

Sydney sucks! (chews and spits): Defining and measuring vortex cities and sustainable cities.

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ABSTRACT

Sydney is increasingly oriented to compete in the global city stakes. This necessitates achieving higher rates of economic growth than rival cities, particularly in sectors such as international finance. Economic growth has spatial and resource dimensions that conflict with many visions of what constitutes a sustainable city. Sydney is Australia's largest vortex city, sucking in resources for production and consumption and using other parts of the planet to assimilate wastes.

This paper analyses the strengths and weaknesses of competing definitions and measuring techniques to identify sustainable cities, including Ecological Footprint Analysis, Taking Sustainable Cities Seriously and Sustainability Indicators. It applies these and other concepts to Sydney, thereby highlighting the critical choice of definition and measuring technique in debates about the sustainability of cities. The conclusion identifies the importance of communication, education and implementing appropriate processes to reduce the most unsustainable practices in Sydney, and in other Australian cities.

INTRODUCTION

“The lack of attention of global cities research on the urban environment is one of the most disturbing gaps in our understanding of global cities”. (Short, 2004, 20)

Australian cities are increasingly oriented to compete in the global city stakes. This is particularly the case in Sydney, which was cited in 11 of 15 studies of world cities analysed by Beaverstock, et al (1999), and updated to 12 of 16 studies by Taylor (2003). The variations in these studies alerted Beaverstock et al (2000) to the “poverty of data” in the world city literature. According to Beaverstock, et al, (2000, 43), “an Achilles heel of world city research is the lack of available data that quantifies the changing positions of cities in the world city system and hierarchy”. There appears, however, to be an abundance of data in comparison with the data available to measure sustainable cities. The silence in the world cities literature about environmental and sustainability issues (Short, 2004), could stem from a concern about a lack of data or viable approaches to measure sustainable cities, but is far more likely to arise from a neglect of sustainability issues by world city theorists who are focussed on corporate and electronic connectivity and hierarchies. One implication of this neglect is a gap between world cities that are focused on economic growth and cities that are aiming to achieve higher levels of sustainability.

This paper is concerned with the spatial and resource dimensions of economic growth. Without economic growth, a city can neither maintain nor improve its status in world city league tables. Sydney has been positioned to attract economic growth, particularly the growth that emanates from being strategically positioned within global city hierarchies and networks. Metropolitan planning documents and studies since the early 1990s tend to vary in emphasis on the importance of economic competitiveness within a global economy, as opposed to enhancing Sydney's pre-eminent position within the Australian urban system, or promoting the unifying vision of livability. Searle

(1996) explored the potential for Sydney to continue to perform as a global city, albeit at a level below cities such as New York, London, Tokyo and Paris. Recent studies such as Abrahamson (2004) and Grosveld (2002) place Sydney as an anomaly in the global city literature, noting that its position is mostly secured by media profile and cultural industries rather than corporate headquarters and other traditional forms of measuring the global influence of a city. Despite the partial success of this positioning relative to other so-called global cities, as noted by Daly and Pritchard (2000, 170), in the case of Sydney, the global city thesis has “spilled over into popular and political discourse concerning the city’s future, raising concrete questions of urban governance and the management of community resources”.

An important challenge for governance is the environment. There is a tension in the tendency for cities such as Sydney to be focused on enhancing their global city position through economic growth, yet attempting to address issues of sustainability. This tension is encapsulated by Luke (2003, 157) in his sub-heading “‘Global cities’ versus global cities”, referring to the difference between the paradigmatic metropolitan centres to which Sydney is being directed and the extent of worldwide urbanisation that is changing the built and unbuilt parts of the earth. The gulf between global city orientation and the orientation of cities towards urban sustainability can also be seen in the minimal overlap between lists of world/global cities (see Beaverstock, et al, 1999 and Taylor, 2003) and the lists of leading sustainable cities in North America and Europe (see Portney, 2003 and Evans, et al, 2005). San Francisco (9 world city lists), Seattle (2), Portland (1) all appear lower in the order of cities, while Santa Monica (within Los Angeles), is the only other overlap in these lists. According to this analysis, the top global cities are not sustainable cities, despite evidence from Newman and Kenworthy (1999) about the relationship between city size and transport energy, and the relationship between size, density and energy use provided by Farrelly (2005), which rates New York (and particularly Manhattan) as the best example of urban environmentalism.

