The Bush Capital—A Complex Urbanising Landscape

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abstract

To a large extent, we live in "yesterdays' cities" in the sense that many of the urban patterns that we see today—roads, buildings, land ownership etc—reflect the social, economic and technological decision making of the past. Understanding the role of time and the way that it conditions future urban options, we argue, is fundamental to the urban design professionals responsible for transitioning "cities of today" into the more sustainable "cities of tomorrow".

We take a view of cities as landscapes undergoing a continuous process of change known as urbanisation—a complex dynamic that is difficult to address through land use policies such as zoning. Decisions constrained by time (the development contract period), and space (the development site), tend to result in a continual shift in the responsibility of decision makers to determine the best outcomes for urban residents. To complicate matters further, it would appear that landscape planning practices and land use policy have not kept up with the "pace of time" and the evolution of landscape science and the constantly changing urban condition.

In this paper, the product of an emerging collaboration between a landscape architect and a landscape ecologist, we re-examine the nexus between landscape science and design as it relates to the sustainability and resilience of cities. To diffuse many of the common problems with conventional expressions of environmentalism, which invariably lead to meaningless debates about sustainable development, we use Canberra as a case study to argue the role for science in providing an objective and rigorous platform for formulating future urban options.

Introduction

Australia is one of the most urbanised countries in the world, with an estimated 93% of our population now residing in towns and cities (WUP 2003). It is clear that urban areas are, and are likely to remain, the principal environment with which most Australian's interact on a daily basis. As such, the process of urbanisation is at the forefront of defining human-environment relationships and landscape change.

In this paper, the product of an emerging collaboration between a landscape architect and a landscape ecologist, we investigate the nexus between landscape science and design as it relates to the future urban development and sustainability of Australia's capital city—Canberra. The genesis for this collaboration stems from the recognition that the very act of planning and designing future urban landscapes is a creative pursuit that must also draw upon scientific knowledge (Corry and Nassauer 2005). With most major Australian cities currently embroiled in the process of revisiting their urban planning and growth strategies—for example, Melbourne 2030, Sydney Metropolitan Strategy, Brisbane SEQ, Perth Network City, Adelaide Strategic Plan (Newman 2005)—there has never been a better time for urban design professionals to strengthen the link between landscape science and design.

When looking at all these urban planning documents, it soon becomes apparent that the cities of Australia's future already exist—to the extent that they have already been imagined and prescribed. Canberra is no exception, with the recently completed Canberra Plan. Australia's future cities are therefore unlikely to be new metropolises emerging out of the landscape as Canberra did less than a hundred years ago. They will be the retrofitted, renovated cities of today. The rules by which this process of urbanisation will continue to unfold are now deeply embedded in the laws and regulations that have developed through Australia's democratic and bureaucratic process. Canberra is a rather unique city in Australia in that it is entirely a product of this planning, design, and regulatory process.

Increasingly, in Australian cities, we lay witness to overly prescriptive and narrowly defined design codes and regulations that discourage development proposals that digress away from the known vernacular. Proponents of a less regulated development industry are all too often ready to lament the lack of imagination, and risk aversion of public officials, yet are unwilling to offer alternative models. We believe the focus of change should not be to reject the regulatory process in favour of a market driven free for all, but to explore how time, new technology and information is a catalyst for change. The development of new knowledge about how we use, and how we perceive urban form and the "space" it creates, is critical to reducing the lag between imagining future urban options, advocating new styles of development, and its implementation through the development process. In this paper, we focus our interest on the "non-built" spaces of our cities, arguing that the city is an urbanising landscape in which the pattern of "space" is functionally related to the health and well-being of its occupants. By taking a more scientific approach to analysing urban form, we suggest opportunities will arise for the design professions to investigate and test new ways of changing our urbanising landscapes in line with the changing needs and requirements of urban populations. This is not a quest to discover the utopian urban form, but rather a challenge to urban landscape planners and architects to view the urban landscape as a complex dynamic "space" constantly changing and evolving over time.

