Planning	national, state, regional, local	local, state, national	mostly community, some regional and national	bioregional, community

TABLE 2: HOW THE FOUR APPROACHES ADDRESS SELECTED PLANNING ISSUES

AUTHOR(S): ACROSS ISSUES: DOWN	PAT TROY	PETER NEWMAN & JEFF KENWORTHY	TED TRAINER	BILL REES
Urban Density	Cities are not seen as sprawling. They should not be consolidated at the expense of poorer people.	Need to increase. Is achieved by increasing housing density, reducing roads, carparks, etc.	Not directly addressed. Merges the rural/urban divide by making suburbs ecologically productive	Reduce urban sprawl. Move away from car dependent forms to higher density city centres with less road space.
Housing	low density (with usable yards), avoid 'gated communities'.	medium/high density, more communal spaces	is part of the growth system. Should build cheap, high quality, energy saving houses.	high density, convert auto-oriented areas to low-cost housing. Lower density, productive spaces in non-urban areas
Transport	public, mostly road based.	public (favour rail), walking, cycling.	walking, cycling, dig up many existing roads	public, walking, cycling
Employment	close to urban sub-regional centres, and decentralised to regional centres	concentrated in urban villages close to residences, and on rail routes	reduce work hours, eliminate dull/meaningless jobs, decentralise to neighbourhood workshops	locally based economic development in bioregions
Gender	critiques Newman & Kenworthy on this point. Sees suburbs as suitable. Address issue by direct policies	Is favoured by public transport and reducing social isolation, but may reduce women's independence obtained through access to cars.	Implicit in language used and desired outcomes, but not directly addressed.	Implicit in language used and desired outcomes, but not directly addressed.
Justice	emphasises equity and accountability	emphasises accessability & nourishing the public sphere	redistribute wealth. Links our lifestyles to impacts on developing countries and nature	Calls for reduced consumption by the already rich, but growth for those whose needs are not yet met.
Equity	strongly emphasised. Sees well-planned suburbs as most equitable urban form.	considered in relation to access to the city. Public transport, housing mixed with shops, etc. increase accessibility for non-car drivers.	strongly emphasised. Calls for wealth redistribution within Australia and throughout the world. Need to de-develop an inequitable system	strongly emphasised through the concept of "fair earthshares".
Social Infrastructure (eg. schools, hospitals, etc.)	vital. Is provided in many ways- neighbourhood & sub-regional centres	provided in urban villages close to public transport - should foster sense of community	more community based social infrastructure, cooperatively administered. Emphasises the needs of poorer people.	provided locally & on a bioregional basis. Should go especially to poorer people in the world
Sustainability	improve suburbs. Include environmental initiatives in existing urban form.	energy efficient transport and housing. Maintaining the global commons.	reduce GNP and work, redesign our cities, focus on community based development	reduce ""ecological footprint" of our lifestyles.

physical limits to growth, whereas this is not a theme in the work of Pat Troy or Peter Newman and Jeff Kenworthy. The latter mentioned authors accept the desirability of economic growth, but recognise the need for material and energy efficiency in achieving economic growth. Rees and Trainer argue that this approach is flawed and will not lead to sustainability.

All authors recognise the need for reduced car dependence, although how this is to be achieved is controversial. Newman and Kenworthy, and Rees, tend to opt for higher residential densities, while Troy and Trainer are alike in their apparent advocacy of maintaining similar densities to what currently exist, but to use the space differently. Both advocate more local production of food and the introduction of environmental initiatives such as water management. However, Troy advocates this within private backyards which enable poorer Australian households to accumulate equity in their housing, whereas Trainer advocates the removal of backyard fences and the development of a more communal vision.

All authors advocate greater energy efficiency, however Rees recognises that the savings accrued through energy saving must also be used to move towards

sustainability. The definition of sustainability differs markedly between the various authors. One key reason for this difference is the acceptance or rejection of any notion of limits to growth. This is important in influencing the perceptions of what is the city. For Bill Rees, the city is the physical form of a much larger ecological footprint. Cities may be simultaneously "the most magnificent of human achievements" and "the entropic black holes of industrial society" (Rees 1995 p356). While Ted Trainer's earlier work did not use the ecological footprint concept because it was not yet available, his work strongly recognises the transboundary basis of a city's activities. Recent work by Trainer does incorporate this concept (Trainer nd). This analysis is less apparent in the work of Pat Troy and Peter Newman/Jeff Kenworthy, who appear to accept the physical boundaries of an existing urban form. The methodology of Newman and Kenworthy encourages this perception because they are collecting data based on clearly defined urban boundaries (see Kenworthy et al 1997). The exception to this case is that all authors recognise that automobile dependence is built upon imported energy sources.

Conclusion

The aim of this article was to present a discussion and framework that clearly represents the important similarities and differences among four key authors in relation to sustainability, urban form and planning. The intention of this paper was not to favour any particular approach, nor to critique one approach through the use of other approaches. By presenting each approach fairly in a readable format, it was intended that readers can identify their own values and be challenged by the ideas of the various authors.

The lack of an article based upon this approach has been one reason for stifled debate in Australia around issues such as sustainability and desirable urban form. Recognising the importance of value judgements (including my own value judgements of who, and what, to compare and contrast) is crucial in encouraging further debate, the perceived need for which is arguably the most important value judgement made in this article. It is necessary to be able to acknowledge and communicate as fairly as possible the value judgements and work of authors who have significantly contributed to our understanding of urban issues over an

extended period of time. Understanding some of the innovative thinking on urban issues, and being able to acknowledge differences, are important aspects of moving towards sustainability.

It is not controversial to claim that planners should be considering issues of sustainability. What is controversial is the meaning of the term, what is to be achieved, and how it is to be achieved. The work of Pat Troy, Peter Newman and Jeff Kenworthy, Ted Trainer and Bill Rees offer a number of possible approaches to moving towards sustainability. All of these authors, and others, agree on some minimal conditions to reduce unsustainable practices, eg. the reduction in unnecessary car use, the reduction in inner city road space and the greater use of land for environmentally useful functions such as water management and food production. Unfortunately, recent construction of inner city freeways (as in Perth) are moving away from sustainability.

Despite some agreement among the authors, important points of disagreement still remain. There are other critiques of the authors studied in this paper, and researchers not mentioned in the cameos of leading urban theorists who espouse different views on many of the issues in Table 2. These areas of disagreement are potentially healthy, but a fair, informative and open debate is necessary to identify, critique and implement further potential actions to move towards sustainability. What is also necessary is a research agenda that openly acknowledges the value positions of various authors, and represents the work of other authors in a fair and constructive manner. Such an agenda could begin with further work on the individual planning issues presented in Table 2. This article makes it possible for existing researchers to engage more constructively in this endeavour, and for new researchers to also be willing and able to effectively engage in this work. ∎

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