While economic growth is not always considered incompatible with the concept of a sustainable city (see for example Douglass, 2002a and b; House of Representatives Standing Committee on Environment and Heritage, 2005), in this paper I am critical of the concept of economic growth. Cities oriented to economic growth are “vortex cities”, sucking in resources from outside their boundaries for production and consumption, and using other parts of the planet to assimilate wastes (McManus, 2005). Another metaphor is the consuming city – Sydney sucks in resources, in economic parlance adds value by transforming these resources (the chewing) and then uses the absorbing capacity of the environment to dispose of, or spit out, the “waste”. Given the minimal overlap between global city and sustainable city lists in North America and Europe (the latter being based on cities receiving the Sustainable European Cities Award since 1996), how sustainable can a city become if it is oriented to achieving and maintaining its position on various global city league tables?

How do we measure vortex cities? How do we measure sustainable cities? The availability of data is important, but is not the primary consideration, when attempting to measure sustainable cities. The paper commences by interrogating various definitions of sustainable and livable cities. It then analyses the strengths and weaknesses of three measuring techniques to identify sustainable cities. These are Ecological Footprint Analysis, the Taking Sustainable Cities Seriously project and Sustainability Indicators. The paper explores the availability of data for each approach and applies these concepts to Sydney. This highlights the critical choice of definition and measuring technique in debates about the sustainability of cities.

DEFINITIONS OF SUSTAINABLE AND LIVABLE CITIES

Various definitions of sustainable cities talk about the integration of economic, ecological, social, cultural and lifestyle factors in an urban context. Some definitions go further to discuss the

maintenance of life support systems, and the impact of cities upon other parts of the planet. Rather than provide a checklist of definitions, it is apposite to focus on the question of whether the term “sustainable city” is an oxymoron. This question depends upon the definition of sustainability that is adopted.

The concept of a sustainable city is both appealing and oxymoronic. Rees (1997) claimed that strictly speaking, a city cannot be sustainable. McManus (2005) writes about moving “towards sustainable cities”, Sorensen et al (2004) titled their book “towards sustainable cities” while the House of Representatives Standing Committee on Environment and Heritage (2005, 9) favoured “‘a vision for a sustainable city’ and a pathway to sustainability”.

If a sustainable city is unattainable, what course of action should be taken? McManus (2005) favours setting the goalposts where they are ecologically meaningful, a move premised on the belief that progress towards these goalposts will then be worthwhile. Other authors focus on the livability element, a concept that has long been associated with urban issues. Under the umbrella of livability, Davidson and MacEwen (1983) focus on thrift, but the concept often means improved landscaping and festivals in other contexts.

The focus of the livable cities literature is encapsulated in Evans (2002), where a sub-title “adding an environmental dimension” highlights how environmental issues are added to human issues (be they livability as a growth strategy or livability as a strategy to address inequity in cities). Livable cities is a concept based on balancing the economic, social and environmental dimensions of sustainability. In its most conservative guise, livability is little more than a growth strategy with a human face.

Douglass (2002a) highlights the links between world cities and livable cities in relation to Pacific Asia. “Amenities” include both cultural and environmental attributes. Improving “amenities” is seen as a viable strategy to create livable cities, which attract economic growth because “... catering to the lifestyle needs of investors has become a critical consideration to be added to providing production-related facilities for their companies” (Douglass, 2002, 62a).

This approach of the livable city, where environmental quality is seen as a way of enhancing international competitiveness (see Searle, 1996), is central to the planning goals of Sydney in *Sydney's Future* (NSW Government Department of Planning, 1993). This approach was reinforced with in the City of Sydney (1994) by the *Living City* report that gave little attention to environmental issues from a sustainability perspective.