In this regard, we also see the process by which development occurs as severely limiting opportunities for exploring new development options. This is because most of the focus on the decision-making process is during the planning and construction phase, while the social, economic and environmental impacts of these decisions occur during the operational life of the city. This ongoing process of urban "maintenance and renewal" is often seen as something beyond our control and not a primary concern for planners and designers, yet it has the greatest impact on the urban landscape and its occupants. The resulting worst-case scenario of this imbalance is a poor relationship between spaces and the users of that space. In the case of human health, this landscape pathology has led public health officials to coin the term "obesogenic environment" referring to the struggle to reduce obesity in the context of an urban environment that promotes high energy intake and sedentary behaviour (Swinburn et al. 1999).

Landscape science and design practice

At the crux of this paper is an argument for better tools and capability to evaluate the impact of all phases of urban development—design, planning, construction, maintenance and renewal—shifting our thinking from the notion of a stable "built environment" to one of a complex dynamic urban landscape comprising "spaces" which are alive and adaptive (Barnett 2002). While we acknowledge that planning and designing cities of the future is difficult and shrouded in uncertainty (Antrop 2005), there appear to be a number of opportunities for the science of landscape ecology to facilitate a new wave of innovation in landscape planning and design (Corry and Nassauer 2005). The notion of coupling science with design is certainly not new, yet despite several books published on the subject (e.g. Dramstad et al 1996; Wilson et al 1998; Lyle 1999; etc) we find the question remains—how much landscape ecology actually finds it way into urban decision making or onto landscape plans and designs? So although much has been written more needs to be done if products of landscape ecology (theory, methodology, tools, etc) are to be integrated into planning and design practice (Hobbs 1997).

One way of making progress, we believe, is by viewing landscape "designs" as expressions of hypotheses about the effects of landscape change (Corry and Nassauer 2005). Designing landscapes, after all, is not a new concept, in fact humans have been designing landscapes ever since they learned how to harness fire and cultivate plants. The difference being, much of this design was inadvertent or unintentional. Thus, the objective of a union between landscape ecology and landscape architecture is to use as much ecological understanding as possible to intentionally create positive landscape change.

Reconciling different goals and timeframes

There are increasing calls for greater collaboration among landscape-oriented research and design practice (Tress and Tress 2001). At face value, this seems relatively straightforward, as landscape science is about generating new knowledge and understanding of the linkages between landscape pattern, structure and process, while landscape design is more about optimising the use of space and improving environmental conditions (Antrop 2001). However in reality, fundamental differences in goals and timeframes render the application of landscape science to the multiple phases of urban development—design, planning, construction, maintenance and renewal—not easy or straightforward.

For instance, with respect to goals, the criteria for success may differ substantially between landscape ecologists and landscape architects. Hobbs (1997) suggests that in many cases, design prescriptions may be put forward that address landscape structure, but often without adequate consideration of landscape function, or these designs simply assume that if the landscape looks "ok", that it will function "ok" too. This is where it is important to understand the design aim—to satisfy a set of aesthetic values or provide a suite of ecological functions? In some cases it may be possible to achieve both outcomes, but in others, the aims may be mutually exclusive, for example, specific ecological functions may require specific landscape configurations. As noted by Hobbs (1997), clear decisions about what society wants or expects from its urban landscapes are vital. Landscape science therefore has an important role in informing this decision making process on urban landscape change.

Differing timeframes are often what influences this decision making process and the range of possible future landscape options. This is because, as mentioned previously, development decisions are often constrained not only by time (the development contract period), but also space (the development site). As such, the most desirable landscape designs (from an ecological perspective) may be inappropriate because of insufficient time and financial resources, or the biophysical constraints of the development site (e.g. size, location, etc) don't allow for the creation/restoration of the desired ecological functions.

Translation and communication of science

The term "landscape" is commonly used in scientific research, design practice, as well as everyday language (Tress and Tress 2001). It is thus a term with multiple definitions and meaning. Greater use of scientific knowledge in landscape design will depend on good communication and reciprocal understanding. What we find is that researchers operating in the natural sciences often saw humans as apart from, rather than a part of landscapes, and if they did include humans, it was often only in a superficial way ignoring cultural meaning and psychological connection with landscape. Furthermore, in the specific case of urban ecology, Alberti (2005) reports that of the few ecologists that have studied urban areas, most simplify their consideration of urban form and structure to such a degree, that the results or their findings are too generalised or abstract to be of practical use to design professionals.