More recent approaches, such as the Triple Bottom Line approach used by the Melbourne City Council in *City Plan 2010*, give increased emphasis to ecological sustainability in a central city context. The Triple Bottom Line approach is, however, predicated on the notion of balancing the economic, socio-cultural and environmental components of sustainable development. The vision is of Melbourne being a “thriving and sustainable city”, which is a city that “enjoys economic prosperity, social equity and environmental quality” (City of Melbourne, 2001). Without addressing issues raised by the ecological footprint analysis approach, such discourse could be papering over the cracks in sustainable development where tensions between economic, social and environmental values are subsumed within a new language (see McManus and Pritchard, 2001).

MEASURING THE SUSTAINABILITY OF CITIES

A number of approaches have been developed to measure the sustainability of cities. This section of the paper explores three measuring techniques; Ecological Footprint Analysis, Taking Sustainable Cities Seriously and Sustainability Indicators.

Ecological Footprint Analysis

The concept of Ecological Footprints (EF) as a way of ascertaining sustainability was developed by Bill Rees and his students, particularly Mathias Wackernagel, at the University of British Columbia in Vancouver, Canada (Rees, 1997; Wackernagel and Rees, 1996). EF is similar to what Moffatt (1999) called the “sustenance space of cities”, a concept that can be found in a study by Mark Jefferson (1917) of England's urban geography. The EF approach is also similar to the idea of “Ghost Acres” for food production, developed by the Swedish academic Georg Borgstrom in 1965 (see also Robins, 1995). MacNeill, et al (1991) extended this approach to include other consumption concerns, and renamed the concept “shadow ecologies”. More recently, Catton (1980) discussed the idea of “phantom land”. This ecological concept refers to how we currently use the ecological productivity of ecosystems that no longer exist, particularly in the case of fossil fuels. Robins (1995) identified a number of other similar accounting approaches, including food miles, environmental space and environmental debt. These approaches focus on aggregating environmental impacts to derive a single figure of impact. For example, the EF of the Lower Fraser Valley (including Vancouver) is said to be 19 times the size of this region (Wackernagel and Rees, 1996).

The concept of the ecological footprint is a metaphor for ecological impact, regardless of where that impact occurs. The ecological footprint measures the impact of consumption and subsequent waste discharge (including consumption of food, housing, transportation, consumer goods and services) by converting impact variables into the single unit of land. This includes land appropriated by fossil energy use (measured by the amount of land needed to absorb the emissions), the built environment, gardens, crop land, pasture, managed forest and land of limited availability, including untouched forests and non-productive areas such as deserts and icecaps. In the case of a city, the approach can be used to calculate the equivalent amount of land consumed in order for a city to function. This equivalent amount of land is influenced by changes in both population and per capita material consumption. As Rees (1997, 308) noted, “cities as presently conceived are incomplete ecosystems, typically occupying less than 1% of the ecosystem area upon which they draw”.

The concept of the Ecological Footprint has become popular in the environmental planning of cities. The metaphor communicates the message that environmental impacts extend beyond the built area of cities. The use of Ecological Footprint analysis as a measuring tool, however, and particularly as a tool for comparisons between jurisdictions, is problematic. The data often does not exist in an accessible form, assumptions have to be made in order to convert various units of measurement into a single unit of hectares of land equivalent, and in the case of comparative studies, results are easily manipulated by the location of boundaries. This is particularly the case if the boundaries include or exclude agricultural land. A larger area also absorbs the energy footprint (typically the largest component of the footprint) within a city's boundaries, thus enabling a city with a wider boundary to appear to be more sustainable than a city with tighter boundaries. For example, if London's footprint is calculate to be 120 times the size of its urban area (Robins, 1995), and the Lower Fraser Valley's EF is 19 times its size, does this mean that the Lower Fraser Valley is six times more sustainable than London? No. What it does indicate is that areas with a high population and little agricultural land within their borders will inevitably generate a higher EF, unless there is a huge discrepancy in the material consumption between the two areas. Portney (2003) discusses annexation as a strategy for reducing the EF of a city. This tactic would work in terms of the numbers, but there would be no immediate change in the actual environmental impact. In the long term, it may be possible to reduce the ecological impact if the boundary changes resulted in improved governance, sustainability policies and environmental performance.

Taking Sustainable Cities Seriously

Taking Sustainable Cities Seriously refers to the work of Kent Portney (2003), who measured the sustainability of 24 cities in the USA based on 34 elements of what could constitute a sustainable

city (the Taking Sustainable Cities Seriously Index). Similar to the Ecological Footprint approach, the Taking Sustainable Cities Seriously project produced a single figure, measured in points rather than hectares, to indicate the sustainability of various cities. These cities could then be ranked based on their single index score that aggregated elements such as sustainability indicator projects, smart growth activities, sustainable transportation planning and policies, pollution prevention and reduction efforts, energy and resource conservation, and so on. These elements are all measurable because the key determinant is their existence, not their effectiveness. “Measuring” is simply ticking the box, and adding the ticks.

This approach differs from the Ecological Footprints approach in many ways. It focuses on current practice of “moving towards sustainability”, rather than the amount of land used by unsustainable practices. The results are not predictable in the sense that Ecological Footprints will always far exceed a city’s jurisdictional boundary. They can easily be changed by the involvement of the mayor or chief executive officer, and the development of a water conservation program and a bicycle ridership program (these three strategies would gain three points, or 8.8 per cent of the total points on offer). The effectiveness of these actions is not, however, measured in terms of environmental impact. This was recognised by Portney (2003, 246) who considered it premature to link the existence of sustainability programs with the quality of the environment or the quality of life, given that “even the most optimistic visions of sustainability anticipate that it might take many years for cities to reap the benefits of their programs”. Portney (2003, 246) did acknowledge, however, that “at some point, it is necessary to build a base of knowledge about what cities are getting for the effort they put into sustainability initiatives”.

Sustainability Indicators

Sustainability indicators are not exclusive of other sustainability projects, indeed they form the first three of Portney’s (2003) 34 elements of the Sustainable Cities Seriously Index and “Portney insists that the most important distinguishing characteristic of a city that is serious about sustainability is the inclusion of indicators that its strategic plan is achieving results” (Simmons, 2004, 644).

Indicators have many advantages and disadvantages. Parker (1995, 51) cautioned that “the reduction of complex environmental systems to a few simple indicators is argued to be a repeat of the attempt to find quantitative social indicators to measure social well-being in the 1970s”. Leading advocates of the use of sustainability indicators, Bell and Morse (2001, 292) agreed to the extent that “summarising complexity into simple numbers can be dangerous, but does condense information into a form that can be accessible to the non-specialist”.

It is pertinent to note that most well-known urban sustainability indicators comprise ecological, economic, social and cultural indicators. Rather than attempting to aggregate these indicators (as occurs with Ecological Footprint Analysis, the Taking Sustainable Cities Seriously project and the global city league tables), most sustainable city indicator projects express each element in terms of movement, whether that be towards sustainability, away from sustainability, or no change. This movement may be analysed in specific units (such as parts per million, hectares of land, weight in kilograms, and so on) but these are often represented so as to enable comparison between different indicators. For example, the common unit may be a human face with a smile or a frown (as in Hamilton, Canada), a plus or minus sign (Seattle) or an arrow that swings towards or away from sustainability (Melbourne, Australia). Sometimes, but not always, these measures incorporate the extent of the movement, ie. whether it is significant or minimal. What these indicators often do not do is prioritise, after the initial choice of a package of indicators, those indicators where any movement is crucial as opposed to important or desirable. In other words, there is no ranking or weighting system in the final package of indicators.