As noted by Antrop (2001), for landscape ecology to be successfully implemented in practical applications of landscape planning and design requires that the products of landscape ecology can be translated and communicated in a way that can be readily taken up by design professionals, who often have many more issues to consider than just the landscape itself. A key ingredient for success in this regard is communication that is both two-way and interactive (Antrop 2001). What this means, is careful consideration of what is communicated so as to facilitate development of shared understanding to move beyond our own familiar ways of thinking, thus bridging the gap between science and design.

Landscape ecology and landscape architecture are the products of their own epistemologies. As such, if planners and designers are to find the theories, methods and tools of landscape ecology useful, they must be both reliable and valid at relevant scales of decision making (Corry and Nassauer 2005). Landscape pattern indices are showing considerable promise in this regard. With the increasing importance of geographic information systems (GIS) and remote sensing (RS) in landscape ecology, new information and tools are emerging that will allow the visualisation and testing of future urban landscape development scenarios (see Haines-Young et al 1993; Johnston 1998; Perlman and Milder 2005). Being able to test these scenarios for their social, economic and ecological consequences can now be done relatively quickly on a personal computer, providing the ability to move beyond simply repetition of those "tried and true" urban landscape patterns that so far, have withstood the test of time.

Urban Complexity and Decision-Making

Urban planners and managers often know quite a bit about specific components of the urban system—transport, infrastructure, housing, etc—but when it comes to the way these various parts interact with each other, often only relatively simple cause and effect relationships can be described. This is not surprising, as engineers, scientists, architects, city planners, managers, bureaucrats, and politicians rarely have the opportunity or means by which to adequately consider all urban interactions and interdependencies. Many are also unaware their decisions and actions can directly and/or indirectly affect other related components of the urban system and its surrounding region. Different people study different parts of the urban system, with all receiving training in disciplines that share little in common. Several authors are now beginning to recognise this "systems failure" and are changing our view of cities to one of "living systems"—dynamic, connected, and open—constantly evolving in response to internal interactions and influence of external factors (see Newton 2003; McManus 2005).

Urbanisation as a driver of landscape change

In the next year or so, the United Nations predict that for the first time in history, more than half the world's population will live in urban rather than rural areas (WUP 2003). Furthermore, most of the world's future population growth is expected to occur in cities, primarily in the developing countries of Africa, Asia and Latin America. Many cities are changing faster than we can understand the diverse forces conditioning these changes. The pace of time is particularly important here. Many cities around the world have grown exponentially since the industrial revolution, and again after the Second World War, where transition to automobiles transformed urban transportation and mobility (Antrop 2005).

Up until recently, most ecologists had ignored the study of urban areas tending to focus on those more pristine areas with minimal human influence. However, in the 1990s the new field of urban ecology gained momentum, partly in response to the fact that we actually knew very little about the ecology of cities, but also due to a recognition that people do not only influence urban landscapes, but that urban landscapes, in turn, influence people as well. This relationship between people, their biophysical environment, and their shared history and culture, implies that landscapes develop in a co-evolutionary process with people (Lineham and Gross 1998, Meurk and Swaffield 2000, and Tress and Tress 2001).

Urban landscapes and their temporal dynamics

There is a view shared by many people that landscapes are stable, simple systems, that hardly change over time, much like the geology that lies underneath them (Perlman and Milder 2005). Landscapes are not static, however, but subject to ongoing change (Tress and Tress 2001). Adaptability and change are in fact inevitable. The process of landscape change and development is intrinsically linked through the passage of time, and a product of the dynamic interaction between both natural and cultural forces. Urban landscape change is often rapid and intensive. Urban design professionals aim to modify urban landscapes by adapting land use and spatial structure to the changing needs of society.

It is hoped that future inquiry into landscape change can help to reposition the development debate away from a narrow view that precludes a close functional relationship between the building in space and the resultant loss of open space. In doing so, it proposes that decisions about developing cities of tomorrow will be more concerned about the continual creation destruction, and recreation of spaces in a system so that the relationship between the pattern of human use and the distribution of structures and spaces follows a closer functional relationship, embedded not in ideas of permanency but in ideas of dynamic fluidity. The application of this concept requires further investigation into the spatial and temporal scales of change caused by environmental, economic and social catalysts. The authors are currently proposing to undertake such a study of the bushfire affected suburbs of southwest Canberra.

This is not a new concept, the genus loci of a city has a long tradition of "cyclic building development by repletion, transformation, clearance, and even urban fallow, before a new cyclic phase is initiated" (Jiven and Larkham 2003). This cycle of change is worthy of consideration, as it is not a call to demolish and re-build with an enlightened vigour indicative of mass urbanisation in parts of Asia. Rather we acknowledge that all parts of a city are dynamic and susceptible to change, and without knowledge of how the parts contribute to the urban pattern we risk diminishing the quality of a city. Ironically, the regulation designed to prevent this deterioration also severely limits alternative options.

A final important characteristic of time is the period involved with respect to decision making. Many academics consider that when talking about sustainable development that we should be thinking of at least several human generations, or more than a century. With planning and political decisions on the other hand, we are typically dealing with considerably shorter time horizons—from hours to a few years, but rarely more than a decade. Individuals and families living within an urban area often have a similar view of time, although often giving priority or attention to slightly longer-term decisions. What this means, is there is a disconnect between timeframes for sustainability and decision making.

The Bush Capital—A Case Study of Canberra

Canberra provides a unique opportunity for exploring urban complexity, because it is one of the few fully planned cities in the world, the design of which was subject to an international competition in 1911. Extensive tree planting was a feature of Canberra's early development and this has largely continued to present, providing one of the main reasons why the city of Canberra has become known as the Bush Capital of Australia (Brack 2002). Modern Canberra now has a population in excess of 300,000 people that live in this largely well-treed and spacious urban environment (Banks et al 1999).

Ecological infrastructure and bioregional context

Ecological infrastructure can be defined in simple terms as the ecological patterns, structure and functions that support biological life. In the case of cities, this ecological infrastructure is best examined at the catchment scale, as catchments not only integrate both terrestrial and aquatic ecosystems, but also represent tangible "real" boundaries that everyone can see and relate to. In the case of Canberra, it is located in the Upper Murrumbidgee Catchment within the Southern Tablelands of New South Wales. The Murrumbidgee River is part of the larger Murray-Darling Basin System.

A key component of the ecological infrastructure of Canberra is its vegetation. Figure 1a shows the results of a predictive vegetation modelling exercise undertaken for Canberra and highlights the pattern of vegetation cover of the ACT Region prior to European settlement. In Figure 1b, we have used the same map, but masked out the current pattern of land use to show the pattern of predicted vegetation that remains today. While there are other present-day vegetation maps that could be used as a surrogate for Figure 1b, the predictive nature of the analysis allows pre and post disturbance comparison of biodiversity impacts in the ACT. Not surprisingly, there are clear biases in this impact with woodland communities found on lower slopes heavily disturbed for pastoralism and agriculture.