The choice of indicators as a measurement of sustainability reflects, to a large degree after allowing for the practicalities of achieving measurements that are going to be accepted, the understanding of

sustainability held by those people who are responsible for the measuring. There is also the important issue of the relationship between the existence of sustainability indicators and how these indicators are used to change policies and practices within a jurisdiction. Sustainability indicators that are very good, but are not being used well, may be understood as a reflection of values and commitment.

SYDNEY – GLOBAL CITY, VORTEX CITY, LIVABLE CITY, SUSTAINABLE CITY?

Previous studies have explored the potential of Sydney to be more sustainable. Taplin (1999) highlighted how Sydney is unsustainable, while Murphy and Wu (2001) discuss the relationships between globalisation and sustainability in Sydney. This latter paper focuses on environmental quality, including both the biophysical and built environment. The analysis is strong on environmental issues *in situ*, but despite mentioning ecological footprints, the paper does not incorporate this concept in the analysis of Sydney as a sustainable city. If the concepts discussed in the previous section of this paper were applied in Sydney, what could it mean for Sydney's progress in terms of sustainability? It is difficult to be certain of the answer, particularly in regard to the Sustainability Indicators measurement because the choice of indicators will clearly influence the results.

The Ecological Footprint Analysis has been applied to Sydney. According to the NSW EPA (1997, 407) in the *State of the Environment Report*, Sydney at that time housed approximately 4 million people on 700 000 hectares of land. The Ecological Footprint was said to be 26 280 000 hectares, which is 37 times the size of its land area. The most recent *State of the Environment Report* (NSW EPA, 2003) incorporates refinements by Lenzen and Murray (2001) to the Ecological Footprint concept, and estimates that the per capita ecological footprint for the Greater Metropolitan Area rose from 6.36 hectares in 1993-94 to 7.40 hectares in 1998-99. Bearing in mind the comments made earlier about the limitations of the Ecological Footprint concept, it appears from this measuring approach that Sydney has an extensive ecological impact. It is a vortex city, not a sustainable city.

If we apply the measuring framework used by Portney in *Taking Sustainable Cities Seriously*, it appears that Sydney is well-endowed with sustainability initiatives. This is a complex issue to negotiate because there are 37 local governments and no metropolitan government in Sydney. Short of measuring each local council using Portney's approach, which in itself appears to be more suited to the conditions of North American cities, it is necessary to either amalgamate state and local government activities (along with regions of councils), or to select the central city council, that is, the City of Sydney. If this latter option was adopted, then it would enable initiatives such as the installation of car pool lanes or limits on downtown parking spaces to be measured, but may not be a suitable unit to consider initiatives such as eco-industrial park development or superfund site remediation. This selection process is feasible given that one of Portney's (2003) cities was Santa Monica, a city of about 90 000 people within Los Angeles County which has a population of approximately 9.8 million people. A rapid and not wholly reliable estimate of sustainability initiatives by the City of Sydney yields a score in the range of 14-19 out of 34, making the City of Sydney on a par with US cities such as Boston, Phoenix, Chattanooga and Tampa, but far short of Seattle (30) and other leading cities (Scottsdale, San Jose, Boulder, Santa Monica, Portland and San Francisco). By using this measuring device Sydney appears to be doing reasonably well in the pursuit of sustainability.

The Sustainable Indicators approach has been used by many local councils within Sydney as part of their State of the Environment reporting process. This practice accords with the Australian and New Zealand Environment and Conservation Council (ANZECC) reporting recommendations, including the use of a core set of indicators (ANZECC, 2000). ANZECC environmental indicators are divided

into six key headings, with the Human Settlements category containing eleven indicators that range from solid waste generation and disposal to visitor numbers (for major tourist destinations). Other indicator projects at the national level include the application of 15 headline indicators by the Australian Bureau of Statistics (2002) and 24 headline indicators by Environment Australia (2002).

At the local government level there appears to be significant work undertaken by some councils on sustainability indicators, but there also appear to be problems in terms of what is being measured and how it is being used (Laybutt, unpublished). For example, while the cost effectiveness and scientific credibility of the indicators are important considerations, it is possible that some indicators are being developed simply because the information exists, rather than the importance of the indicator from a sustainability perspective being the deciding factor in whether to adopt such an indicator. Additionally, there is conflation between indicators of activity to address sustainability concerns (for example, the number of pollution traps being used) and the results of this activity, which would be an improvement in water quality (after Laybutt, unpublished).