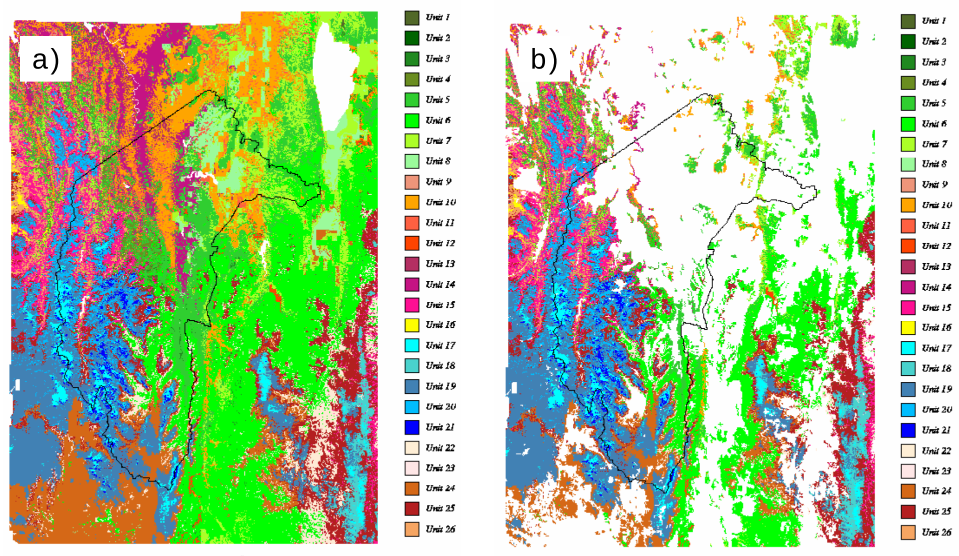

Figure 1: (a) Pre-European vegetation patterns in the Canberra region as predicted by CSIRO modelling. (b) This is the same image as that to the left, but is masked using Landsat imagery to exclude the areas of vegetation that have been cleared since European settlement. As such, it represents the Present-day pattern of predicted vegetation. Of course, there are actual vegetation maps that could be used as a surrogate for our map on the right, but the consistency we gain by using the modelling approach allows for a comparison of "before" and "after" impacts. Source: CSIRO Wildlife and Ecology (1996).

In terms of the utility of this information for landscape architects, it is at such a broad scale that only very general abstractions can be made, yet nevertheless, it provides novel insights into what vegetation does/did occur in Canberra and importantly where in the landscape—fundamental bioregional context.

From an urban landscape perspective, this information could be incorporated into the development of landscape plans and designs in two key ways. Firstly, by understanding the pre-European pattern of vegetation in Canberra, revegetation strategies and landscape treatments could be adapted to enhance biodiversity by reconstructing key aspects of former vegetation patterns. Secondly, moving beyond the retrospective, we can undertake regional significance analysis to inform development decisions of the impact on remaining vegetation and fauna habitat. For instance, we can determine what extent of original vegetation cover remains, and through the incorporation of expert fauna opinion, assign a probability of finding certain fauna that may utilise this vegetation as a habitat resource. In other words, we can use these flora and fauna predictions as objective baseline information for informing decisions and associated tradeoffs regarding proposed urban development—i.e. if we disturb **X** hectares of this vegetation type, only **Y** per cent will remain in the region, impacting fauna species **Z**.

Measuring urban open space and ecological function

Starting with an understanding of the bioregional context of a city is important, but moving to finer scales such as neighbourhood are perhaps where the biggest gains are to be made in terms of integrating landscape ecology with landscape architecture. In particular, our interest is in the patterns of "non-built" space, as we continue to see decisions about these spaces made in the absence of any substantive knowledge of flow-on consequences. By using remote sensing to identify and classify "non-built" spaces, we can look at spatial pattern (regardless of tenure) and interrelations (Figure 2).

Information on "non-built" space is difficult to access, quantify and compare (Newton et al. 2001). This is largely a result of the different ways urban planning authorities around Australia collect and classify this information. It is surprising how little is known about patterns of "non-built" space in Australian cities—how much there is and issues of distribution and access. In Figure 2, the results of a new generation of satellite imagery are displayed which offer considerable promise in rectifying this situation. Figure 2a is a remotely sensed image of equivalent resolution to aerial photos. The benefit of remote sensing over aerial photos, however, is in the multi-spectral information that they contain. For instance, in Figure 2b, patterns of vegetation have been extracted from the first image (Figure 2a), by separating high reflectance materials (e.g. steel, concrete, glass) from the low reflectance of vegetation. In Figure 2c, we then compare the resultant map of total urban vegetation (Figure 2b) with what has been designated as public open space from the more conventional cadastral based methods.

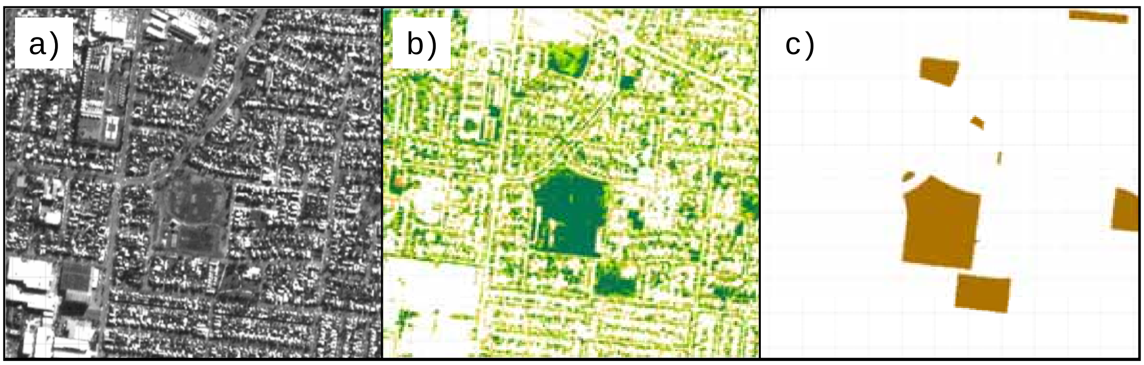

Figure 2: (a) Unclassified remote sensing imagery clearly showing urban infrastructure. Brighter tones associated with high levels of reflectance (such as roofs) and darker areas of vegetation and asphalt surfaces. (b) Remote sensing image classified using the Normalized Difference Vegetation Index (NDVI). Light green areas are irrigated grasses, dark green areas un-irrigated grasses and shrubs, while the tan colour represents tree cover. (c) Designated public open space derived from the cadastre for the same area.
Source: Barnett (2005) with Quickbird Image provided by DigitalGlobe and Sinclair Knight Merz.

By analysing resident's attitudes towards "non-built" spaces (i.e. those presented in Figures 2b and 2c) using qualitative research methods such as grounded theory and critical discourse analysis, we can then model a range of options for a future urbanised landscape that takes into consideration both opportunities for better landscape design, and threats such as providing inadequate "non-built" space for a suburb. By taking this approach we hope to distance ourselves from politicised debates about the value of open spaces, instead focusing on the relationship between people and their urban landscapes.

An innovative study by Brack (2002) has gone one step further and looked at the ecological functions that Canberra's urban vegetation provides. With a particular focus on the potential of the urban forest to reduce energy consumption and ameliorate pollution in the city, these authors estimated the value of this service at between US$20–$67 million (or $66–$223 per resident) for the period between 2008 and 2012 (Brack 2002). Thus urban decision making must take account of these values, which when including other ecological services such as water purification, flood mitigation, etc, will be substantial.

Why look at the "non-built" spaces?

Our key argument is that the future development of cities in Australia is likely to be focussed on urban infill, placing increased pressure on regulators to accommodate more people into the existing suburban fabric. In order to do this successfully, they need to know the pattern of "non-built" space in a suburb, and what the resident's attitudes are to that pattern. Canberra's recently published spatial plan adopts a containment strategy as part of its future plan. Containment as described by the spatial plan is a strategy to limit the development of new housing to within fifteen kilometres of the city centre. This is seen as a response to the need to contain sprawl (Canberra Spatial Plan—ACTPLA 2004). The idea of containing cities has emerged out of the anti sprawl debate which began in Australia in the mid seventies in response to suburban development in areas such as Western Sydney (Darbas 2002).

In a complex urban system, almost all spaces can be occupied, appropriated or adapted by the actors in the system. The numbers of "non-built" spaces that are publicly available for this interaction are reduced significantly once restrictions imposed by property rights, public safety, security, and other third party interests are imposed. So if we define "non-built" spaces for public use by removing those that are restricted by legislation, then the left over is a large poorly understood mosaic which is vigorously defended by interest groups who then seek to give purpose to these spaces for the benefit of conservation or development without really understanding how they contribute to the broader urban system. This polarises the "non-built" space argument, and offers only two definitions for these spaces by advocating for unrestrained (meaning public) instead of restricted (meaning private) space. This argument is deeply embedded in stories such as, civil liberties, and government's roles as stewards of public spaces. While these are clearly important arguments for the purpose of advocacy and public interest, they cloud scientific inquiry of the ecology of "non-built" spaces and functions they provide.

Understanding the publics' attitudes and behaviours toward "non-built" space needs to be investigated in more rigorous detail. Rather than just asking respondents to describe their use of open spaces, it is important to discover the narratives that reveal their perceptions of the patterns of all "non-built" space. For example if residents were asked to describe how they felt about an individual space, whether it is a park, verge, backyard or even a tree, the respondent would focus on its function, its use, or appearance. However if you asked how the pattern of spaces, (parks, verges, trees) in their suburb made them feel about living in that suburb, you could begin to investigate a more discursive analysis of peoples attitude to the patterns of all types of spaces as part of the suburban landscape. By using qualitative data analysis such as grounded theory we hope to be able to generate a level of confidence about how "non-built" space is defined by people's attitudes rather than pursuing a more normative approach. We believe this information can be incorporated into development plans that focus on the structural relationship between "non-built" spaces and the users of that space that is potentially more informative than the current "constrained focus" of prevailing urban environmental planning policies.