While it has not been applied to the metropolitan region of Sydney, again largely because of governance structures, it is likely if the Sustainable Indicators approach was applied that there will be a mixture of progress and regression in Sydney. For example, water quality in Sydney Harbour is likely to show improvements, whereas traffic congestion and public transport are indicators that are likely to be negative. Depending upon the indicators chosen, it is not immediately apparent whether Sydney would emerge as looking like a livable city, a vortex city or a city making progress towards sustainability.

RECOMMENDATIONS

Measuring the sustainability of cities presents many challenges. As with some of the world cities research, some of the data may not be readily available. This, however, appears to be a minor issue compared to the array of measuring approaches that are available. These approaches are based on different understandings of what constitutes a sustainable city.

I have argued previously that we cannot be complacent about processes that create “vortex cities” (McManus, 2005). Measuring is potentially a useful activity that can help in overcoming unsustainable practices, but it can also be used to create complacency. Of the three measuring approaches discussed above, the Ecological Footprint is structured in such a way that it is least likely to be reduced to meaningless data that simply aids further economic growth. The Ecological Footprint concept has its benefits, but it inevitably yields results that are a snapshot of the state of unsustainability and provides no recognition of the efforts to move towards sustainability. While efforts on one issue may be effective, this effectiveness may be concealed through the process of aggregation by increased unsustainable impacts on other issues. This can result in a demoralising scenario.

It appears that the most beneficial approach may be a Sustainability Indicator projects based on meaningful ecological measurements (air pollution, water use, energy use, and so on) that incorporate the components of Ecological Footprint analysis without converting everything into a single unit of land. These Sustainability Indicators could operate on two levels – first, the actual change in the environment and second, the sustainability initiatives that are being implemented to address the major environmental issues. This division inverts the Taking Sustainable Cities Seriously approach that privileges the existence of initiatives and postpones the actual impact of these initiatives (or other unrelated factors) that may result in increased sustainability. A two-tiered initiatives approach that privileges outcomes and recognises the importance of programmes and policies to achieve desirable outcomes, would integrate the two groups of indicators without conflating them. Communication, education and implementing appropriate processes are vital to

reduce the most unsustainable practices in Sydney, and in other Australian cities. While related, these sustainability initiatives should not be conflated with environmental change.

CONCLUSION

Despite the weaknesses in the world city literature, with the silence on environmental issues being very significant, there is much to be learned from this research for sustainable cities. The various attempts to measure world cities on the basis of particular functions, or their connectivity, has produced a body of literature that can be transferred into urban policy.

While acknowledging the contributions of authors mentioned in this paper and other contributors to sustainable cities thinking, it seems that the debates about measurement and implementing sustainability in urban policy have been undervalued in the literature on sustainable cities. This is certainly the case relative to measuring world cities.

The pursuit of sustainable cities in Australia is a significant challenge. As noted by Murphy and Wu (2001, 400), “among major metropolitan areas in Australia, Sydney most sharply represents the challenge of achieving sustainability, because of its large size and unique physical setting”. I would add that consumption patterns, and the desire to be seen as a world city in preference to being a sustainable city, are at least equally, if not more important, challenges to be faced. While the answers will vary between Australian cities (see McManus, 2005), there is a role for the largest and most influential cities such as Sydney to show leadership on this issue.

The first key decision to be made is whether we are willing to face these challenges. If the answer is yes, then there are questions about measurement. This paper has produced one approach to measuring sustainable cities that is feasible, integrates but does not conflate actions with outcomes, is ecologically meaningful and offers hope from an early stage in the movement towards sustainability without diminishing the physical challenges to be faced. Given the extent of the challenges, these attributes are crucial in any measuring approach for sustainable cities.

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