Discussion of designated and "non-built" spaces

The reason for looking more closely at "non-built" urban spaces is to ask whether a city of the future can learn from them, as spaces lacking clear vision, they are capable of being adapted to suit the most ephemeral needs of the time? Or is the risk that without some sort of vision and structure, these spaces are vulnerable to the excesses of self-interest that produce sites with very little reference to each other?

Designated spaces are designed for a particular purpose. When these spaces are public they are designed for the common good, or community. They also become symbols of respect for common values, and sites of social interaction where behavior is bound by positive mutual restraint (Olwig 2005). The common was traditionally thought of as a shared resource where the use of the resource was also managed by the moral imperative. However the ancestor of the village common is public space and the subjective moral conscience of mutual restraint has been replaced by the legal imperative. The need for this legal underpinning of land use comes as a result of a lack of mutually held understanding as to how a public resource can be used by an individual to the extent that it doesn't disadvantage other users and future users of the space. This is known as the tragedy of the commons. Not only did this concept give rise to our understanding of how public space is managed as a public good, but also how the economy is largely governed by the assigning of property rights, that is to make land private, thus eliminating the public goods dilemma. So space has become a contested territory, "a nexus of community, justice, nature, and environmental equity" (Olwig 2005). Space is never fully public, and is designated by legislation and designed for predicted uses. Public space can also become contested territory, especially when it serves to act as a defacto forum for competing social, environmental, or economic interests of stakeholders, governments and the wider community. However public spaces are known (but not always contested), and public behavior in those spaces is not held in the assigned properties of that space, but in the mutually held and understood rules that are culturally embedded in understanding and interactions with that space (Harrison and Dourish 1996).

Public spaces not designed or designated for public activity fall outside the commonly understood rules of behaviour and understanding. They are occupied places and as such have meaning, but because they are not formally designated (though they are described) their inclusion in planning methods that define space by function does not occur. For example a public park clearly identifies boundaries of behaviour through its defined purpose, commonly held expectations and understandings of interaction. However a roadside verge, a green corridor or drainage easement have narrowly defined uses that prefer utilitarian descriptors and ignore situations where appropriation and adaptation for legitimate uses occur. Yet they have social relevance, aesthetic value and functionality. (Corner 1991)

So although these "non-built" spaces are often assigned a singular function they can be both engaging and alienating places. Geographers, sociologists, and ecologists all explain the value of these spaces within the discourse of their own fields of expertise. Each one explaining a use or value based on their own empirical research. The question remains, however, are these spaces gaps in the rational design methodology of the city plan, or are they the forgiving spaces that due to their lack of regulatory rigour provide an unrecognised opportunity for visual relief and opportunities for appropriation, as required over the course of time by neighbouring residents and other actors in the urban landscape?

Summary and Conclusions

Urban planning and design is largely concerned with where and how people live their lives. It is the code by which urban development decisions are made. While largely a creative pursuit there are substantial opportunities for integrating with landscape science. Particularly, given the renaissance in urban planning in Australia as evidenced by the number of cities who are in the process of revisiting their urban planning and growth strategies. A common feature of all has been an emphasis on urban infill and the containment of future urban growth. What one can conclude from this is that Australia's cities of the future are unlikely to be new metropolises, but rather retrofitted, renovated cities of today. Our argument is that for infill and containment strategies to be successful, urban design professionals must understand how space is patterned in cities and how these patterns influence urban quality of life. Developing new knowledge about how we use, and how we perceive urban form and the "space" it creates, is critical we suggest, to reducing the lag between imagining future urban options, advocating new styles of development, and implementation through multiple phases of the development process. What is required is a shift in thinking from cities as stable and predictable, to complex and dynamic urban landscapes comprising "non-built" spaces capable of being adapted to requirements of the time. °

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